

Structure of the Buchans mine area: new approaches to exploration

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Structural analysis of the Buchans mine area confirms that the volcanic and sedimentary rocks of the early Ordovician Buchans Group comprise an extensive south-verging, linked thrust system. This interpretation contrasts strongly with views held during the period of production of the Buchans orebodies, that the Buchans Group occurred in a structurally little disturbed north-dipping homocline. Structural approaches are outlined to unravel the complicated macroscopic geometry of the Buchans thrust stack, using the revised stratigraphy of the Buchans Group proposed by Thurlow and Swanson (1987). Emphasis is placed on delineating the distribution of the prospective Buchans River Formation in blind settings within the thrust stack. The structural controls on the setting of the Oriental #1 and blind Sandfill and Middle Branch prospects are illustrated using various types of structural geological maps and cross sections.

Sequences of the Buchans Group occur in a number of imbricate thrust systems, in the form of duplexes, which are exposed in eyelid windows and half-windows through a broad, east-west trending culmination. The geometry and stacking order of the duplexes can be explained in terms of a kinematic

model, involving south-directed imbrication of the Buchans Group by progressive footwall collapse (piggy-back stacking) along complicated frontal and lateral ramp systems beneath the advancing Hungry Mountain crystalline thrust sheet.

The Oriental #1 orebodies form two fine scale imbricated antiformal stacks of ore lenses in a sheared matrix of volcanic and volcanoclastic rocks. This structural belt extends to the northeast, where it comprises the Sandfill and Middle Branch prospects which occur in a blind setting beneath the Middle Branch duplex. The trend of the belt is controlled by a structurally underlying culmination consisting of arkose of the Sandy Lake Formation (which lithostratigraphically overlies the Buchans River Formation). The culmination forms a highly prospective target for exploration at 1500-2000 feet depth from surface, because it may be cored by an antiformal stack of rocks of the Buchans River Formation. Drill holes in the area only penetrated to top arkose of the culmination, because this unit was considered to form the "Footwall Arkose" to the ore zone in the old stratigraphic scheme for the mine area.