

Evidence for Deep Anaerobic Biodegradation Associated with Rapid Sedimentation and Burial in the Beaufort-Mackenzie Basin, Canada

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Summary

Formation waters of the Beaufort-Mackenzie Basin, Arctic Canada, show a broad range of salinity and water chemistry but no systematic relationship with depth. Three main water types are defined, paleo seawater, freshwaters related to a gravity driven flow system, and low TDS – high alkalinity waters. High alkalinity waters are isolated in overpressured fault blocks characterized by rapid sedimentation and burial. The high alkalinities (up to 9000 mg/L) are interpreted to be related to in situ CO₂ generation through anaerobic methanogenesis during burial. The dominant control on biogenic gas generation appear to be maximum burial temperature rather than the modern temperature distribution, consistent with the paleopasteurization model.