

LIQUEFACTION SUSCEPTIBILITY IN TOOEELE VALLEY TOOEELE 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.

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. In Tooele Valley, the most susceptible soils are along the shorelines of Great Salt Lake and Rush Lake.

How is liquefaction susceptibility* determined? Liquefaction susceptibility is based on soil and ground-water conditions (but does not include the probability of earthquake ground shaking). **High** liquefaction susceptibility means that possible susceptible soil conditions exist and the depth to ground water is less than 10 feet (3 m). **Moderate** liquefaction susceptibility means that possible susceptible soil conditions exist and the depth to ground water is from 10 to 30 feet (3-9 m). **Low** liquefaction susceptibility means that possible susceptible soil conditions exist and the depth to ground water is from 30 to 50 feet (9-15 m). **Very low** liquefaction susceptibility means that the area either does not have susceptible soils and/or the ground-water depths are greater than 50 feet (15 m).

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 more explanation on the liquefaction susceptibility in Tooele Valley, refer to *Geology and geologic hazards of Tooele Valley and the West Desert Hazardous Industry area, Tooele County, Utah*, 1999, by Black and others, Utah Geological Survey Special Study 96 (available at the Natural Resources Map & Bookstore, 1594 W. North Temple, Salt Lake City, UT 84116-3514, 801-537-3320).

* This is not a liquefaction potential map, because it does not consider the probability of earthquake ground shaking needed to cause liquefaction in areas of susceptible soil and ground-water conditions.