

**The Origin of Trondhjemite In the Palisades Sill at the Graniteville Quarry,
Staten Island, NY: A 2011 Review and Ideas for Further Research**

Alan I. Benimoff Ph.D.
Department of Engineering Science and Physics
College of Staten Island
2800 Victory Boulevard
Staten Island, NY 10314

alan.benimoff@csi.cuny.edu

ABSTRACT

It is a real treat to view the parent of an igneous rock adjacent to that igneous rock. Such is the extraordinary “arrested state” case at the Graniteville Quarry where a xenolith of sodium-rich Lockatong argillite enclosed in the basaltic magma of the Palisades sill resulted in coexisting silicic and mafic melts. Petrographical, mineralogical, and chemical data, plus field evidence indicate that coexisting silicic and mafic melts resulted when the margins of a xenolith of Lockatong argillite fused within the Palisades sill. This occurrence provides a natural laboratory for the study of cationic diffusion profiles across a magmatic liquid-liquid interface which involves coexisting trondhjemite magma, derived by fusion of a xenolith of Lockatong argillite, and basaltic magma of the enclosing sill. We are interested in understanding the physiochemical factors that play a role in sediment fusion. Present research by this author is focused on answering the following questions: Why didn't the two melts physically mix? What are the relative diffusivities of these ions in the coexisting melts?