EFFECTS OF GROUNDWATER LEVELS DEPLETION ON FISSURING IN LAS VEGAS VALLEY

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Las Vegas Valley is located in a tectonic basin overlain by at least 1000 m of Quaternary and Tertiary aged alluvial sediments and containing numerous generally north-south trending Quaternary faults. This Valley is one of the several places in the United States affected by subsidence and fissuring from excessive groundwater pumping, which has caused damage to infrastructures resulting in economic loss.

A rigorous aquifer storage and recovery program has mitigated subsidence in some localities as water levels have recovered dramatically. Nonetheless subsidence is occurring at several localities and new earth fissures continue to appear while others are being elongated and widened. This complex pattern of subsidence and recovery is a consequence of stress and strain accumulation likely resulting from (1) the nature of Quaternary faulting, (2) compressibility differences in the geologic deposits, (3) differential thicknesses of compressible material, and (4) seasonal water-level changes.

Although several fissures have appeared in the vicinity of pumping wells and ancient tectonic faults, their mechanism of formation and development is still not well understood. The general goal of this work is to discover a better understanding of the process of formation and development of fissuring in heavily pumped basins. The first specific objective is to know the distribution and evolution of stress caused by the depletions of ground water based on recent and past water-levels across the Valley. The second specific objective is to develop and analyze the potential processes using a computer model that simulates the characteristics of these complex fault-fissure systems within the valley. The outcome is to better quantify hazard zones to minimize economic loss.

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