Pennsylvanian and Permian Strata of the Western Canada Sedimentary Basin; Biostratigraphic and Sequence Stratigraphic Framework Development

Charles M. Henderson*, Lindsay Dunn
Department of Geology and Geophysics, University of Calgary,
Calgary, Alberta, Canada T2N 1N4; henderson@geo.ucalgary.ca

and

Kevin Fossenier
Talisman Energy Inc. Calgary, Alberta, Canada

Sediments that comprise Pennsylvanian and Permian strata in western Canada were deposited in arid environments along the western margin of Pangea at approximately 20 to 30°N paleolatitude. During the past decade several students and I have conducted conodont biostratigraphic analyses that currently recognize 20 conodont biozones that are crucial for constructing the Upper Paleozoic stratigraphic framework in the WCSB. The results of these analyses have increased, since 1989, the number of recognized sequences in the subsurface Belloy from two to seven and from five to eight for surface equivalents.

A late Mississippian embayment is subdivided by uplift of the Pouce Coupe High where Bashkirian siliciclastics are apparently missing. This high was transgressed during the latest Bashkirian to Early Moscovian by a dolostone succession. Major uplift during the late Pennsylvanian (Beatton High) resulted in the inversion of the Hudson Hope “Low” and at least part of the Fort St. John “Graben”, significantly affecting sedimentation trends and shifting basin geometry. A Kasimovian-lower Gzhelian sequence is only locally represented. During the Permian the depocentre shifted toward the south and east into Alberta. A Lower Permian Asselian to Sakmarian limestone sequence is apparently restricted to surface sections. Siliciclastic units of Artinskian, Kungurian, and Roadian-Wordian age are widespread in the Alberta portion of the Peace River Basin, but are localized in northeastern British Columbia. These units are primarily marine sands, however alluvial environments have been identified on the eastern margins of the PRB. Correlative condensed marine units in southern Rocky Mountain outcrops exhibit different lithofacies.