The subseafloor replacement-style Boundary volcanogenic massive sulfide (VMS) deposit (0.45Mt @ 3.4% Cu, 4.0% Zn, 1.0% Pb, 34.0 g/t Ag) is located within the Tally Pond group (~510 Ma), Victoria Lake Supergroup in central Newfoundland, Canada. Stratigraphically, Boundary consists of a hanging wall composed of flow-banded, quartz-phyric flows and breccias. A thin, quartz-phyric tuff is found at the contact between the footwall and hanging wall and in some locations has been replaced by massive sulfides. The immediate footwall is comprised of aphyric lapillistones and lesser tuffs, which grade into aphyric flow breccias and massive flows. The deposit is found in two main zones (possible fault disrupted parts of the same original lens) and mineralization consists of pyrite, chalcopyrite, and lesser sphalerite. The North Zone is dominantly massive and replacement-style chalcopyrite and pyrite. Mineralization in the South Zone also displays some replacement style chalcopyrite, but also contains bedded sphalerite, pyrite, and chalcopyrite. The North Zone has undergone moderate-intense chlorite alteration, creating zones of black chlorite that have completely replaced the host lapillistone. Zones of intense chlorite alteration occur as discordant pipes and as conformable sheets that occur just below the ore horizon. In the less heavily altered areas of the North Zone, quartz-sericite alteration becomes more prevalent. The South Zone also contains intense chlorite alteration that appears to be an extension of the black chlorite alteration found in the North Zone. Additionally, moderate-intense quartz-sericite alteration is present on the periphery of the South Zone. The Northern Zone has high CCPI and Cu values, whereas the South Zone shows elevated Al, Ba/Sr, Hg, Pb, and Zn values. In both zones, the hanging wall alteration is dominated by quartz (+/-sericite) alteration, though moderate-intense chlorite alteration is present in some locations above both ore bodies. The intense chlorite alteration found in both zones represents the location of the central fluid upflow zone, whereas the sericite-quartz alteration found in the South Zone represents the lower temperature, white mica alteration zone commonly found at the margins of these upflow zones. The hanging wall alteration is likely the result of extended hydrothermal activity after the hanging wall was deposited.