



**CALIFORNIA STATE SCIENCE FAIR  
2004 PROJECT SUMMARY**

<b>Name(s)</b> <b>Andrea K. Flinn</b>	<b>Project Number</b> <b>S0206</b>
<b>Project Title</b> <b>Is the Corrective Accelerated Blister Testing of Orthophthalic Laminate Valid?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective is to test the validity of a more accurate method of measuring the resistance of orthophthalic laminate to degradation by water.</p> <p><b>Methods/Materials</b> Three groups of 100 laminate samples were labeled, massed, and submerged in distilled water. The groups were cooked at 55°C, 65°C and 93°C for 47, 13.5, and 1.25 days, respectively, so that all groups should have degraded equally. The cooked groups were massed. The average mass of the water gained was calculated for each group. Implementing the new method, all samples were dried in an industrial oven at 71°C for 8 hours and under a vacuum for 30 hours. The samples were massed again, and the average differences between the original and dried masses were calculated. When added to the original masses of water absorbed, these values revolutionarily accounted for the mass lost when blisters on the laminates broke. The percent difference was found between the groups' uncorrected values, then corrected values, and finally between each group's corrected and uncorrected values.</p> <p><b>Results</b> A 19.7% difference existed between the average mass of water absorbed by samples at 55°C and 65°C, while a 64.67% difference existed between those at 55°C and 93°C. These deviations indicate that accelerated testing is invalid. Data indicates that a mass (an average 0.018 grams per sample) was lost from blisters bursting only in the group at 65°C. The group's corrected and uncorrected values differed by 0.6%.</p> <p><b>Conclusions/Discussion</b> s the amount of water absorbed differs by more than 15% between the groups, the data does not support accelerated testing. It cannot support the corrective test without supporting accelerated testing, and so does not support the hypothesis which states that if the groups absorb equal masses of water, then the corrective test is supported. However, the mass lost when blisters burst indicates that the new test measures a value which the old cannot. During longer periods of submersion, this value becomes more significant in the overestimation of laminates' stability. Such inaccuracies endanger the lives of those who rely on the stability of marine crafts made from orthophthalic polyester laminates.</p>	
<b>Summary Statement</b> A more accurate method was engineered for determining the resistance of orthophthalic polyester laminate, a material used in marine crafts' hulls, to degradation by water, and that method's validity was tested.	
<b>Help Received</b> Survival Systems International donated 300 laminate samples, two thermometers, and a scale to the project. A qualified technician at SSI placed the samples in and removed them from the industrial oven and vacuum. A neighbor, Caroline Nelson, recorded the samples' temperatures for a week.	