



**CALIFORNIA STATE SCIENCE FAIR  
2008 PROJECT SUMMARY**

<b>Name(s)</b> <b>Katherine W. Glockner</b>	<b>Project Number</b> <b>J1115</b>
<b>Project Title</b> <b>Firestorm Fallout: Effects of Particulate Exposure on Peak Flow Rate</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this project was to determine if poor air quality during a week of extensive wildfires negatively affected children's lungs according to tests using peak flow meters. To get a peak flow rate, a subject blows as fast and hard as possible. Peak flow rate is a fairly accurate measure of lung capacity. I hypothesized that all of the subjects' peak flow rates would improve over time, but that depending on protective measures taken and proximity to the fire, the rates of improvement might vary.</p> <p><b>Methods/Materials</b> I performed a total of 895 tests in my experiment. I tested 149 students in grades 4 through 8 a total of six times, spanning from one to seven weeks after the fire reached the north coast of San Diego County. On my first day of testing, I distributed a questionnaire to gather information about each student's activities during the week of the fires. On both the first day and all subsequent test days, I entered the classrooms, distributed peak flow meters, briefly explained how to use them, and collected the highest reading for each student. Before going to the next class, I wore gloves and goggles to thoroughly wash each peak flow meter using alcohol. To keep the meters as sterile as possible, I used disposable mouthpieces as well.</p> <p><b>Results</b> Unexpectedly, the peak flow rates were always within the normal ranges during the test period. However, some distinct patterns emerged. Those subjects who received either mandatory or voluntary evacuation calls (those who lived closer to the fires) had consistently lower maximum peak flow rates than students who did not live in an evacuation zone. This suggested that proximity to the fire, and thus greater exposure to particulates, impacted peak flow rates. Also, the lower the daily air quality index (indicating better air quality), the higher the peak flow rates.</p> <p><b>Conclusions/Discussion</b> My results showed a significant inverse correlation between the air quality index levels for each day and the peak flow rates. Peak flow rates appeared to be influenced more by the daily air quality index level than by the length of time after the fire. Proximity to the fire also seemed to be a factor since it impacted maximum peak flow rate.</p>	
<b>Summary Statement</b> This project uses peak flow rate in an attempt to measure the effects of particulate exposure on children's lungs one to seven weeks after a wildfire.	
<b>Help Received</b> My mother, father, and science teacher supported and advised me; my math teacher and statistician John Polich explained linear regression; Dr. Amy Oro, a pediatric allergist, supplied charts of normal peak flow rates; North Coast Family Medical Group demonstrated peak flow meter cleaning procedures.	