

Re-examination of the Gautreau Formation and its stratigraphic position, Weldon, New Brunswick, Canada

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At its type location in the Weldon area south of Moncton, the Gautreau Formation is a Lower Carboniferous (Tournaisian) evaporite deposit. The evaporites occur within boreholes in the fault-bounded, westerly-dipping Weldon syncline, where the enveloping strata range from the Albert Formation of the Horton Group to the Hopewell Cape Formation of the Mabou Group. Presumably coeval surface exposures of dominantly grey shale with and without minor evaporites have been mapped by previous workers at several nearby locations.

When first identified by Norman in the 1920s, the Gautreau Formation was interpreted as a salt-dominated Horton Group unit. The definition was subsequently expanded to include the overlying evaporite-bearing (glauberite; $\text{Na}_2\text{Ca}(\text{SO}_4)_2$) and non-evaporite-bearing grey shales beneath red beds of the Weldon Formation. In recent published literature, the stratigraphic position of the broadened Gautreau Formation was reassigned to the younger Sussex Group that unconformably overlies the Horton Group in the Moncton subbasin. This refinement was based on palynology constraints (Spore Zone 5) identified in the Stilesville and Peck Creek areas from surface outcrops of shales presumed to be Gautreau Formation equivalent, but without evaporites present.

The Gautreau Formation is herein examined from 90 well logs and conventional core within the Weldon syncline. Surface outcrops and cliff sections along the Petitcodiac River and adjacent tributaries have been remapped. New palynology samples have been studied in conjunction with reprocessed seismic. As a result, the stratigraphic position and definition of the Gautreau Formation are reinterpreted. On the north flank of the Weldon syncline, the Stoney Creek Fault is truncated by overlying sedimentary rocks, suggesting a subtle disconformity exists at the contact or within the overlying red beds of the Weldon Formation. Palynomorphs collected directly from the salt of the Gautreau Formation suggest a Lower Tournaisian age (Spore Zone 2; typical of the Horton Group) and the same for laterally equivalent and overlying evaporite-bearing grey shales. Younger spore zones typical of the overlying Sussex Group (Zones 4 and 5) do not occur consistently until the overlying Weldon Formation, implying assignment of the current Gautreau Formation and its lateral equivalents to the Sussex Group is not justified in the type area, and it should instead remain within the Horton Group as suggested by

some prior workers. Bed-scale and longer-term fluctuations between halite, glauberite, gypsum, anhydrite, and other minerals (e.g., thenardite Na_2SO_4) represent the evolution of the evaporite basin from subaqueous halite to eventually sabkha-like nodular gypsum/anhydrite deposition near the end of evaporite deposition.