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Testimony
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In keeping with current administration interest in the establishment of a national energy policy, research relating to advancements in energy resource technology is critical to our long term economic strength and environmental responsibilities. The importance of research in science and technology are well appreciated in the oil and gas industry and pertinent government agencies as keys to improving efficiencies in exploration, production, and conservation of resources. Such research is also imperative in providing good stewardship for the environment and accessing various new non-conventional energy sources.

It has long been recognized, in a general sense, that there are divisions of research which are best conducted by industry, and others best conducted by government. Traditionally, in the energy industry, in-house research relates to areas of proprietary interest, improving operational efficiencies, etc. Government sponsored research has been most successful in addressing long term and high risk areas beyond the short term economic interest of industry imposed by market realities. A good current example of appropriate government support for research is the Department of Energy (DOE) and the Department of Interior (DOI) gas hydrate research programs in the U.S. EEZ. Other new and related research partnerships involving industry and government include the Gulf of Mexico Joint Industry Program.

The program I represent is The Center for Marine Resources and Environmental Technology (CMRET), based at The University of Mississippi, sponsored by the DOI, Minerals Management Service (MMS). The principal mission of the CMRET over the past few years has, and will, for the foreseeable future, focus on the Gulf of Mexico (GOM) continental slope, shallow hydrocarbon system, within the hydrate stability zone (HSZ). The HSZ on continental margins is pressure/temperature associated, occurring within appropriate thermodynamic parameters. Further, it typically relates to a hydrocarbon supply, a significant accumulation of sediments, and active faulting, which provides migration routes from source to the HSZ section. In the GOM the HSZ is encountered at water depths of about 450 meters and below. Thickness of the HSZ within the sedimentary section is dependent on the thermal gradient with influence from a number of variables.

The sea floor of the HSZ is a different world from that which we are familiar in other under sea areas. It is a region where hydrocarbon gases, mainly methane, may erupt violently from sea floor craters, much like “Old Faithful” in periodicity and scale. In less active areas, lesser volumes of gas may be chilled sufficiently to form ice or hydrate mounds as they permeate host bottom sediments, cooled by cold bottom water in the range of 4-7 degrees C.

The dynamics of this peculiar system are further complicated in the GOM by the rapidity at which surficial hydrate occurrences may form and dissociate; in some cases, in days and weeks. On the other hand, more massive, deep seated hydrate deposits may form mounds on the sea floor, and host elaborate chemosynthetic communities. These deposits seem more stable, and are revealed by biologic evidence to have longevities in the hundreds of years. Other phenomena, referred to as "shallow water flows", with probable links to the hydrocarbon system are highly pressurized gas/water charged sands, occurring as thin, linear sheets within the shallow sea floor sediments. Unintentional encounters with "shallow flows" in deep ocean drilling activities in the HSZ have been at most, proven very costly, and at least, a time consuming nuisance.

The hydrocarbon system of the HSZ poses both problems and promise. Conditions of sea floor instability effected by hydrate phase shifts and shallow flows can and do present serious and costly hazards for bottom founded installations and exploratory drilling in the deep GOM oil and gas province. Also, on the negative side, mass expulsions of methane into the sea convert/oxidize to CO_2, and together with some methane directly added to the atmosphere, contribute substantially to the greenhouse gas inventory. On the positive side, these ubiquitous gas hydrates of the GOM, HSZ and elsewhere in the U.S. EEZ, represent a very considerable potential energy resource for the future, which has gained serious attention within the nation's research community, industry, and appropriate government agencies.

Presently, the CMRET is managing an investigation of the shallow hydrocarbon system and related phenomena in the HSZ of the northern GOM. The project is a multi-year endeavor, involving a number of academic institutions with participation and support from government (DOI and DOE) and industry. The approach is multi disciplined, involving the principal fields of science and engineering. The goal is the establishment of a sea floor observatory at a selected site within the HSZ, representative of the features and activities typical of a dynamic shallow hydrocarbon system. The purpose will be to monitor and study the system and its related phenomena. From this study, models will be attempted to better understand, recognize, and predict the presence or onset of conditions that might place at risk industrial activities/installations. Of equal importance would be consideration of potential impacts on the environment, for better or worse (from an anthropogenic perspective) on scales both regional and global.