



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Paul Epperson; Steven Wang	Project Number J1109
Project Title Engineering an Energy Efficient Solar Powered Water Desalination Apparatus	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to generate a direct current using solar cells to power an apparatus that desalinates enough water for an average person's use.</p> <p>Methods/Materials Four different apparatuses were designed and constructed. The apparatuses were powered by a solar module that we constructed which provided a peak power of 45.1 watts. Using this power, these apparatuses attempted to desalinate 35-ppt saltwater (sea water equivalent) through distillation. Apparatus A heated water with engine enamel coated resistors and condensed steam onto thin film plastic wrap. Apparatus B used rubber coated resistors and condensed steam into a tube connected to a beaker. Apparatus C used a test tube that isolated the resistors from the saltwater and also used a condensing tube. Apparatus D used a copper tube filled with heat transfer fluid that isolated the resistors from the saltwater and also used a condensing tube.</p> <p>Results Apparatus A and B were unable to desalinate water due to resistors causing electrolysis and then corroding. Apparatus C was not air tight and let steam leak out. Apparatus D was able to distill 170 ml of water in 6.5 hours at 61% efficiency.</p> <p>Conclusions/Discussion Apparatus D was able to desalinate 170 ml of water in 6.5 hours and was the most successful apparatus. The cost is approximately \$100. However, a person needs about 2 liters of potable water everyday to be healthy. In order for this design to provide enough water for a person's daily use, at 61% efficiency it must be powered by approximately 500 watts and the heating reservoir would have to be increased to hold 6 to 7 Liters. These changes would result in a product that costs approximately \$550.</p>	
Summary Statement We engineered a solar powered apparatus that desalinated saltwater to provide drinking water.	
Help Received Parent used dangerous equipment (table saw; propane torch). Equipment was borrowed from school.	