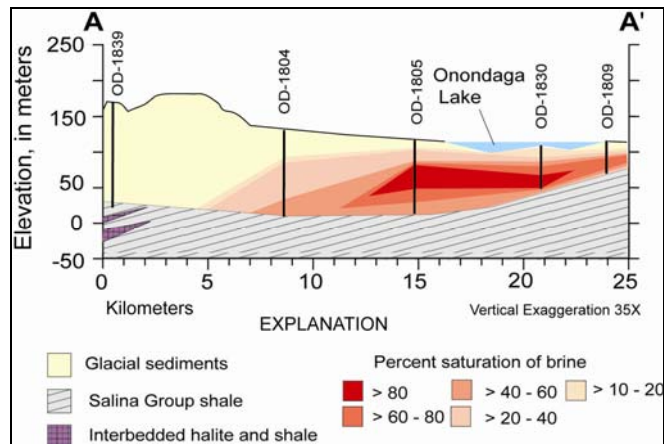
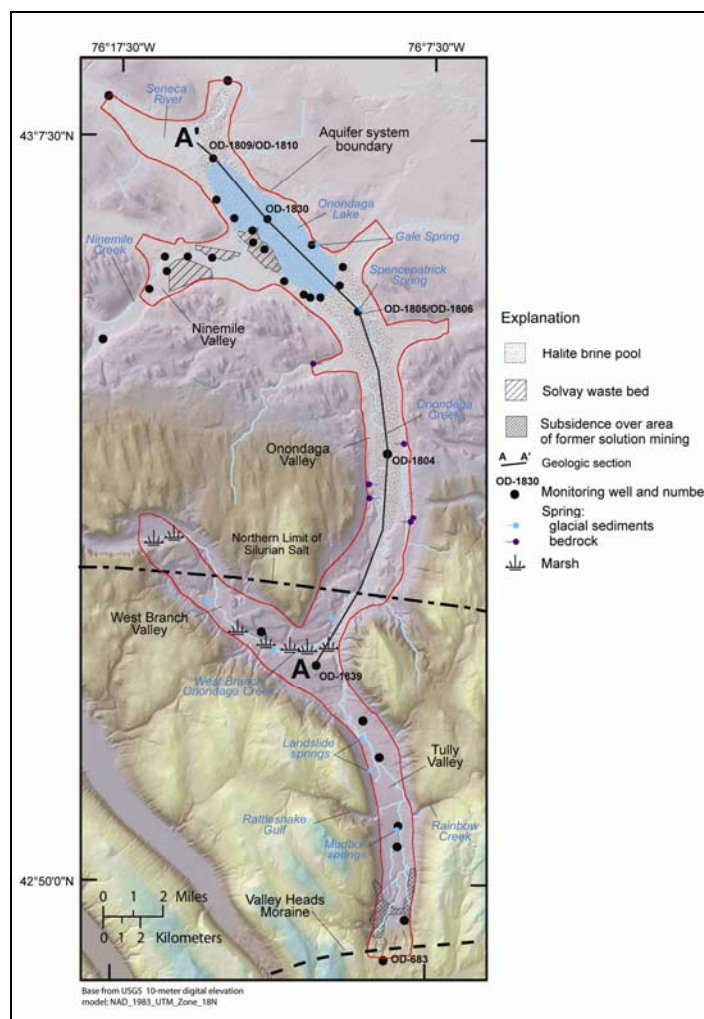


# CHARACTERIZATION AND SIMULATION OF GROUNDWATER AND BRINE IN THE ONONDAGA TROUGH

**Project Description:** The U.S. Geological Survey (USGS) conducted a hydrogeologic study of the Onondaga Trough near Syracuse New York, which extends from the Valley Heads Moraine near Tully to Onondaga Lake (Figure 1). The study characterized the geology and geochemistry of the aquifer system in the trough, estimated the rate and direction of groundwater movement, and estimated mass loadings of chloride to Onondaga Lake and its tributaries from natural and anthropogenic sources. Water quality samples collected from wells were analyzed for a variety of constituents to determine the source, age and concentration of saline waters within the aquifer. A three-dimensional geologic model of the unconsolidated deposits that fill the Onondaga Trough was developed from analysis of hydrogeologic data from new and existing wells. The geologic model, together with water quality and pressure data from wells, supported the development of variable-density flow models of the aquifer system.



**Figure 2. Generalized Section Showing Percent Saturation of Brine**



**Figure 1. Geographic Features of Onondaga Trough**

Results of the USGS study and simulations of the groundwater flow through the glacial-drift aquifer in the Onondaga Trough indicate that a pool of halite brine resides in the northern part of the trough (Figure 2). The source of the brine was dissolution of halite beds exposed by glacial erosion in the Onondaga Trough by melt waters during deglaciation of the area about 17,000 years ago. The brine pool is currently being depleted as freshwater flows over the southern end of the pool and discharges saline water to Onondaga Creek through natural and man-made pathways. Discharge of brine also occurs to Onondaga Lake through slow diffusion of the brine through a thick layer of fine-grained lacustrine sediments beneath the lake, but the rate of brine discharge is much smaller than the rate of discharge to Onondaga Creek. Historical discharges of saline water from waste beds associated with a chemical plant on the west shore of Onondaga Lake were much greater than natural discharges, however, and created the hypersaline conditions observed in the lake by the mid 20th century. Continued depletion of brine from the glacial-drift aquifer to surface waters will slowly diminish the size of the brine pool in the Onondaga Trough.

**Location:** Onondaga Lake and Onondaga, lower Ninemile, West Branch and Tully Valleys.

**Project Sponsor:** Onondaga County serves as the non-Federal sponsor of this Onondaga Lake Partnership project, and the U.S. Environmental Protection Agency serves as the Federal sponsor.

**Current Status:** The project has been completed and a USGS report entitled "Halite Brine in the Onondaga Trough near Syracuse, New York: Characterization and Simulation of Variable Density Flow" by R.M. Yager, W.M. Kappel and L.N. Plummer will be distributed in the Fall of 2007.