



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Taylor K. Patrick	Project Number J0299
Project Title Water Waves: The Ultimate Energy Source	
Objectives/Goals I wanted to build a water wave machine that would generate electricity. I wanted to know if bigger waves generate more electricity. I also wanted to see if the number of waves or frequency affected the amount of electricity created. I think that higher waves will produce more electricity and that greater frequency will also generate more electricity.	
Abstract Methods/Materials A 32 ft. wave tank was constructed and a paddle device was attached at one end of the tank to generate the wave action. There are three types of devices that can harness electricity from ocean waves. I decided to concentrate on two types: a flotation device and an oscillating water column (OWC). The bicycle seemed like the logical start because I had to use something that could convert the vertical or seesaw action of the waves into a spinning action that would turn a generator, which would then allow me to see if electricity is created. I made modifications on the bicycle as well as a micro-computer fan and boogie board. Using aluminum and steel pipe I constructed a flotation device. A volt-ohm meter was used to measure the electricity generated. The OWC design was made after reading about a company specializing in wave energy. Using 4 one-way valves, acrylic pipe tubing, and micro computer fan I constructed an OWC device.	
Results After 150 tests with the flotation device I found that higher amplitude waves produced more electricity. On average the highest amplitude produced the highest voltage up to 1.914 volts. However, frequency was harder to determine. It looked like the mid frequency range produced the most electricity. Frequency was one variable which I had difficulty controlling. Unfortunately, I could not get the OWC to work properly. I found out that if you took the whole system and forced it into the water and lifted it back up you could actually generate enough air pressure to get the fan to move.	
Conclusions/Discussion My hypothesis was partially correct. Higher waves did produce more electricity. However, I could not determine for sure if higher frequency of waves produced more electricity. According to research, if we could harness just .1 to .2% of energy from waves we could supply the world with twice as much electricity it now uses. Why are we still so dependent on oil when we should be developing alternative energy sources?	
Summary Statement I wanted to see if larger waves and/or higher frequency of waves would generate more electricity which was tested by using a flotation device and OWC I designed.	
Help Received Dad and friend assisted me in building the 32 ft. wave tank. Dad help cut the pieces of acylic tubing and to cut the blades off the fan with the rotozip also special cuts so that the fans would fit properly. Parents helped with trials. I needed 3 people to help me with the trials. Mother help review and edit my report.	