Lithogeochemical variation in the granodiorite and biotite monzogranite of the South Mountain Batholith, Nova Scotia

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The South Mountain Batholith is a large composite intrusion consisting of several leucomonzogranite - leucogranite (biotite-muscovite-bearing) plutons intruding an envelope of predominantly biotite monzogranite-granodiorite (biotite only). The similar textural and modal mineralogy of the envelope rocks makes separation of these plutons difficult. Thus, a detailed geochemical study was undertaken to assess the elemental variations within the granitic rocks of the envelope.

Contouring of geochemical data indicates previously unrecognized systematic chemical variations within the envelope rocks. Using the observed geochemical variations and known geological boundaries the data have been grouped geographically. Final groupings are based on both absolute contents and variation trends, the latter of which reflect (i) normally zoned (relatively mafic borders), (ii) reversely zoned and (iii) unzoned areas. The distinction of these groups has facilitated the interpretation and modification of geological boundaries previously based on bedrock mapping. We consider these groups to represent separate intrusive suites.

Binary plots of the geochemical data and normative mineralogy collectively indicate single uniform trends with variable intragroup ranges for the respective x and y parameters. This systematic behavior of the data suggests that all the chemical variation can be explained in terms of crystal fractionation of the observed mineral phases. However, statistical treatment of the data using discriminant function analysis shows that near perfect separation of the groups exists. This indicates the existence of distinct chemical differences among the groups that are not recognized using conventional Harker-type diagrams.

Preliminary interpretation of the data suggests that the envelope rocks consist of discrete intrusive suites which have geochemically distinct signatures. More speculative is the fact that the geochemical distinctions among the groups may ultimately be reflecting different source regions.