AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

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Ancient Hydrocarbon Emission Sites, North America Western Interior Cretaceous Basin Cold-Seep Mounds (Tepee Buttes) - Geographic, Stratigraphic, and Age Distribution

Western Interior Cretaceous (WIK) basin cold-seep mounds or tepee buttes, which are anomalous carbonate bodies within basinal shales, are reported to be sites of hydrocarbon emissions (methane) during the Late Cretaceous. Stratigraphic sleuthing has revealed WIK cold-seep mounds to be narrowly restricted in their geographic, stratigraphic, and age distributions. The geographic distribution ranges from the northern Black Hills southward to the Texas-Mexican border, in a narrow band east of the front-range of the Rocky Mountains, roughly between 1018 30" W and 1058 30" W longitude. The age distribution of cold-seep formation in the WIK basin consist of five discrete intervals during a time span of approximately 14 million years, from the basal Campanian through the Early Maastrichtian.

The earliest and most southern WIK cold-seeps are reported from the upper Ojinaga Formation, West Texas, within basal Campanian Gulf Coast biozone *Submortoniceras tequesquitense*. Later cold-seep mounds are reported from the central WIK basin (Black Hills to Colorado/New Mexico border) within the Pierre Shale. These occurrences are distributed within four intervals from the Middle Campanian through Early Maastrichtian within the WIK ammonite biozones of: 1) *Baculites perplexus* and *B. gregoryensis*, 2) *B. scotti* through *Didymoceras cheyennense*, 3) *B. reesidei* through *B. eliasi*, and 4) *B. grandis* and possibly *B. clinolobatus*. Comparisons in the geographic and temporal distribution of central WIK basin cold-seep mounds to subsurface structures, basinal subsidence patterns, and strandline position, suggest an association between cold-seep formation and changes in basin tectonics, western strandline migration, and the possible delineation of the forebulge region.