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## **A Depositional Model for Carbonate-evaporite Sequences in the Mississippian Midale Bed, Steelman Field, Southeastern Saskatchewan**

The Steelman Field is located on the northeastern flank of the Williston Basin, where hydrocarbons are produced from the Midale and Frobisher strata. Midale sediments were deposited over a gently dipping epeiric ramp, where minor fluctuations of relative sea level caused significant lateral migration of the coastline. Four transgressive-regressive sequences (S1, S2, S3 and S4, in ascending order) were identified based on core examination and facies analysis.

In this study, the Frobisher Evaporite is subdivided into a basal sabkha facies and an upper salina-lake facies. The sabkha facies forms the regional caprock for a carbonate-evaporite sequence (S1) initiated during deposition of the underlying Frobisher Bed. Units S2 and S3 onlap a more steeply dipping unconformity surface marking the upper contact of S1. These units are characterized by beach barrier and back-barrier washover facies that grade abruptly (e.g. < 1 km ) into algal marsh, restricted lagoon, and salina-lake facies in a landward direction. Both units are overlain by regional unconformity surfaces that are marked by caliche deposits and/or paleokarst features.

Transgressive deposits of S4 overstep S2 and S3 and onlap the S1 unconformity surface. During transgression, paleotopographic lows were filled by open-marine, skeletal wackestone and packstone. This bioturbated facies contains biota, which indicate normal marine conditions. Sea-level stillstand created persistent shallow-water conditions over much of the ramp. Lack of circulation resulted in widespread deposition of a restricted subtidal facies that consists of bioturbated dolomudstones. S4 is capped by evaporitic mud-flat and sabkha facies that gradually prograded over restricted subtidal deposits.