

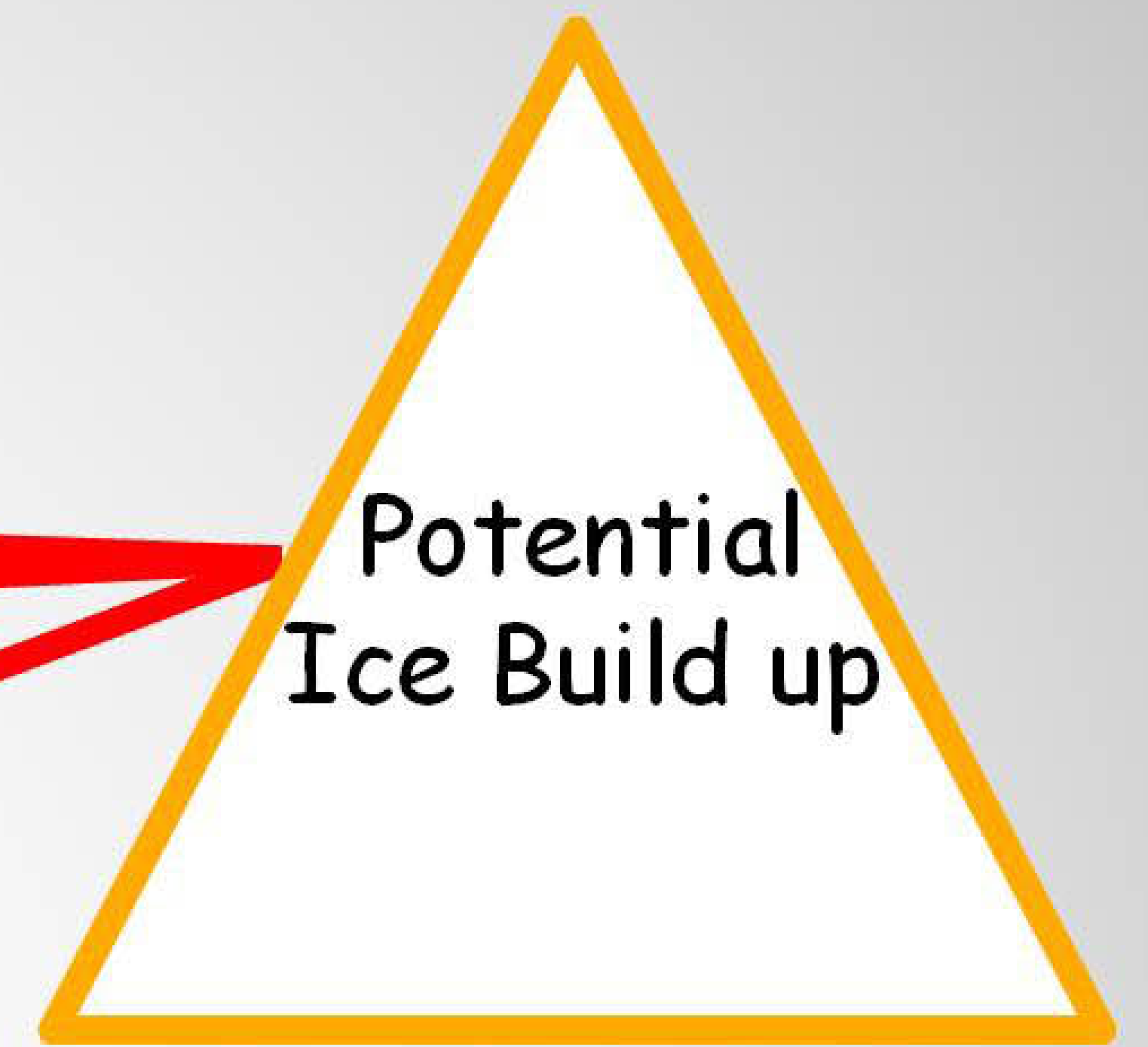
