



# CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

<b>Name(s)</b> <b>Jack E. Davis</b>	<b>Project Number</b> <b>S1706</b>
<b>Project Title</b> <b>Aluminum Water Pollution: The Effects of Aluminum on Daphnia magna in Fresh Water</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This science fair project first investigates the current state of aluminum water pollution in fresh water sources such as rivers and lakes. According to the World Health Organization (WHO), "fresh waters with near-neutral pH values usually have aluminum concentrations ranging from 0.001 to 0.05 mg/L but rise to 0.5-1 mg/L in more acidic waters or water rich in organic matter". Using these concentrations as a guide, the following experiments determined the acute toxicity of aluminum (in the form of aluminum nitrate) on <i>Daphnia magna</i>, a known biological indicator species.</p> <p><b>Methods/Materials</b> The first method involved in this project is an aluminum serial dilution, from 10,000 mg/L to 0.001 mg/L. This was replicated multiple times, to accommodate for multiple trials. The second main method involved is the acute toxicity test. Roughly 15 <i>Daphnia magna</i> were placed into each concentration, and were observed over a 48 hour period. At the end of this period, I recorded how many <i>Daphnia</i> had lived, and how many had died. This method was replicated multiple times.</p> <p><b>Results</b> By graphing the results of the experiment, and by finding the corresponding exponential trendline, the LC50 is calculated to be 1.07 mg/L. This means that in fresh water that has an aluminum concentration of 1.07 mg/L, 50% of <i>Daphnia magna</i> will not be able to survive.</p> <p><b>Conclusions/Discussion</b> The data from these experiments show that the LC50 for <i>Daphnia magna</i> is 1.07 mg/L. If the data from the WHO is accurate, then a toxic level of aluminum in waters that are slightly acidic or waters rich in organic matter is likely going to be reached very shortly.</p> <p>Even more troublesome is that few organizations monitor the level of aluminum in fresh water.</p> <p>Over the course of these experiments, I spoke with the lead water quality monitors from the City of San Diego as well as the San Diego Coastkeepers. Both organizations explained that they do not currently monitor aluminum levels in water, citing both difficulty and budget restrictions. Given the results of this experiment, we may only be 0.07 mg/L away from reaching a toxic level of aluminum, and I would propose that aluminum levels be monitored, and efforts be made to reduce the level emitted into water sources.</p>	
<b>Summary Statement</b> This project investigates the current state of aluminum pollution in fresh waters, and determines the LC50 of aluminum for <i>Daphnia magna</i> , a known biological indicator species.	
<b>Help Received</b> Used my high school's lab equipment.	