



# CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

<b>Name(s)</b> <b>Madeline C. Kuney</b>	<b>Project Number</b>  31483
<b>Project Title</b> <b>Solar Desalination: Taking the Salt Out of the Sea</b>	
<b>Objectives/Goals</b> I investigated whether a container's shape affects how much desalinated water (D/W) is produced through solar desalination under set conditions. My hypothesis was that a broad/shallow bowl ("Broad Bowl") would produce more D/W than a narrow/deep bowl ("Narrow Bowl") because the sun will heat the larger, shallower water surface more quickly. <b>Abstract</b> <b>Methods/Materials</b> METHODS: Placed 1 cup (236.5ml) of sea water in 40 containers: 20 Broad Bowls (13cm water surface area ("WSA")) and 20 Narrow Bowls (9cm WSA) along with a metric measuring cup (the "Cup") to collect D/W. Added 3 drops of red coloring dye to distinguish between the sea water and D/W. Containers were covered with plastic wrap and a weight to make the plastic wrap sag so that D/W dripped into the Cup. The 40 containers were exposed to the sun a set period of time and the D/W and environmental conditions were recorded every 2 hours. The total quantity of D/W in each container was recorded and the salinity of the sea water and D/W was measured by both an EC Meter and commercial laboratory. MATERIALS: 5 gallons of sea water; 20 Broad and Narrow Bowls; 40 Cups, fishing weights, and rubber bands; water and air thermometers, EC Meter, aluminum foil, dye, paint.(See, detailed methods and materials list on Science Board and log book.) <b>Results</b> Sample One (3-day test) and Sample Two (2-day test) confirmed that the difference in WSA between the Broad and Narrow Bowls affected the quantity of D/W produced. The results for Sample Two were significantly different and more representative because I modified this experiment to make the slope of the weighted plastic wrap constant for both sized containers. Final measurements: Sample One: 1) Avg. Total Production ("ATP"): Broad Bowls 10.18ml, Narrow Bowls: 8.17ml; 2) Avg. Daily Production ("ADP"): Broad Bowls 3.393ml/day, Narrow Bowls 2.723ml/day. Sample Two (modified method): 1) ATP: Broad Bowls 15.35ml, Narrow Bowls 6.25ml; 2)ADP: Broad Bowls 7.675ml/day, Narrow Bowls 3.125ml/day. <b>Conclusions/Discussion</b> The container's shape and WSA affected how much D/W was produced with the Broad Bowls producing significantly more D/W than the Narrow Bowls.	
<b>Summary Statement</b> This project applies the process of solar desalination to sea water to investigate whether a container's shape affects the quantity of desalinated water produced under set conditions.	
<b>Help Received</b> My father assisted by driving me to Carpenteria to collect the five gallons of sea water, helping to paint the aluminum foil wrapped around the door, and working with me to record some of the measurements during my experiments. I contacted Zalco Laboratories, Inc. to arrange for them to measure the salinity.	