

QUINSAM COAL: HILLSBOROUGH RESOURCES

QUINSAM
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The Quinsam Coal Mine (MAPSHEET 92F/14, MINFILE NUMBER 92F 319), at Middle Quinsam Lake near Campbell River, is owned by Hillsborough Resources Limited. It has been in production since 1986 and produced approximately 400,000 tonnes of low-sulphur bituminous thermal coal in 1991. The Company expects to increase production to a rate of 500,000 tonnes in 1992 (Annual Report; 1991). It has approximately of 44 million tonnes of accessible reserves.

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The Quinsam "coal measures" are Cretaceous in age (see attachments). They are part of the Comox Formation, a sedimentary unit that is part of the more widespread Nanaimo

The Comox Formation was deposited in an erosional basin formed on the east side of Vancouver Island. It is composed of a three units, (1) a basal unit comprised of conglomerate (Benson Member), (2) a central unit comprised of interbedded sandstones, siltstones, mudstone and coal (Cumberland Member) and (3) an upper unit comprised of sandstone (Dunsmuir Member). The three units reflect differing environments of sediment accumulation. The basal member was formed from sediment accumulation in river channels cut into an irregular land surface. The central member was formed in a shallow water, estuarine, environment and the upper member was deposited on a coastal plain under shallow marine conditions.

Coal beds form from forest growth that accumulates on estuarine flood plains. Trees die and accumulate under fetid "swamp" conditions. There is minimal decay and recycling of organic material. Debris accumulates as long as the water level remains constant. If it falls (marine regression), the swamp will dry out and erosion will occur. If it rises (marine transgression), the swamp will be inundated with seawater, growth will cease and the "coal beds" will be covered by sediment. Note that coal-bearing horizons will tend to "shale out" if the water gets too deep to support growth. The thickness of a bed will, in part, be governed by the time available for forest growth prior to marine transgression. The quality or rank of the coal formed (anthracite, bituminous coal, thermal coal) is a function of it's depth of burial and post-depositional tectonic history.

There is commonly a cyclicity to the sediment sequence that makes a set of "coal measures". The cyclicity reflects periodicity in marine transgression and regression.

Coal beds differ from most metallic mineral deposits in that the product is commonly reasonably "pure", containing only a minimal amount of intermixed sediment. There is far less grade variability than is found in "massive sulphide" deposits and no possibility of "high-grading" a deposit above a fixed maximum value. There may be small chemical differences that affect the saleability of the coal and it may, as at Quinsam, be necessary to blend coal from different seams or areas within a seam in order to achieve an optimum trace element content (low sulphur, low iron, low ash, high BTU) and decrease extraction cost to increase profit. The key variables in coal mining are extraction costs and engineering constraints. Mineability is governed by variables such as (a) seam thickness (minimum mining width at Quinsam 1.5 metres); (b) amount of structural dislocation as result of faulting; (c) seam orientation, particularly dip angle, and relation to ground surface; (d) hanging-wall rock stability and (e) specific composition.

Prior to the recent merger, Consolidated Brinco produced much of its coal from an "open pit" strip mine operation. Hillsborough is discontinuing this form of mining as the coal price will no longer support the cost of waste removal. The Company is switching to "room and pillar" underground mining using two "continuous miners". This method of extraction will provide for 100% recovery at the cost of a small relatively small amount of surface subsidence. The Company is currently planning its extraction programme to provide up to 500,000 tonnes a year of suitably blended material.

Coal measures are readily recognizable. The key for exploration geologists is to locate thick seams of saleable product (within terms set by the consumer) that are amenable to extraction by either open cut or underground mineable methods. Geologists pay particular attention to stratigraphy and the depositional environment of sediment. It is important to recognise rocks deposited under estuarine conditions and in coastal lagoons. The principal tools are (1) geological mapping; (2) seismic geophysical surveys (designed to show rock structure at depth) and (3) rotary drilling with or without down-hole geophysical surveys. To this one could also add driving around in a truck until it sticks in black carbonaceous mud (the method I used in Alberata!).

ISLAND COPPER: BHP-UTAH MINES LIMITED

The Island Copper "porphyry copper" deposit is at the head of Holberg Inlet, approximately 15 kilometres due south of the community of Port Hardy (MAPSHEET 92L 11/W; MINFILE NUMBER 92L 158). It is an "open pit" operation that has been in continuous production since 1971. In an average year it produces approximately 175,000 tonnes of copper concentrate, 4,600 tonnes of molybdenum concentrate and some 40,000 to 60,000 ounces of gold (GCNL Sept. 29th, 1990). It currently processes approximately 50,000 tonnes of ore per day at an average grade of approximately 0.35% Cu and 0.2g/t Au. + rhenium

The mine is reaching the end of its life and it is planning for the decommissioning process. The pit went through a major, and probably final, "push-back" that involved the construction of a retaining wall in 1990. As of September, 1991 it had mineable reserves of 130 million tonnes of ore grading approximately 0.35% Cu. By the end of its active life, it will likely have produced approximately 400 million tonnes of ore at an average grade of 0.45% Cu, 0.017% Mo and 0.0064 o/t Au at cut-off figure of 0.2% Cu.

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