

LIQUEFACTION POTENTIAL IN CACHE VALLEY CACHE COUNTY, UTAH

What is liquefaction? Liquefaction may occur when water-saturated sandy soils are subjected to earthquake ground shaking. When soil liquefies, it loses strength and behaves as a viscous liquid (like quicksand) rather than as a solid. This can cause buildings to tilt or sink into the ground, empty buried tanks to rise to the ground surface, nearly level ground to shift laterally tens of feet (lateral spreading), and there can be slope failures, surface subsidence, ground cracking, and sand blows.

Why is liquefaction a concern? Liquefaction has caused significant property damage in many earthquakes around the world, and is a major hazard associated with earthquakes in Utah. The 1934 Hansel Valley and 1962 Cache Valley earthquakes caused liquefaction in northern Utah*, and large prehistoric lateral spreads exist at many locations along the Wasatch Front.

* The magnitude 5.7 Cache Valley earthquake caused liquefaction along the Bear River near Richmond.

Where is liquefaction likely to occur? Two conditions must exist for liquefaction to occur: (1) the soil must be susceptible to liquefaction (loose, water-saturated, sandy soil, typically between 0 to 30 feet below the ground surface), and (2) ground shaking must be strong enough to cause susceptible soils to liquefy. Northern, central, and southwestern Utah are the state's most seismically active areas. Identifying soils susceptible to liquefaction in these areas involves knowledge of the local geology and subsurface soil and water conditions. The most susceptible soils are generally along rivers, streams, and lake shorelines, as well as in some ancient river and lake deposits.

How is liquefaction potential determined? The liquefaction potential categories shown on this map depend on the probability of having an earthquake within a 100-year period that will be strong enough to cause liquefaction in those zones. **High** liquefaction potential means that there is a 50% probability of having an earthquake within a 100-year period that will be strong enough to cause liquefaction. **Moderate** means that the probability is between 10% and 50%, **low** between 5 and 10%, and **very low** less than 5%. The split classifications of **moderate-high** and **moderate-low** are used in areas where the data are so sparse that there is high degree of uncertainty in the classification.

What can be done? To determine the liquefaction potential and likelihood of property damage at a site, a site-specific geotechnical investigation by a qualified professional is needed. If a hazard exists, various hazard-reduction techniques are available, such as soil improvement or special foundation design. The cost of site investigations and/or mitigation measure should be balanced with an acceptable risk.

Where to get additional information. For a more detailed map and explanation, refer to UGS Contract Report 94-6 (see front of map for complete reference) available at the Natural Resources Map & Bookstore, 1594 W. North Temple, Salt Lake City, UT 84116-3514, 801-537-3320.