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EFFECTS OF SALT SOLUTION IN SASKATCHEWAN

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ABSTRACT

During Middle Devonian times a thick bed of evaporites was deposited over most of southern Saskatchewan, forming the Prairie Evaporites formation of the Elk Point Group. These evaporites were covered by a sequence of Devonian carbonates with some interbedded clastics and evaporites of Devonian age, the entire sequence being followed by deposition of Mississippian carbonates with some evaporites.

Post-Mississippian and pre-Jurassic erosion resulted in near peneplanation of these Paleozoic sediments, after which an essentially clastic sequence of Jurassic and Cretaceous sediments was deposited in the area.

Local solution of the Devonian salt began some time after the deposition of the Mississippian Mission Canyon formation, but prior to the peneplanation of the Paleozoic rocks, and resulted in the development of downwarped blocks in which excess thickness of Mississippian beds were preserved from the post-Paleozoic erosion. Other areas have been recognized in which the salt solution and subsequent downwarping took place after the post-Paleozoic erosion, but prior to the deposition of the Jurassic sediments. All known cases of such early solution are small in extent, usually one or two miles in diameter.

Cases of salt solution in post-Paleozoic, but pre-Cretaceous times have also been found but because of lack of well control the extent of the phenomenon is unknown.

Enormous areas of the Prairie Evaporite basin were affected by salt solution of relatively recent times, post-Cretaceous but pre-Pleistocene. This resulted in downwarping of all the sedimentary section overlying the salt and is easily located by sub-surface and seismic mapping of Cretaceous structure.

The combination of early, localized salt solution and the later, regional solution resulted in the formation of numerous "pseudo-structures" in the younger beds.

The solution of the salt is attributed to movement of subsurface waters across the Province. Studies of the salinity and formation pressures indicate that this movement is in a general northeast direction and is still taking place today. The Prairie Evaporites are being dissolved at the present time and local earth movements have been recorded in recent times.

The existence of structural anomalies caused by this salt solution is of great importance in exploration for oil in the Williston Basin and certain unfavorable features of this phenomenon are discussed and other potentially favorable features are also mentioned.