



# CALIFORNIA STATE SCIENCE FAIR 2004 PROJECT SUMMARY

<b>Name(s)</b> Claire E. McKinley	<b>Project Number</b> <b>J0821</b>
<b>Project Title</b> <b>But Not a Drop to Drink! Third World Water Purification</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective was to find a method of purifying water which was simple, effective and inexpensive, and so could be used in a third world country. Four methods were tested: chlorination, boiling, solar (UV) disinfection, and solar heat disinfection (the AquaPak).</p> <p><b>Methods/Materials</b> The materials obtained were empty water bottles, unopened water bottles, secondary effluent, 1 bottle of Clorox bleach, 1 AquaPak, 1 stainless steel pot and 1 eyedropper. The empty bottles were cleaned and filled with a mixture of secondary effluent and bottled water in a ratio of one to ten, respectively. Two drops of bleach were added to six samples. Water for another six samples was boiled for thirty minutes. Six samples were placed in direct sunlight for six hours. Another six samples were poured into the AquaPak and placed in the sun, and at least one sample was refrigerated, serving as the control. This entire process was repeated three times.</p> <p><b>Results</b> The samples were subjected to a heterotrophic plate count. The control plates averaged 168.4 colonies. With chlorination, the plates averaged 4.8 colonies. Chlorination was the most effective method in eliminating the bacteria. The next most effective method was boiling, which averaged 5.9 colonies per plate. The third most effective method, according to the results, appeared to be the AquaPak, which averaged 19 colonies per plate. The least effective method in this experiment was solar (UV) disinfection, which averaged 110.3 colonies per plate.</p> <p><b>Conclusions/Discussion</b> Chlorination was effective in eliminating bacteria and is an inexpensive method of purifying water. It is also less subject to inadvertent contamination than the other methods, since it's able to eliminate bacteria after its addition to the water. Although boiling is also very effective, it's possible that water can be contaminated after it is boiled. Boiling should have eliminated all bacterial colonies in this experiment, and its failure to do so suggests inadvertent contamination. Also, boiling is easily the most expensive method tested, and cost is an extremely important consideration in the third world. The AquaPak eliminated most of the bacteria, and it was also very inexpensive. However, the AquaPak did not eliminate as many bacterial colonies as boiling or chlorination. In this experiment, solar (UV) disinfection was an ineffective method of water purification.</p>	
<b>Summary Statement</b> The objective was to find a method of purifying water which was simple, effective and inexpensive, and so could be used in a third world country; four methods were tested.	
<b>Help Received</b> My mother drove me to San Elijo Water Reclamation Facility - the lab where I tested my samples. Suzanne Mosko (a chemist at the lab) provided me with secondary effluent and taught me how to do a heterotrophic plate count. My science teacher, Mrs. Hunker, edited my abstract and my report.	