Facies interpretations and lateral variability based on correlation of conventional core in the Logan Canyon and Missisauga formations of the Scotian Basin

K.M. GOULD[1], D.J.W. PIPER[2], AND G. PE-PIPER[1]
1. Department of Geology, Saint Mary's University, Halifax, Nova Scotia B3H 3C3, Canada <075353g@acadiau.ca> ¶ 2. Geological Survey of Canada (Atlantic), Bedford Institute of Oceanography, P.O. Box 1006, Dartmouth, Nova Scotia B2Y 4A2, Canada

The interpretation of sediment facies in the Lower Cretaceous of the Scotian Basin has been based almost entirely on vertical successions of rock recovered in conventional core or logged with wireline logs. Previous work by others in the Glenelg field has demonstrated that lateral correlation and interpretations of reservoir extent and connectivity require an understanding of the lateral extent and variability of sediment facies. In this study, two other areas of the Scotian Basin with several adjacent wells and overlapping cored intervals in the Aptian to Cenomanian Logan Canyon and Tithonian to Barremian Missisauga formations were investigated. The Panuke-Cohasset area included five wells sampling the Upper Member of the Missisauga Formation through to the basal Cree Member of the Logan Canyon Formation. The West Venture-Venture area includes five wells in the Lower Member of the Missisauga Formation.

A regional correlation in each area was completed using gamma ray well logs. Sixty-seven cores were described, using lithology, sedimentary, and biogenic structures to determine lithofacies. Using the regional correlation, packets of equivalent core were correlated and compared.

Within the Panuke-Cohasset area, the middle Cree Member in the Cohasset A-52 well shows tidal inlet facies, whereas 3 km away in the Balmoral M-32 well it shows trangressive offshore facies. The base of the Cree Member in the Cohasset well has a blocky gamma character, with estuarine channel and river mouth facies not seen in the gamma ray logs at Panuke B-90. Sand packages near the top of the upper Missisauga Member are tidal flat to tidal estuary in Panuke, shoreface and river-mouth turbidites in Cohasset, and reworked sands and thick turbidites in Lawrence D-14. Down section, in the upper member of the Missisauga Formation, the Panuke well has muddy tidal deposits, whereas the Lawrence well remains sandy and less clearly tidal. Overall, facies become more distal to the northeast river mouth sand complexes have lateral dimensions of 15 km.

In the West Venture-Venture area, a key surface at the top of industry sandstone 7 and an underlying thick sandstone package give confident correlation across the area. This interval at

Atlantic Geology, 2011, Volume 47, Number 1

the West Olympia O-51 well is slumped, and may represent a delta front. In West Venture C-62 and Venture B-52, delta-front turbidites in industry sandstone 6 are overlain by estuarine-tidal flat facies, but in West Venture N-91 and Venture H-22 are overlain by more distal prodelta sands and muds, suggesting delta lobe switching.

The recognition of facies associations and distinctive vertical successions of parasequences was effective for comparing and correlating across several wells. Individual trangressive surfaces and coal beds proved vital for reliable correlation between wells. Tidal parasequences can be quite local and therefore are more difficult to correlate than regional sandstone packages. Some sandstone packages are laterally continuous, even if depositional environment changes. Gamma logs are most effective for regional correlation, but since lithology and sedimentary facies change laterally on a scale of 10 km, gamma can only correlate major lithological changes related to sand input or transgressions.