

## The Deepest CORE Staten Island New York- Geological Results

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The Staten Island Serpentinite is a lens shaped, NE-SW trending body, having a dimension of approximately 55 Km and occupies a ridge located in the Northeastern section of Staten Island, reaching an elevation of approximately 135 meters above sea level. This Serpentinite body is part of a string of similar ultramafic bodies, extending throughout the Appalachians, from Alabama to Newfoundland. The Serpentinite displays a sheared fault contact with the Cambro Ordovician Puffer (2024) concludes that the mode of emplacement of the New York area serpentinites is controversial but most evidence tends to favor the Taconic obduction of the base of a Iapetus ophiolite sequence.

Snug Harbor Pilot Borehole B1A, a New City Department of Design and Construction Project, was completed in 2006 to study the feasibility of a Geothermal Standing Column Well (SCW) for NYC facility at 1000 Richmond Terrace, Snug Harbor Cultural and Garden Center Staten Island New York. Dennis Askins the senior author was the Professional Geologist, working for New York City at the time of drilling. The borehole was drilled and cored to a total depth of 869' (263m) below ground surface (bgs). The overburden consisted of unconsolidated sediment composed of sand, silt, gravel, cobbles, and boulders to a depth of 155' (46.9 m). Serpentine bedrock was encountered at 155' and cored to 195' (59 m), highly weathered, fractured, and containing decomposed zones (saprolite) of greenish-bluish gray rock (Run 1-Run 4), 40' (12 m) thick. A 3 inch diameter casing was set to 195' to keep the borehole integrity and rock coring. The following results from 195' to total depth: 1) 195' to 345' (Run 5-Run 20), 150' (46.9 m) thick, composed of serpentinite, 2) 345' (104m) to 353' (106.9 m) orange/red foliated serpentinite which was hydrothermally altered (Run 20), 8' thick, 3) 353' (106.9 m) to 363' (110m) to 869' (263 m) pelitic schist (Walloomsac Formation), gray pyritized, garnet, biotite schist and calcite (Run 21-72) 506' (153 m) thick.

The borehole reflects a complex Manhattan Prong geology from Staten Island New York to the western side of the Hudson River to Hoboken New Jersey. The Walloomsac Formation crosses the Hudson River (eastside) to Manhattan at Leroy Street and north to West 57th Street, where it is associated with serpentinite. It traditionally outcrops at the Bronx Botanical Gardens. We refer to Merguerian (2005, 2006, 2007, 2010, ) and Moss for further reading.

The bedrock at Snug Harbor is composed of Middle Ordovician Walloomsac Formation (Manhattan Schist Member A which is over 500' (151m) thick and composed of pyritized, garnet biotite schist, and calcite. The serpentinite ophiolite bodies, almost 200' (60 m) thick, were accreted to the Laurentian Continental Plate and the Walloomsac Formation during the Taconic Orogeny. The lithology of the serpentinite has a complex history showing hydrothermal geochemical changes and alterations.

