



2009

MASSACHUSETTS CLEAN TECHNOLOGY AWARDS

A Program from The Foresight Project Inc; www.theforesightproject.org



Region I, Western MA
CleanTech Award:

Miranda Mooring and
Elizabeth Niedziela,
Hopkins Academy,
Hadley

"Hello Sunshine"

ABOUT US:

My name is Elizabeth Niedziela. I am 14 years old and live on a small farm in Hadley, MA, with my mother, father, and younger sister. Both of my parents work at the school I go to. I have one dog named Louie, three rabbits, two fish, a cat, and some sheep. My hobbies include playing soccer, showing sheep, and drawing. I spend most of my summer traveling to different sheep shows. The farthest I have traveled is Kentucky but this summer I will go to Wyoming. I also enjoy watching football. My favorite team is the New England Patriots. I have been to some of their training camp practices and have some of their autographs.

My name is Miranda Mooring. I am 15 years old. I live with my mom, Susan, my dad, Guilford II, and my two sisters, Corinne who is 13 and Jessica who is 11. I also have a dog, Cocoa and a cat, Smokey. I have lived in Hadley for 8 years. My mom is a teacher at the local elementary school and my dad works in Amherst, the next town over, as the DPW Director. One of my hobbies is cheerleading (we only cheer at basketball games so it is a very short season). I also baby sit a lot and I keep score for the girls JV Softball team.

OUR PROJECT:

The purpose of our experiment was to determine if the density of a liquid affects how fast it heats up in a thermal solar collector. The hypothesis was that the least dense liquid would heat up faster than the liquid that is denser. We choose this project because people are becoming more environmentally conscious about the energy that they use, and buying solar collector to capture the heat from the sun, so we decided to build a thermal solar collector and test different liquids to see which is more efficient in capturing the heat.

The liquids that were used are water, salt water, and antifreeze. The control was plain water. The experimental set up is a solar collector, with the different fluids going through it. The first step was to build a solar collector, which we did, using plywood, a garden hose, clear vinyl, and insulation. It was

painted black to absorb more heat. Three gallons of each liquid was run through the solar collector starting with the water, then the salt water, and then the antifreeze. Each liquid was timed for 30 minutes checking the temperature every 3 minutes. Then the density of each liquid was calculated.

The results were not as predicted. The antifreeze, which is the densest liquid, heated up at the rate of .39 degrees Celsius per minute. The water, which is the least dense, heated up at a rate of .26 degrees Celsius and the salt water heated up at a rate of .34 degrees Celsius. So the antifreeze, the densest of the liquids that we tried, heated up the fastest. The final temperature of the water reached 24.5° C, the salt water reached 23.8° C and the antifreeze reached a final temperature of 23.6° C. Although the water heated up more slowly it reached the highest temperature; the antifreeze heated up the fastest but had the lowest final temperature.

Antifreeze would be the best choice to put in a solar collector because it heats up the fastest. It is also good because it will prevent the pipes from freezing in colder weather better than plain water would. This experiment could be improved by putting the bucket with the liquid in an insulated container so it will hold the heat longer.