Merguerian, Charles; and Sanders, J. E., 1992a, Xenoliths as indicators of paleoflow and paleoenvironmental conditions in the Palisades sheet, New York and New Jersey.

The Palisades Sill, a world-renowned mafic intrusive sheet, is continuously exposed from west of Haverstraw, NY southwestward to Staten Island, NYC. Many investigators have postulated that the Palisades magma flowed outward from fractures paralleling the NE-SW-trending Ramapo fault. To reach Fort Lee, magma from such fractures would have to flow from NW to SE.

Beneath the George Washington Bridge, in Fort Lee, NJ, a large Lockatong xenolith containing contact-metamorphosed, deformed, highly laminated cyclic lacustrine sediments, is exposed. At the S end of the xenolith, hypocrystalline basalt is adjacent to metamorphosed Lockatong. Microscopic vesicles in the basalt may have been caused by vaporized pore water from the sediments. Near the contact the sandy sediments are chaotic and have intruded the igneous rock to form "sedimentary apophyses" up to 20 cm long and a 40-cm-thick basaltic offshoot intrudes the Lockatong. Furthermore, the basal contact of the sheet cuts across the bedding at a high angle in a ramp-like fashion toward the north. In the contact zone, tight, chevron folds with vertical, east-west-trending axial surfaces indicate differential flow from S to N. Such flow to the N is consistent with evidence from the Graniteville quarry, Staten Island, where a partially fused, Lockatong xenolith is vertical. This vertical xenolith implies upward flow of the magma and thus proximity to the feeder channel. If this is correct, then from Staten Island to Fort Lee, the lateral paleoflow pattern would have been from SSW to NNE. South of Staten Island, we predict NNE- to SSW-directed lateral paleoflow.

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