

Abstract

Vertical ground motions caused by a variety of hydrogeologic processes in overburden have been identified in portions of western New York where solution mining and underground mining of bedded salt are in progress. The ground motions are particularly recognizable near brine cavities and underground mines located beneath the floors of glaciated valleys filled with thick (100-500 ft.) deposits of glacial drift that include sand and gravel aquifers along with till and glaciolacustrine silt and clay. Some motions are cyclical, and some appear to be permanent. All are of small magnitude (<0.3 ft.).

Cyclical motions with a period of one year are commonly observed and correlate with natural changes in the water levels in aquifers. Ground elevations are highest in the late spring when water levels are at the seasonal maximum; ground elevations are lowest in the late fall when water levels are at the seasonal minimum. Cyclical ground motions with periods of several years correlate with long-term dewatering events. Both cyclical motions are attributable to reversible expansion and contraction of aquifers caused by changes in hydrostatic head.

Some permanent subsidence of the surface may result from self-compression of the fine-grained portions of valley fill sediment. In addition, permanent subsidence caused by consolidation of fine-grained glaciolacustrine clay and silt due to long-term dewatering has probably occurred. The catastrophic lowering of water levels in the Genesee Valley that resulted from flooding of the Retsof Mine between March, 1994 and January, 1996 appears to have caused both reversible and permanent subsidence of the valley floor adjacent to the mine cavity.