CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY

Name(s)
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Project Number
S0609

Project Title
Liquefaction in Sherwood Valley Soils

Abstract

Objectives/Goals
The goal of my project is to see how the soils of Sherwood Valley react under earthquake conditions. In addition to this the goal of my project is to see if the soils of Sherwood Valley will exhibit the characteristics of soil liquefaction.

Methods/Materials
Five different soil samples were collected from the Sherwood valley area. The effects of a simulated earthquake were tested by building an earthquake shaker and shaking all the samples. In order to simulate the worst case scenario the soil samples were completely saturated prior to testing. To conduct the shake test the soil samples were placed in a coffee can, then an object of known weight was placed onto the samples which were shaken 15 times. Afterwards the depth which the object sank was recorded. In addition to testing the effects of a simulated earthquake the soils were tested for their composition and their porosity. The composition of the samples was determined by conducting sedimentation tests. To conduct the sedimentation test ½ cup of soil, 3 ½ cups of water and 5 tablespoons of Calgon solution were placed in a jar, shaken for five minutes and the settled soil was measured after 40 seconds, 30 minutes and 24 hours. The soil depth after each time interval was divided by the total depth to determine the percentage of clay, sand and silt in each soil sample. The porosity of the soil was determined by filling a beaker with 350 ml of soil, pouring water into the soil until it reaches the top of the soil and dividing the amount of water used by 350 to calculate the percent pore space.

Results
The soils with the greatest amount of sinking in descending order are field 2, field 3, hill 1, hill 2 and field 1. The soils with the greatest porosities in descending order are hill 2, field 1, field 2, field 3 and hill 1.

Conclusions/Discussion
My conclusion is that the soils of the Sherwood Valley could, under the right circumstances, experience soil liquefaction. This is in part due to the fact that the soils are very high in sand which means that while the soils could experience liquefaction it would require an enormous amount of rain in conjunction with an earthquake. This high proportion of sand also means that the soils drain relatively easily and that flooding and complete soil saturation would be unlikely to occur without torrential rains.

Summary Statement
The goal of my project is to determine the effects of a simulated earthquake on the soils of Sherwood Valley.

Help Received
Mother took pictures; school loaned triple beam balance