



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Allysun R. Robie</b>	<b>Project Number</b> <b>J0714</b>
<b>Project Title</b> <b>Action Packed Liquefaction</b>	
<b>Objectives/Goals</b> The purpose of this project is to determine how the transfer of force varies in different types of soil mixtures. The reason I performed this experiment was to measure how the effects of soil liquefaction, which can occur during an earthquake, can be prevented by changing the soil composition.	
<b>Abstract</b> Four PVC pipes (12" height X 2" diameter) were filled to the same level with four different pre-measured dry soil mixtures. The soils used were sandy soil, sandy soil mixed with clay, sandy soil mixed with organic matter (mulch mixture), and sandy soil mixed with inorganic matter (polystyrene pieces). The same volume of water was added to each mixture. Dowels were inserted two inches through the 1/4" hole in the middle of each pipe. Small round weights were placed on top of each soil mixture to compact the soil. Settlement time was one hour. A shake table was used to simulate earthquake motion for 30 seconds. A spring scale was used to measure the amount of force needed to remove the dowels from each pipe. The amount of settlement was measured in each pipe. Three complete trials were performed.	
<b>Methods/Materials</b> The pipe filled with the moist sandy soil and mulch mix settled the least and required the greatest force to remove the dowel. The three other pipes had greater soil compaction and required less force to remove their respective dowels.	
<b>Results</b> The moist sandy soil and mulch mix withstood the process of liquefaction the best. This mixture demonstrated the most cohesive strength and since it settled the least, suggests that a liquefied ground of this mixture would maintain the greatest physical stability of the four soil mixtures. My experiment demonstrated that the moist sandy soil mulch mix sustains the least amount of disruption from the liquefaction process that occurs during an earthquake. Location and the soil composition of the ground are two interdependent factors affected during earthquake activity.	
<b>Conclusions/Discussion</b>	
<b>Summary Statement</b> This experiment measured how the effects of soil liquefaction, which occur during an earthquake, can be prevented or lessened by changing the soil composition.	
<b>Help Received</b> My parents helped build the shake table and obtain supplies for my project. My project advisor, Mr. LaBolle, provided spring scales.	