ENVIRONMENTAL/ENGINEERING GEOLOGISTS

HGS ENVIRONMENTAL/ENGINEERING COMMITTEE DINNER MEETING MARCH 19, 1990

Time: Dinner 5:30 p.m., Meeting 6:30 p.m.

Where: Ninfa's (Buy your own meal)
3601 Kirby (Kirby at Richmond)

KERRY J. CAMPBELL—Biographical Sketch

Mr. Campbell holds BS (1968) and MS (1975) degrees in geology from the University of Massachusetts, Amherst. Mr. Campbell is a Registered Geologist in Alaska, California, Georgia, and Oregon; a Certified Engineering Geologist in California and Oregon; and a Certified Professional Geologist. He is a member of the American Institute of Professional Geologists; the International Association of Engineering Geology; the Association of Engineering Geologists; the Houston Geological Society, the Geological Society of America; and Sigma Xi. Mr. Campbell is the author or co-author of some 30 technical papers in geology, geophysics, and engineering geology. His most recent paper is "Integrated Geophysical and Geotechnical Deepwater Site Investigations."

Kerry J. Campbell is Geology Manager and Marine Engineering Geologist with Fugro-McClelland Marine Geosciences, Inc., in Houston. Mr. Campbell is responsible for consulting, project supervision, and business development for various types of offshore engineering-geological and geophysical projects. Mr. Campbell joined McClelland Engineers' Ventura Division as an engineering geologist in 1977, and became Geologist Manager in 1981. In 1985 he transferred to McClelland's Houston Division. Prior to joining McClelland, Mr. Campbell held positions with BBN Geomarine Services Co., D'Appolonia Consulting Engineers, Geophysical Survey Systems, and the U.S. Geological Survey. Mr. Campbell has some 20 years of professional geological and geophysical experience. His experience includes the engineering-geologic interpretation of high-resolution seismic and soils data acquired in various areas off North and South America, Africa, Asia, Australia, and Europe. Most recently, Mr. Campbell has been principal engineering geologist for multi-disciplinary studies of seafloor stability of deep-water sites on the upper continental slope in the Gulf of Mexico and elsewhere. He has also directed a series of regional studies for which geophysical and geotechnical data were integrated to develop predictive geologic/soil models for large parts of the Bering, Chukchi, and Beaufort Seas.

DEEP WATER GEOHAZARDS AND ENGINEERING GEOLOGY, NORTHERN GULF OF MEXICO

The engineering geology of the upper continental slope in the northern Gulf of Mexico is probably among the most complex of any offshore areas in the world. It is far more complex than the engineering geology of the continental shelf with the exception of the Mississippi Delta area. This deep-water complexity is largely due to the recent and ongoing uplift of numerous salt diapirs and can have an adverse impact on siting and design of petroleum production facilities. Production facilities recently have been installed in water depths of up to 1760 ft. in the Gulf of Mexico, and represent investments of hundreds of millions of dollars. A thorough understanding of the shallow geological and substrate conditions is needed for the safe and economical development of these deep-water facilities.

Geologic conditions on the continental slope that can cause engineering difficulties include: 1) steep and potentially unstable slopes of 15 degrees or more; 2) irregular, commonly rocky, topography with sharp relief ranging from a few feet to several tens of feet; 3) active faults with seafloor scarps ranging up to more than 200 feet high; 4) both modern and ancient landslides covering large areas; 5) gas hydrates (solid, ice-like mixtures of gas and water) that may be subject to reduced shear strength and thaw settlement when heated; 6) seafloor erosion of tens to hundreds of feet of sediment; and 7) substrate conditions ranging from weak, underconsolidated sediments to rock. The role of the marine engineering geologist in a site investigation is to: 1) describe in detail those potentially troublesome geologic and substrate conditions; 2) assess their potential engineering significance; 3) present results in terms directly useable by design engineers; and 4) provide recommendations for final siting and foundation design.

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Deep-water high-resolution site surveys require special geophysical equipment and are operationally more complex than conventional shallow-water high-resolution surveys. Several types of tools are used to define water depth and seafloor topography, relationships among substrates, and geologic conditions. The suite of tools that has been used on many deep-water surveys includes: narrow-beam water-depth recorder with velocimeter calibration; combined deep-tow side-scan sonar and 3.5 kH_z subbottom profiler with acoustic navigation to show the seafloor and geologic conditions to penetrations of up to about 200 feet; intermediate-penetration profiler (minisparker, for example) to show conditions within the foundation zone (to penetrations of about 500 feet); and deep-penetration profiler (sleeve guns with digital recording, for example) to show deep-seated faults, buried landslides, and gassy sediments.