



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

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Project Title Ice Spike Formation in the Presence of a Strong Wind	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this experiment was to characterize the specific conditions of ice spike formation in the presence of a strong wind.</p> <p>Methods/Materials The experiment was conducted by testing various types of water (i.e. Arrowhead steam-distilled water, Alhambra crystal fresh reverse-osmosis drinking water, and Santa Clara city tap water) in different ice cube containers (plastic and aluminum). A temperature-controlled environmental chamber was used to conduct the trials. Containers were filled with the same amount of water, with and without contaminants. Spike growth was continuously monitored over a range of temperatures (-5C to -30C). The process was visually and continuously observed with a video camera.</p> <p>Results Ice spike formation under conditions of a strong wind created by the blower in the temperature-controlled environmental chamber is best in a non-aluminum container using distilled water at -5C to -11C.</p> <p>Conclusions/Discussion Any minimal amount of sediment, particles, or minerals present in the water prevented the formation of ice spikes. The internal pressure that builds up in the ice cell results in bulges and cracks, which eventually pave the way for the formation of ice spikes. Ice spike growth continues to a certain limit, yet further research must be done to determine the nature of this process. It was concluded that the research hypothesis of this project was fully supported because: 1. ice spikes of different character formed in distilled water at a variety of temperatures; 2. ice spikes did not form in Santa Clara city tap water due to its mineral content; 3. ice spikes did not form in distilled water contaminated by sodium chloride; 4. it appears that the smallest amount of contamination inhibited ice spike formation. Avenues for further study were also identified.</p>	
Summary Statement Ice spike formation was observed in a temperature-controlled environmental chamber and optimal conditions for their formation were identified.	
Help Received Supportive mentoring was provided by Dr. John C. Howe and Dr. Charles Barker. They also provided ongoing supervision in the use of the environmental test facilities at Aurora Networks in Santa Clara to ensure proper safety procedures were followed.	