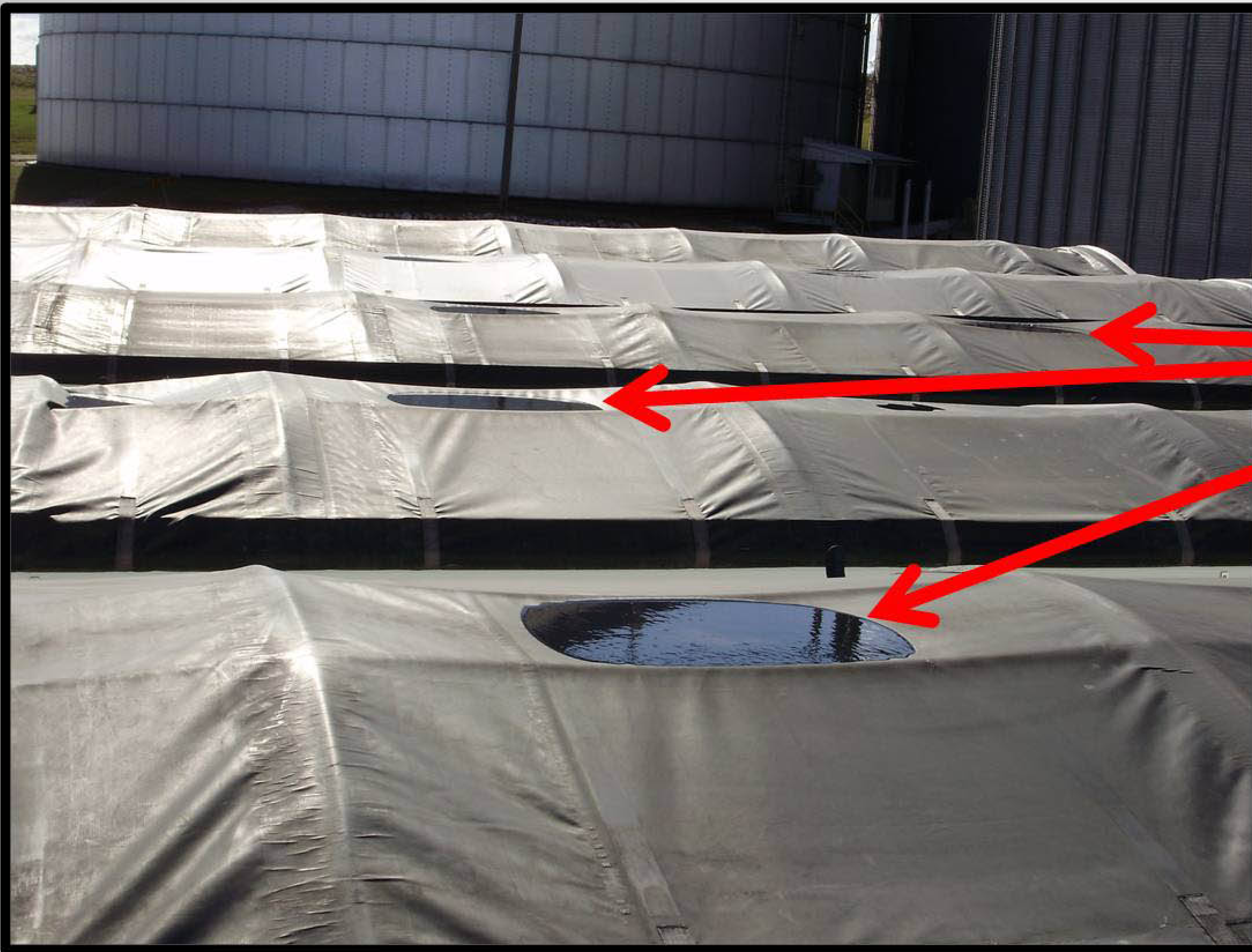
# Heated Semi Tarp

