MEETINGS

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JAMES M. RINE—Biographical Sketch

Jim Rine is a Senior R&D Geologist for NL Erco, a division of NL Industries, Inc., in Houston, Texas. He received a B.S. and a Ph.D. from the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences. His doctorate degree in 1979 involved study of modern coastal sediments along the coast of Surinam.

From 1979 to 1983, he was a Research Geologist for Cities Service Company in Tulsa, Oklahoma where he studied onshore and offshore sediments in Brazil, Argentina, Colombia, and the North Sea. In addition, he completed a detailed study of Holocene sand ridges on the continental shelf of New Jersey. Jim joined NL Erco in 1983, where he has been involved in extensive reservoir analysis of cores from wells in the Gulf of Suez and elsewhere in Egypt. He has also completed a regional study of Miocene clastics in the central Gulf of Suez.

Jim published the results of his work in the **Journal of Sedimentary Petrology** along with Bob Ginsburg. He has produced numerous short papers, seminars and other company reports. He is a member of AAPG, SEPM, and the International Association of Sedimentologists.

EFFECTS OF RISING SEA LEVEL ON FACIES DISTRIBUTION WITHIN THE CARDIUM FORMATION OF WEST CENTRAL ALBERTA, CANADA - A MODEL FOR OTHER SHALLOW MARINE SAND BODIES IN THE ROCK RECORD

A relative rise in sea level during Late Turonian or Early Coniacian time appears to be a major factor controlling the distribution of depositional facies within the Cardium Formation of west-central Alberta. Sea level variations not only controlled deposition of the two main subsurface units of the Cardium, the regressive Cardium Sand unit and the overlying, transgressive Cardium Zone, but sea level changes also controlled distribution of lenticular sandstone/conglomerate bodies that make up the majority of reservoirs within the Cardium Formation.

Both the Cardium Sand and the Cardium Zone are more sand-rich in the western half of the study area and both have continental deposits in the west and marine deposits in the east. The Cardium Sand, which consists of a laterally extensive sheet of sandstone, was deposited primarily as a strand plain. It averages 9 meters thick, and extends from the foothills of the Rockies eastward over 80 kilometers to where it thickens (up to 26 meters) and abruptly pinches out into marine shales. East of this pinchout are lenticular bodies of sandstone and conglomerate that are meters thick and were deposited in an innershelf setting. These bodies which make up the major reservoirs within the Cardium are only found along or east of the edge of the sand sheet. The overlying Cardium Zone consists of continental or marginal marine sediments grading up into marine shales and sandstones, except in the extreme northwestern edge of the study area where the sequence is marginal marine to continental and in the eastern half of the area where the sequence is all marine shales.

Many factors could have produced this distribution of facies, but a relative sea level rise is considered to be the most plausible. Other possible controls include a sea level fall, paleotopography, or a drastic climatic or hydrologic change within the environment. How a relative sea level change could affect Cardium deposition is as follows: 1) during a gradual sea level fall or still stand, the sandstone sheet of the Cardium Sand was deposited as a prograding strand plain; 2) after a slight rise in sea level (5 to 10 meters), progradation of the strand plain ceased and its seaward edge was reworked; 3) reworking of the eastern edge of the strand plain concentrated sand and pebbles that were transported seaward and formed into shelf sandstone bodies; 4) with an increase in the rate of sea level rise, the Cardium Sand unit was inundated and deposition of the shale-rich Cardium Zone unit began.

Relative sea level changes, whether they be due to eustascy, subsidence or local tectonics, are major controls on nearshore deposition. Relative sea level changes have affected deposition of the Viking Sandstone (Jurassic), the Muddy, Tocito and Gallup Sandstones (Cretaceous), and Holocene sands of the Gulf Coast and the eastern continental shelf of the U.S.A. An examination of the Cardium Sandstone and these other examples shows how sea level changes can be recorded in the rock record.