Alluvial fan deposits of the Grantmire Formation (DDH PE 83-1), Horton Group, at Point Edward, Cape Breton Island, Nova Scotia

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The Early Carboniferous (Tournaisian) Grantmire Formation belongs to the Horton Group and is ~800 m thick, based on exposures and drill core in the northern part of the Sydney Basin onshore. The 503 m measured section of the Grantmire Formation in drillcore PE 83-1 is dominantly pebble conglomerate with interbeds of siltstone and minor beds of sandstone. The conglomerate (facies 1) is light to medium red, polymictic, poorly sorted, and clast supported with subangular to subrounded clasts. Conglomerate beds reach 15 m thickness with a maximum recorded clast size of 22 cm. They are divided into three subfacies: interbedded pebble conglomerate/sandstone, pebble to cobble conglomerate, and small boulder conglomerate. The other facies are sandstone (facies 2), siltstone with multiple sandy layers (facies 3), gritty siltstone (facies 4), and fine siltstone (facies 5). Siltstone is medium reddish brown and in two facies has calcareous nodules with green reduction patches and/or envelopes suggesting palaeosol or shallow groundwater origin. Sequences of large scale upward-coarsening alluvial fan units contain smaller scale upward-fining cycles.

The Grantmire Formation has been interpreted as the clastic fill of fault-bounded basins within the region of the Sydney Basin. Currently, the Grantmire Formation is the only mapped unit in the Sydney Basin Horton Group. The presence of black shales in the Atlantic Canadian Horton Group is important for hydrocarbon potential regionally; they are not presently identified in the Sydney Basin. Porosity and permeability tests reveal that reservoir quality ranges from poor to good and is likely controlled by variable amount of detrital clay, authigenic minerals, carbonate cement, palaeosol development, and irregular laminae of finer material.