EMPLACEMENT STRUCTURES IN NORTH MOUNTAIN BASALT AT GRAND MANAN ISLAND, NEW BRUNSWICK

MCHONE, J. Gregory, Earth Science Education and Research, P.O. Box 647, Moodus, CT 06469-0647, gregmchone@snet.net.

The giant North Mountain basalt of the Early Mesozoic Fundy rift basin between New Brunswick and Nova Scotia has thicknesses of 300 to 400 m along the eroded margins and up to 1,000 m in the south-central basin. The eroded edges indicate that this ponded flow originally extended well beyond the present basin, with likely source dikes inland in New Brunswick and New England, and with identical lavas in basins much farther southwest.

Three distinct members of the formation are present on Grand Manan Island at the southwestern end of the basin. The lower unit is massive, dense, columnar basalt in a colonnade up to 190 m thick on a basal contact with Blomidon siltstone. In place of the expected entablature above the lower member, there is a stratified middle member of 10 to 12 amygduloidal flows and sills, each about 3 to 7 m thick and totaling about 50 m. Some strata show distinct flow tops and basal contacts with pipe vesicles. Above them is about 90 m of medium-coarse to porphyritic columnar basalt in a third or upper member. The upper and lower members are dramatically thicker than most lava flows of other flood basalt provinces such as Columbia River and Deccan, which tend to be less than 20 to 30 m thick (although there are many more flows in those provinces).

The lava structures of the North Mountain basalt are apparently related to this extreme thickness. As the massive lower flow unit expanded into the basin, it produced the initial middle member layer as a gas bubble-rich crust, and additional amygduloidal flows overran this crust as gas-rich extrusive surges from the upper levels of the lower member. Intrusions from the lower member also crosscut the middle flows, including a large dike that bends to become a sill within the amygduloidal flows. The entire middle-flow package was breached and overflowed by a massive extrusion of magma from the lower member, which produced the third or upper member.

The North Mountain basalt members and structures reflect eruptive surges from one or more volcanic fissures beneath the western side of this immense lava flow. The surge events inflated the liquid interior of the lower flow, which then produced additional flows into and over its amygduloidal surface strata across the basin.