



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Chance C. Sorensen</b>	<b>Project Number</b> <b>S0614</b>
<b>Project Title</b> <b>Slope Stability</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective was to investigate how soil type and the degree of saturation of the soil affects slope stability. I believe that under dry soil conditions, sand will be less stable at increasing slope angles. Under increasingly wet soil conditions, such as during a sequence of heavy winter rains, the clay soil will be less stable at increasing slope angles. <b>Methods/Materials</b> Five types of soils (clay, silt, sand, gravel, and loam) were tested to evaluate the stability of the soil on a slope under increasing degrees of saturation. Equal volumes of soil were placed in soil pans and shaped to represent a hillside slope. The angle of the slope was increased until failure occurred. The first test was conducted when the soil was dry. The test was then repeated at least five times with increasing volumes of water added to the soil, representing rainfall events on the soil and an increasing degree of soil saturation. <b>Results</b> Sand and gravel soils were the least stable under dry soil conditions. As soil moisture initially increased, sand and silt soils showed increasing strength and stability. Once the degree of saturation of the clay soil reached 30 percent, the clay showed a significant decrease in strength stability, and proved to be the least stable soil under wet conditions. <b>Conclusions/Discussion</b> Sand is the least stable soil material under dry conditions. With increasing saturation (such as extended heavy rains), clay became the least stable soil material. The project showed how important moisture content is to the stability of a slope. For sandy and gravelly slopes, a small amount of moisture actually increases the slope strength and makes the slope more stable. But if too much moisture is allowed to saturate the soil, all the slopes fail. And once the clay soil reaches a certain level of saturation, it becomes very unstable.	
<b>Summary Statement</b> Soil type and the degree of saturation of the soil affects slope stability, that is, the angle of the slope at which failure occurs.	
<b>Help Received</b> I would like to thank Fugro West for letting me use their soils lab. Thank you, Dad, for driving me, guiding me, and helping me with writing results and data. I also thank God for all He created, because without anything He created, we would not have a science project to work on.	