RHYODACITE DIKES OF THE QUEENS TUNNEL COMPLEX, NYC WATER TUNNEL #3

Charles Merguerian, Geology Department, 114 Hofstra University, Hempstead, NY 11549

One of the most scientifically startling and unforeseen discoveries made during detailed mapping of the subsurface geology of the Queens Tunnel has been the identification of a suite of red-colored, rhyodacite dikes exposed ~800' beneath Woodside, Queens. Five sub-parallel dikes, all displaying pristine igneous textures, are found in nine formally connected locations in the tunnel. Although the tunnel boring machine (TBM) may have removed dikes no longer exposed in the tunnel walls, the exposed dike rocks underlie a minimum of 667' between stations 109+20 and 152+40 and compose 15.4% of the tunnel perimeter rocks within that 4,320' tunnel reach. They occur as tabular, discordant bodies roughly oriented N53°W and average just under 10' in thickness. The larger dikes vary from 16' down to 3' and taper off to thin dikelets. The rhyodacite dikes are predominately thin tabular bodies oriented approximately parallel to a ~N50°W regional fault and fracture pattern but local offshoots of the rhyodacites are sill-like, occurring as small masses that intrude parallel to the existing foliation in the deformed host rocks.

The rhyodacites are reddish, glassy to aphanitic igneous rocks with no metamorphic fabric and low average density (2.58 g/cm3). Hand samples are hard and flinty in aspect and fresh in appearance with a multitude of curviplanar cooling joints whose intersections produce cobble- to boulder-sized multifaceted blocks and slabs. The rhyodacites are highly porphyritic. Suspended in the red, siliceous groundmass are non-aligned 1 mm to 6 mm euhedral phenocrysts of hornblende, clinopyroxene, biotite, plagioclase, and subordinate K-feldspar. The groundmass is enriched in quartz and K-feldspar and dusted with fibrous aggregates of iron oxide - the probable result of quenching and devitrification of initial felsitic volcanic glass. The dikes crosscut folded Proterozoic Y granulite facies rocks of the Queens Tunnel Complex with which they are genetically and temporally unrelated. The dikes are cut by a generation of steep, NNE-trending brittle faults that are cut by younger, steep NW-trending faults. The injection of a suite of rhyodacite dikes that are chemically, texturally, and temporally unrelated to their bedrock hosts, mark an anomalous geological formation that adds a new chapter to the evolution of the New York City area.

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