



Shaky Ground

Background:

During an earthquake, soil liquefaction can occur in an area which has both unconsolidated sediments and a water table near the surface of the ground. When these wet sediments are shaken, the sediment grains become suspended in groundwater, or liquefied. The liquefied sediments deeper down are then compacted, reducing the available space between the sediment grains, and forcing the water to the surface. Heavy objects, such as buildings, may start to sink, while light buried objects, like storage tanks, may rise to the surface. Extensive damage may occur.

An example of this was the El Grande earthquake in Mexico on September 19, 1985. The massive destruction in Mexico City was due mainly to the fact that the city was built on an ancient, sediment-filled lake bed. Something similar could happen if a large earthquake occurred along the Wasatch Fault.

The demonstration uses sand that is wet, but not saturated. In other words, some of the pore spaces are filled with water, but many are not. Thumping on the pan causes the sand grains to compact, thus eliminating much of the pore space and forcing the water to rise to the surface.

Materials:

- shallow container, such as a kitty litter pan or dish pan
- fine-grained sand, enough to fill the container at least half way
- water
- model buildings, like monopoly houses
- cork or film canister (to simulate underground storage tank)
- trowel

Activity:

Moisten the sand to the point where a hold dug to the bottom of the pan does not fill with water quickly, but where shaking the pan will cause water to accumulate on the surface. Experiment with this to get it right.

Have the students move the sand around the pan with the trowel so that they can see that the sand is not saturated or muddy. Then have them re-smooth the area, and bury the cork or canister.

After the students have built their houses in the sand, thump rhythmically on the sides of the pan with your hands to simulate an earthquake. Water will rise to the surface and flood the houses, and the storage tank should come to the surface.

Ask the students to explain where the water came from and why the shaking would cause it to collect on the surface. What would happen to Salt Lake City if a huge earthquake occurred?