Karsting and Exposure of Winnipegosis Reefs in the Williston Basin of southeast Saskatchewan

J.H. Lake, Lake Geological Services Inc.,
1911 MacDonald Drive, Swift Current, Saskatchewan, S9H 1M1

ABSTRACT
Several Devonian Winnipegosis Reefs on the western shelf margin of the Williston Basin show karsted surfaces in the upper part of the reef buildups. The surfaces were noted in core at Benson and Macoun Pools.

Reef development was terminated when sea level dropped and prolonged exposure resulted in the development of an angular unconformity. The karsted surface exhibits extensive infill by anhydrite. The basinward continuation of the karst can be used as a time datum for correlation. The regional circulation and reef response to development was from a general northerly direction. Platform development was extensive and numerous reefs developed on this base.

The karsted surface is a hydrodynamic seal and restricts flow from the regional aquifer to the final stage of reef growth. Pressure maintenance in Winnipegosis pools is a problem and the reefs require energy infusion in order to maintain production levels.

The reefs are layered deposits with an abundance of muddy carbonate sediments. They are baffled by stromatoporoids and corals and accumulated a small percentage of calcareous algae. They were subsequently buried in halite following the termination of reef growth and the basin became evaporitic. The 9-9-6-8 W2M Total Home et al Benson example is the best example of karsting and temporary termination of reef growth. Reef development above the karsted surface highlights biological activity in a high energy environment.

Bibliography

Figure 1.

Map of Devonian Wells with location of cores on display: Macoun and Benson Fields.
Rock the Foundation Convention, June 18-22, 2001
Canadian Society of Petroleum Geologists
Figure 4.
Winnipegosis Reef Development above Knoll Surface:

A. Back reef facies, stromatolitic mudstone, 6-30-4-8 W2M, Microsand, 258-2.2m.
B. Recessional facies, floatstone with large Favosites encrusted by stromatoporoids, 9-9-4-8 W2M Benson, 2258.0m.
C. Shallow facies, floatstone with Thamnophora combs and pelloidal matrix, 9-9-4-8 W2M, 2260.0m.
**Figure 5.**

**Kare Facies:**

**D** Karst Facies. Vertical growth of stromatolites on vertical karst walls, 6-30-4-8 W2M Macoun, 2387.0m.

**E** Karst Facies. Vertical walls coated with encrusting red algae. This surface represents the temporary termination of reef development and is now a vertical barrier to fluid flow: 9-9-6-8 W2M Benson, 2265.8m.

**Reef Growth Below the Karst Surface:**

**F** Shaded Interior Facies. Articulated brachiopod wackestone with good intraparticle porosity, 6-30-4-8 W2M Macoun, 2364.3m.
Reef Growth Below the Karst Surface (Continued):

G  Lower Foreslope Facies, Pellitaeal codiacean algae mudstone. Anhydrite infills lenticular cavities. 20 degree bedding angle, 9-9-6-8 W2M Benson, 2273.5m.

H  Codiacean Algae Buildup Facies, Codiacean algae mudstone has been exposed and weathered, 9-9-6-8 W2M Benson, 2282.2m.

I  Shdall Margin Facies, Crinoidal wackestone with abundant Amphipora, 9-9-6-8 W2M Benson, 2286.2m.