

# **Dynamic paleoenvironmental changes within Cretaceous shales of the Colorado Group in east-central Alberta at Cold Lake**

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## **ABSTRACT**

Previous studies in the Cold Lake area, east-central Alberta, focused on the oil sands of the Lower Cretaceous Mannville Group with less emphasis on the overlying shales of the Colorado Group. Several long cores covering the entire Colorado Group provide a unique opportunity for a detailed stratigraphic and biostratigraphic study, utilizing foraminifera and nannofossils, unravelling a dynamic history of a previously relatively unknown part of the Cretaceous seaway.

Cores cover the interval from the Albian Joli Fou Formation to the newly described Santonian/Campanian Niobrara Formation. The area reflects overall distal sedimentation, dominated by shale with fine sandstone intervals occurring mainly within the Westgate Formation. The Viking Formation is expressed in thin distal siltstone beds and contains a unique foraminiferal assemblage. Bioclastic layers of abundant phosphatic remains, indicating seafloor winnowing, occur at the base of the Fish Scales and Second White Specks formations and within the upper Niobrara Formation. A series of bentonites, used by Nielsen (2002) to subdivide the Carlile Formation from the overlying Niobrara Formation is recognized as thin distal ashfalls in the Cold Lake area allowing for application of his newly defined Upper Colorado Group stratigraphy. Development of planktic foraminiferal assemblages is sporadic within the Turonian Greenhorn sea-level highstand and poor within the Santonian Niobrara cycle indicating periods of surface water anoxia. The dominance of infaunal, minute benthic calcareous and agglutinated species in the upper Colorado Group infers prevailing periods of bottom water anoxia. Nannofossil occurrences support the stratigraphic placement of the Second and First White Specks intervals.