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## Problem Statement

During the winter months there becomes the possibility for water to turn into ice. This ice is usually stuck in the lowest part of the tarp which is commonly in-between the tarp bows on the trailer. The large chunks of ice make it nearly impossible to open the tarp, and the excess weight added to the tarp can cause the tarp to tear.

## Solution

Create a heated semi tarp that will assist in the melting of both ice and snow. This will make it easier to open the tarp during the winter months, and also prevent any unnecessary damage.

## Deliverables

- Create a working heated tarp prototype
- Test the prototype and determine a heating value through analysis
- Determine the electrical requirements

## Project Application

To test the theory of a heated tarp  
Investigate public interest  
Adapt tarp to automated opening system

# Heated Semi Tarp

## Overview

### Materials & Production Cost

- Industry standard 22 ounce vinyl tarp material (\$1.20/square foot)
- Outdoor heating cable (\$0.50 / foot)
- Installation Labor \$100
- Total production Cost for Prototype \$250
- Estimated cost for 30' x 10' Heated tarp \$700 including the \$200 for installation
- This is only \$300 more than a regular with the same dimensions



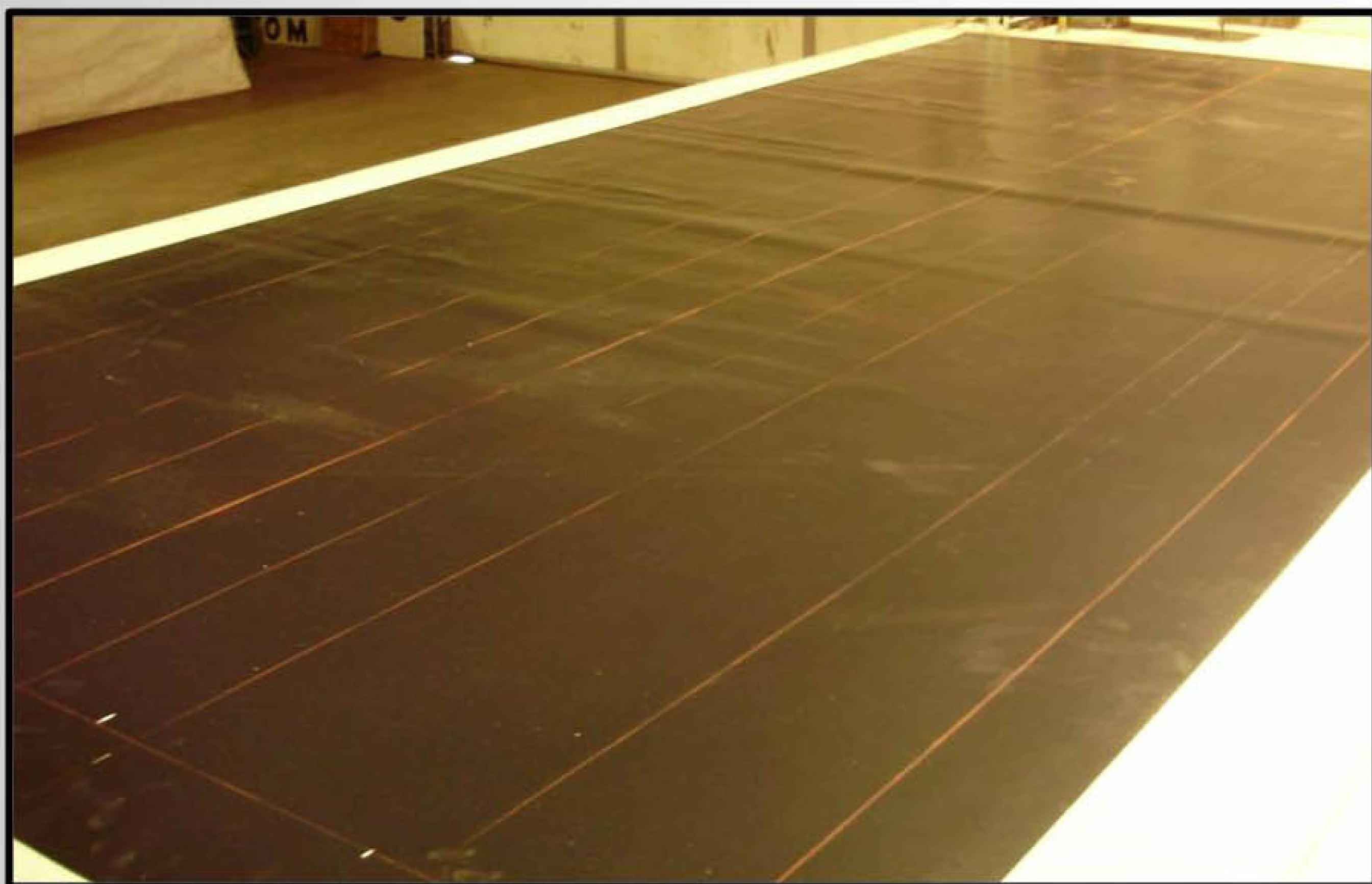
### Energy Requirements

#### Prototype

- 5 Watts per foot, 400 Total Watts
- 3.3 Amps for experimental tarp @ 120 Volts

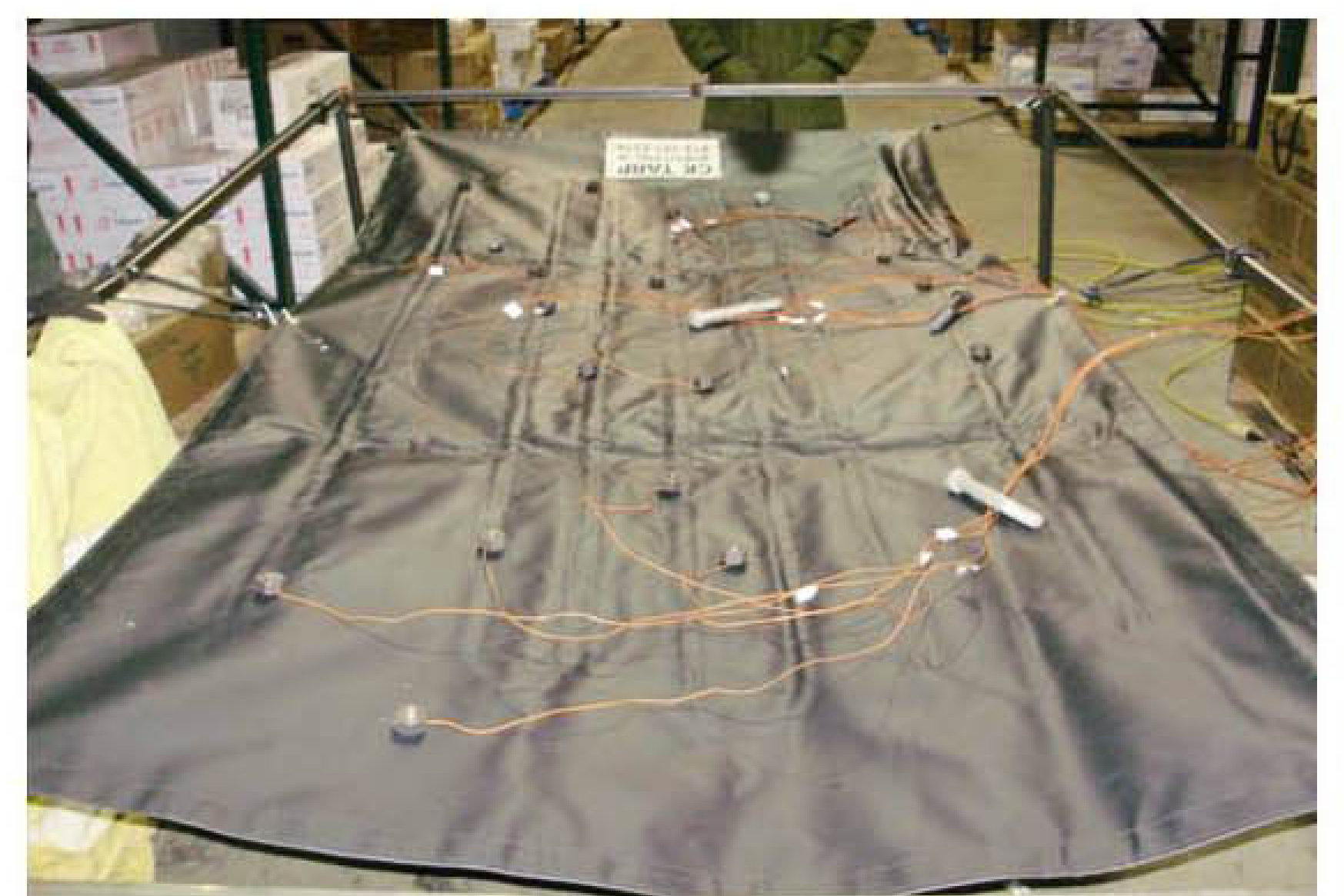
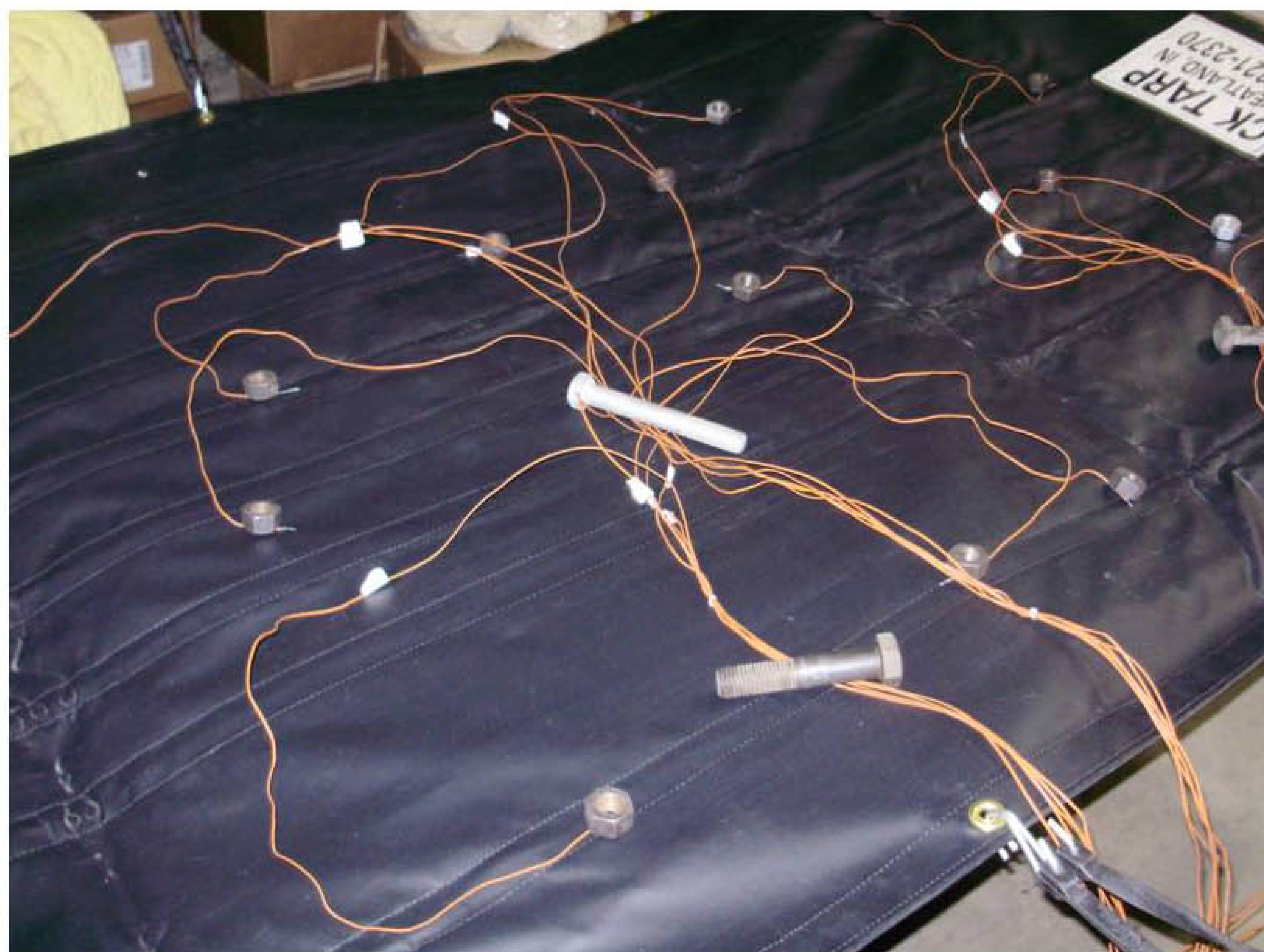
#### Full Size

