



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Joseph C.A. Kost</b>	<b>Project Number</b> <b>J2220</b>
<b>Project Title</b> <b>Beating Duraflame(R): What Kind of Firewood Offers the Best Value?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective is to determine if Duraflame(R) burns the longest, generates the most heat and provides the best firewood value. <b>Methods/Materials</b> Samples of five different wood types of equal mass and approximately the same size were burned using denatured alcohol as a fire starter. The heat produced by each sample was determined indirectly by measuring the mass of water evaporated from a container placed directly above the fire. As the water boiled on each trial, the heat produced was proportional to the water evaporated. The cost per gram of each wood sample was determined from the best prices available locally or online. The best heating value was determined by dividing the heat produced by the sample cost. <b>Results</b> Duraflame(R) burned the longest and provided the most heat, but was second to worst in heating value. Seasoned Oak provided the best heating value of the five wood types tested. <b>Conclusions/Discussion</b> Each wood type tested had different heat production and burning rates. The heat generated differed between samples of the same wood type. This showed that uncontrolled factors such as wood moisture content, sample density and geometry, completeness of combustion, outdoor wind speed, water temperature and air temperature influenced the test results. Duraflame(R) burned the longest and provided the most heat, but performed second to worst in heating value, due primarily to its high cost compared to the other wood types. Seasoned Oak provided the best heating value of the five wood types tested.	
<b>Summary Statement</b> The purpose of this experiment is to find out whether any firewood is more cost-effective for heating than Duraflame(R) and which firewood generates the most heat for a given mass.	
<b>Help Received</b> My father supervised the experiment at our home and assisted in putting the boards together. My mother helped type my report. My brother, Jordan, took pictures of me conducting the experiment. My science teacher, Miss Amber Baranowski, and Doctor Gerald Oliver reviewed my drafts and offered advice.	