

Hydrogeological Characterization for Siting Geothermal Wells in Fractured Bedrock at Bronx Zoological Park, Bronx, New York

Dennis Askins, Assistant Geologist; and Alex Posner, Geologist; New York City Department of Design and Construction

ABSTRACT

The Bronx Zoological Park is located in the Western part of Bronx County between the Harlem and the Bronx Rivers. The subsurface geology is composed of folded gneiss, marble and schist while the surficial soil cover overlying this crystalline bedrock is a thin glacial till, 2- 6 feet in depth. Some areas contain weathered bedrock (saprolite) that can be more than 20 feet in depth. These weathered zones overly both fractured and brecciated faults and are conduits for ground water recharge. Tectonics also influences ground water recharge within this area. The Bronx River flows along Cameron's Line, a subduction suture that trends N-S. The Mosholu Fault Line that trends N-W crosses Cameron's Line and the Bronx River. Joint sets, which transect this crystalline metamorphic bedrock, are also enhancing the secondary porosity. Wells near this area have yielded sustainable ground water at depths of approximately 900 feet.

In order to delineate the location and depth of ground water a geophysical survey using seismic reflection techniques was made prior to the drilling operations. Seismic reflection data displays jointed and fractured bedrock to a depth of 1500 feet indicating the probability for yielding sustainable ground water beneath the Bronx Zoological Park, Bronx, New York. This preliminary hydrogeological characterization in fractured bedrock makes it strategic for the design and development of geothermal wells at this site.

Keywords: Ground Water, Geothermal Well, Seismic Reflection, Secondary Porosity

Biographical Sketch

Dennis Askins is an engineering geologist with the Subsurface Exploration Section of the New York City Department of Design and Construction: he has been with this city agency since 1990. Prior to this he owned an environmental service company for 25 years. He received a bachelor of science in geology from Brooklyn College, CUNY, in 1980. He is currently working on his master's thesis at Brooklyn College, CUNY. He specializes in environmental and engineering geology. E-mail: ASKINSD@DDC.NYC.GOV Telephone 718-391-1338

Alex Posner is a hydrogeologist with the Office of Sustainable Design of the New York City Department of Design and Construction: he has been with this city agency since 1999. Prior to this he was employed by NYS DEC, USEPA and USGS, Water Resources Division for a total of 12 years. He also worked 10 years in the private sector with environmental consulting firms. He received a bachelor of arts in geology from Queens College, CUNY in 1977. He received a master of arts in geology at Indiana State University in 1979. He specializes in environmental and water resources. E-mail: POSNERA@DDC.NYC.GOV Telephone 718-391-1771

Mail Address

New York City Department of Design and Construction
30-30 Thomson Avenue
Long Island City, New York 11001