- For large 30'x10' tarp the requirements are:
  - 250' of wire
  - 10 amps
  - 1200 Watts
- The energy cost for running the 1200W tarp for 12 hours @ \$0.09/kWh will be \$1.30 per day.
- The estimated operating cost per month is \$40
- Overall cost for a heated tarp is roughly \$160 per year on top of the additional \$200 for installation
- With a heated tarp life of 7 years the estimated cost of ownership is \$189 per year



### Testing

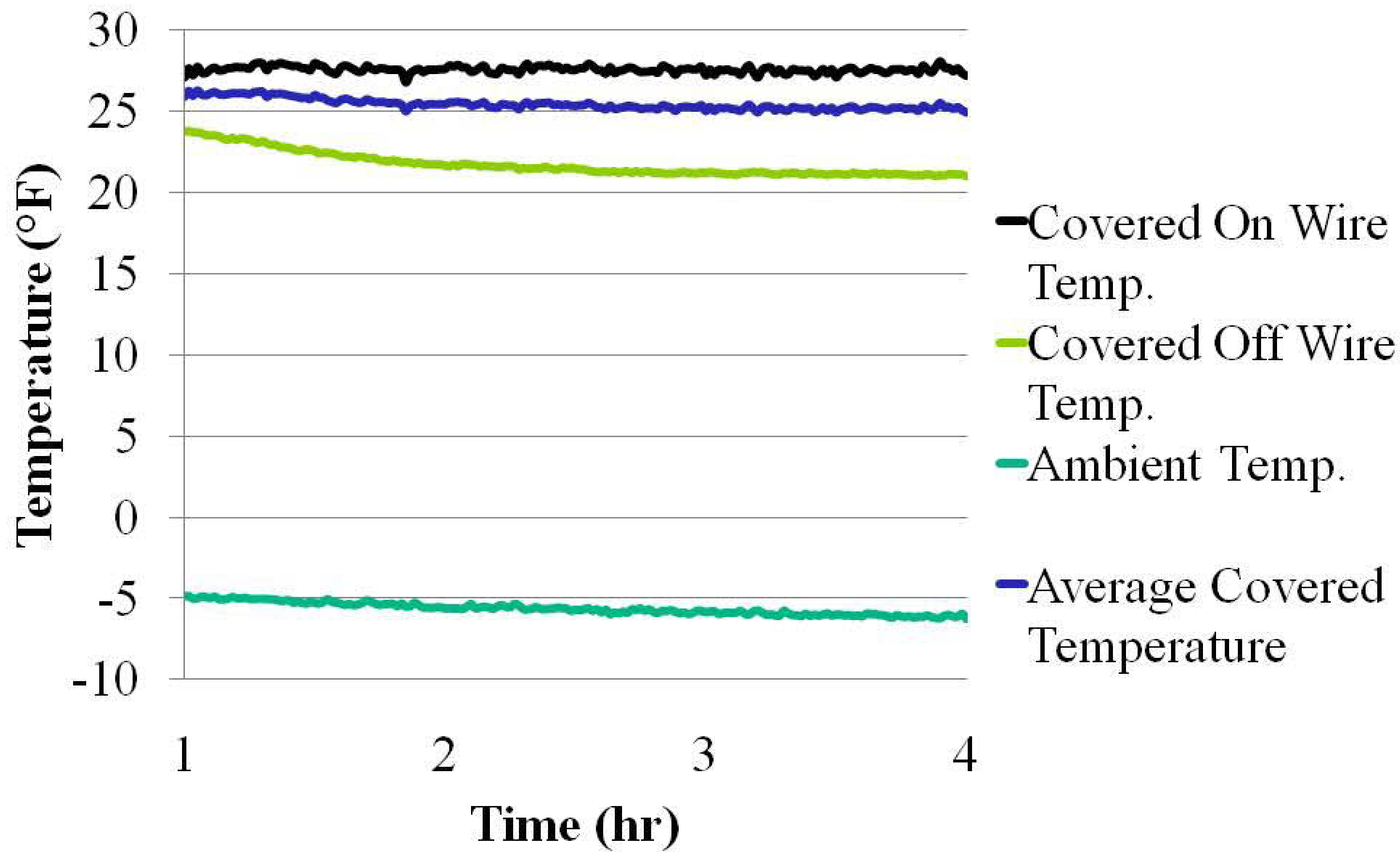
- Average Temperature -5°F
- Data Logger
- Insulation to simulate snow



