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**The sedimentology of Minto-Salmon Harbour  
mine site and its high sulphur coals**

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The Minto coal field at the Salmon Harbour mine site is located in central New Brunswick. The coal field lies in the upper part of the Minto Formation of the Pictou Group, the uppermost unit within the Maritimes Basin in this area. Bio-stratigraphy gives an age of Middle Carboniferous, Westphalian C. The stratigraphic succession at the mine site is divided into 7 units. The first unit is the coal seam which is of high volatile A bituminous grade that contains between 5 to 9 % sulphur. The sulphur levels increase to a high of 9% as the coal becomes thinner towards the sub-basin margins. This unit is interpreted as a shallow poorly drained bog swamp environment. Unit two, the shale that forms the roof rocks and contains an abundance of organic material used in age dating, and is interpreted as suspension sedimentation that is infilling the bog swamp. Units three and five are mudstones/siltstones with soil horizons and minor interbedded fine sands. These are interpreted as sheet floods and over-bank deposits. Unit four is a sandstone-conglomerate with trough cross beds, rip-up clasts and climbing ripples and is interpreted as a river channel. Unit 6 is smaller channels that pinch out and are not always present in the section. Unit 7 is the present day overburden.

Sulphur and carbon analyses (using LECO method) show,

at the base of unit two shales, 3.1 wt% sulphur and 1.32 wt% carbon values, and lower values up-section. The same is true for the other units where higher levels of sulphur and carbon were observed at the base of each unit and decreased up-section. In units 2 and 3 petrographic analysis identifies quartz as a blocky cement and kaolinite as a pore-filling vermiform clay phase. The quartz also forms “dog tooth” crystals alongside calcium carbonate cement (5–12%) with a minor kaolinite phase. The quartz and kaolinite reflect an acid pore water environment, and the later calcium carbonate phase that fills the remaining pore space may reflect a later more alkaline pore water environment.

The Minto area is modelled as a shallow depositional sub-basin of an ancient river valley that was poorly drained. The river valley fill is dominated by normal grading fluvial facies, with trough cross bedding overlain by climbing ripples that indicates palaeoflow towards the northeast. The development of soil horizons containing peds with preserved organic material is indicative of long periods of subaerial exposure in better-drained areas of the floodplain. The peat bog developed in the poorly drained areas. The source of the sulphur in the coal is debatable. Although sulfate from seawater would provide an abundant source of sulphur for the coals, no sedimentological evidence for marine influence is noted. Instead it is proposed that sulphate-rich freshwaters were derived from solution erosion of the adjacent Windsor Group evaporites.