

Hydrology - Open-File Report 2

Land Surface Collapse and Ground-Water Problems in the Jamestown Area, Berkeley County, South Carolina

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ABSTRACT

Land-surface collapses and subsidence depressions have occurred in a carbonate terrane in the Jamestown area of Berkeley County, South Carolina. These collapses have occurred since the summer of 1975, and have caused property damage, and damage to a county highway. Personal injury to one local resident reportedly occurred when the land surface suddenly collapsed.

Collapses and subsidence depressions have formed in clays and sands of the Talbot Formation overlying the Santee Limestone, a cavernous carbonate-rock aquifer. The formation of these collapses has been related to large water-level declines in the Santee aquifer. As ground-water levels decline below a cavernous, upper permeability zone in this aquifer, overlying unconsolidated sands and clays lose strength and collapse. Ground-water pumpage from two limestone quarries, estimated by the writer and reported by quarry owners to be periodically in excess of 36 mgd (million gallons per day), has caused a water-level decline of over 35 ft since the summer of 1975. A collapse-prone area has been delineated by mapping the distribution of collapses and relating this distribution to a potentiometric map of the Santee aquifer.

In addition to land-surface collapse, water-supply problems have been caused by large ground-water pumpage from the Santee aquifer. Water levels have been lowered below the bottoms of some wells, and below the practical pumping lifts of pumps in other wells. Water levels in wells located over 1 mile from the center of pumping have been affected by the pumpage.

Several solutions are available to restore adequate drinking-water supplies to local residents. Existing wells could be deepened, and larger-diameter casing and pumps with greater lift capability installed, or water lines could be extended to the area from an existing municipal water system. However, the problem of land-surface collapse is more serious because of the possibility of personal injury. If large ground-water withdrawals from the Santee aquifer continue, land-surface collapse will probably continue and will most likely become more severe if ground-water pumpage from the Santee aquifer is increased. In all probability, land-surface collapse will be drastically reduced or will cease entirely if ground-water levels in the Santee aquifer are allowed to recover into the upper permeability zone of the Santee aquifer. A recovery of water levels would also restore some artesian pressure in the Santee aquifer and water levels would again be within the practical pumping lift of existing pumps.

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