



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> Alexandria Gallizioli; Sean Wieser	<b>Project Number</b> <b>J1207</b>
<b>Project Title</b> <b>Is Copper the Cause? Investigating Copper in the Santa Cruz Mountain Drinking Water</b>	
<b>Objectives/Goals</b> Part 1: To determine how much copper is in the wells and tap water in the Santa Cruz Mountain homes and research factors and treatment systems that affect it. Part 2: Analyze hair for copper levels as an indicator of its possible effect on health. Hypotheses: *If water stands in copper pipes for 6+ hours or is acidic, then the tap water will have higher levels of copper than the water source. *If the water is flushed for 1 minute or treated with reverse osmosis, carbon filtration, or deionization, then there will be less copper than in the tap water. *If the copper levels are high in ingested water, then there will be high levels of copper in the hair analysis.	
<b>Abstract</b> <b>Methods/Materials</b> We tested well/spring water and tap water from 50 houses in the Santa Cruz Mountains for copper, pH, alkalinity, total dissolve solids, and temperature and had owners complete a water system survey. 2 different faucets unused for 6 hours inside the house were tested and then flushed for 1 minute and retested. Samples from reverse osmosis, deionization, and/or carbon filtration systems were also tested. 3 hair samples were analyzed for copper.	
<b>Results</b> None of the wells or springs contained copper but we found 84% of untreated tap water in the Santa Cruz Mountain homes were above the Ca EPA health goal and 56% were above US EPA action level. 100% of the houses with acidic water also had the maximum amount of copper measurable in their tap water. If you flush the pipes for 1 minute, copper levels are significantly reduced. Reverse osmosis and carbon filtration (refrigerators) are very effective in removing copper. Sean's hair analysis showed high levels of copper and his tap water had high levels. Alexandria's hair sample had ideal levels and she has copper free tap water.	
<b>Conclusions/Discussion</b> Using a t-test we determined that our results were statistically significant. The government should reevaluate whether copper piping should be used. We recommend residents flush faucets 60 seconds before using, use filtered refrigerator water, reverse osmosis with deionization if needed, and add a neutralizing system if the water is acidic. For future research, we would like to test more houses, do more hair analyses, and for part 3, compare copper levels in tap water to the resident's health histories.	
<b>Summary Statement</b> We tested wells and tap water and found that 84% of the tap water had copper levels higher than the CA EPA goal due copper pipes, that excess ingested copper shows up in tissue samples, and that copper can be effectively removed from water.	
<b>Help Received</b> Our mothers drove us to most of the houses tested and to get materials. We used ideas from Sean's brother's science fair board to organize our board. My mother gave advice on getting this abstract to fit the form.	