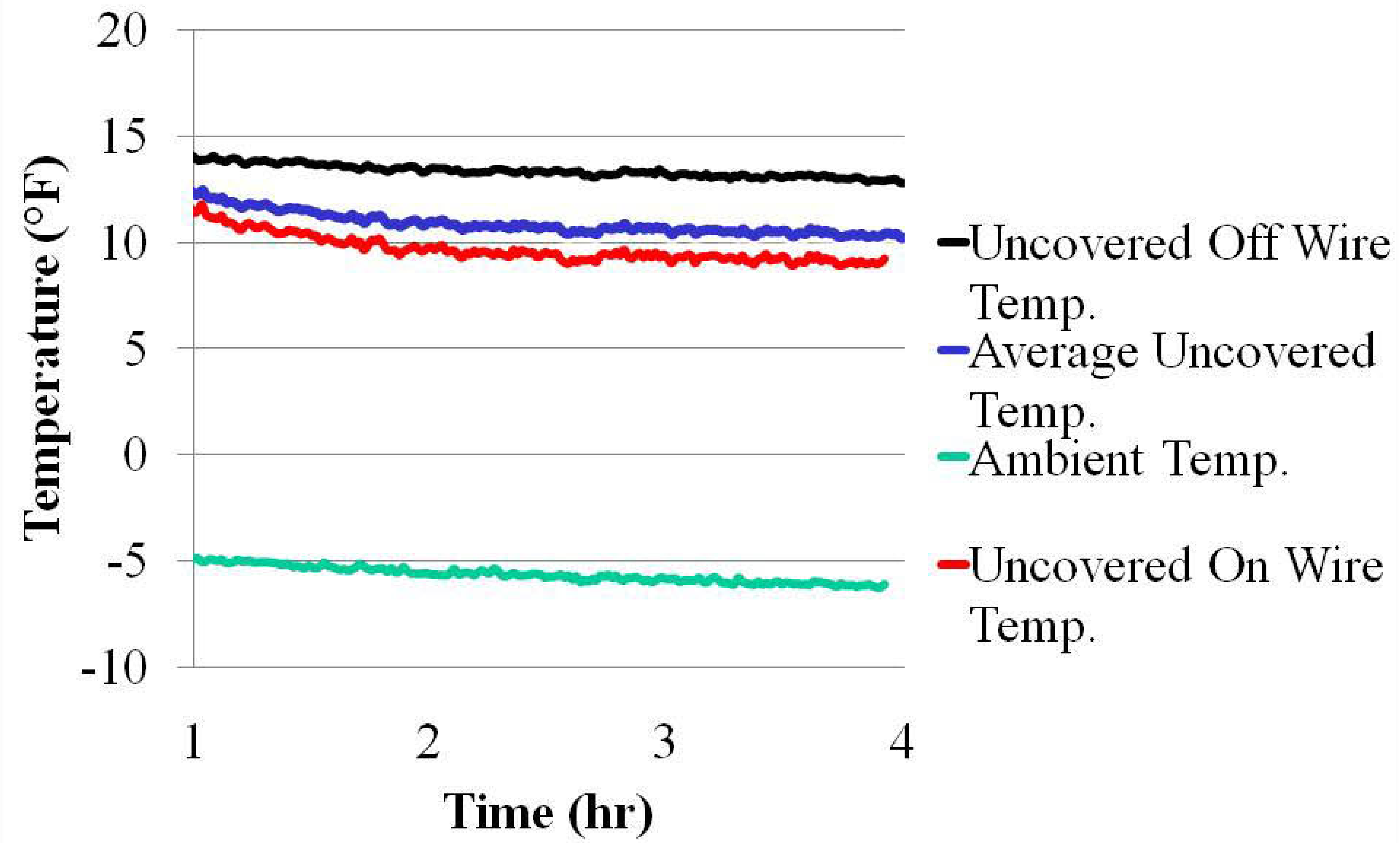
# Heated Semi Tarp

## Data Analysis

