



CALIFORNIA STATE SCIENCE FAIR 2017 PROJECT SUMMARY

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Project Title Surviving Disaster: Purifying Contaminated Water Using Only Junk and Debris in the Aftermath	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this project is to save lives in the aftermath of disaster by building a water filter using junk & debris that produces safe water for varied family sizes. Central Valley residents are spread out far more than a dense, metropolitan area thereby presenting a challenge for emergency services to locate them. The body can go 3 days without water and less, if subjected to sweltering Valley temperatures. FEMA's average response time is 3-4 days.</p> <p>Methods/Materials Materials were scavenged from the surrounding area consisting of 5.5 miles. Prototypes were designed and built from materials that would be available following disaster. Wood was collected and burned to make charcoal. An Egyptian well was constructed to pre-filter river water. Contamination levels were tested with an EPA approved test kit. It was hypothesized that the filter with the cleanest water would produce the least amount of liters per hour.(LPH)</p> <p>Results Round One testing rejects the hypothesis because all prototypes tested positive for bacteria. Design adjustments aimed to improve filtering and flow rate. Each Round Two filter was flushed with one liter of pure rain water. It was poured back through each filter 3 days in a row. The Egyptian well was left to fill overnight so the sediment could settle. After Round Two samples were collected, one model was boiled at 100 Degrees Celsius. This model produced the least amount of LPH and tested safe for drinking with a flow rate capable of supplying 1-4 people per day. Therefore, the hypothesis is accepted for Round Two.</p> <p>Conclusions/Discussion The goal of purifying safe water was fulfilled by the filter that produced the least amount of LPH. One filter could sustain a family of 4 until assistance arrives. However, multiple filters, or a scaling up of this model would be necessary for larger families. While this filter could save lives, further research & testing is paramount regarding the varying environmental factors that could alter results in different circumstances. These include the heavy rainfall between testing rounds, the area being crop dusted right before the disaster, the presence of algae in summer months and the possibility of animals inhabiting the water upstream from the collection site. If these factors can be eliminated through further testing, the model will, in fact, save the lives of families in the aftermath of a disaster.</p>	
Summary Statement This project aimed to design, build and test a water purification system using only junk & debris found in the aftermath of a natural disaster thereby possibly saving the lives of Valley Families.	
Help Received Earned money for test kits by babysitting. Charcoal was burned at a friend's ranch. Nathan Olson, Lemoore Public Works Director & his son explained how to figure LPH. Grandmother paid for board materials. God, because without Him, I'm nothing.	