Temperature Analysis on Covered Tarp

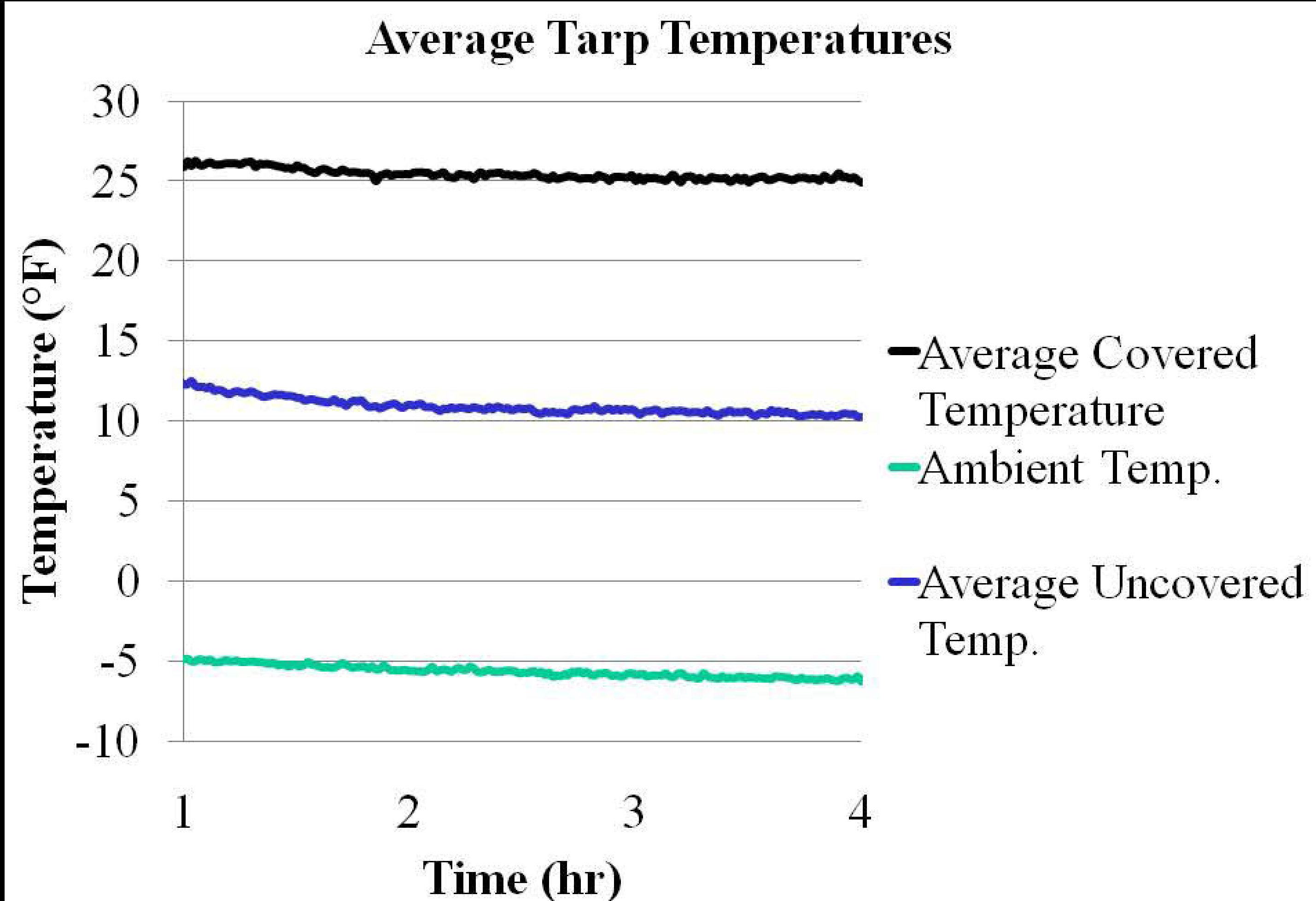
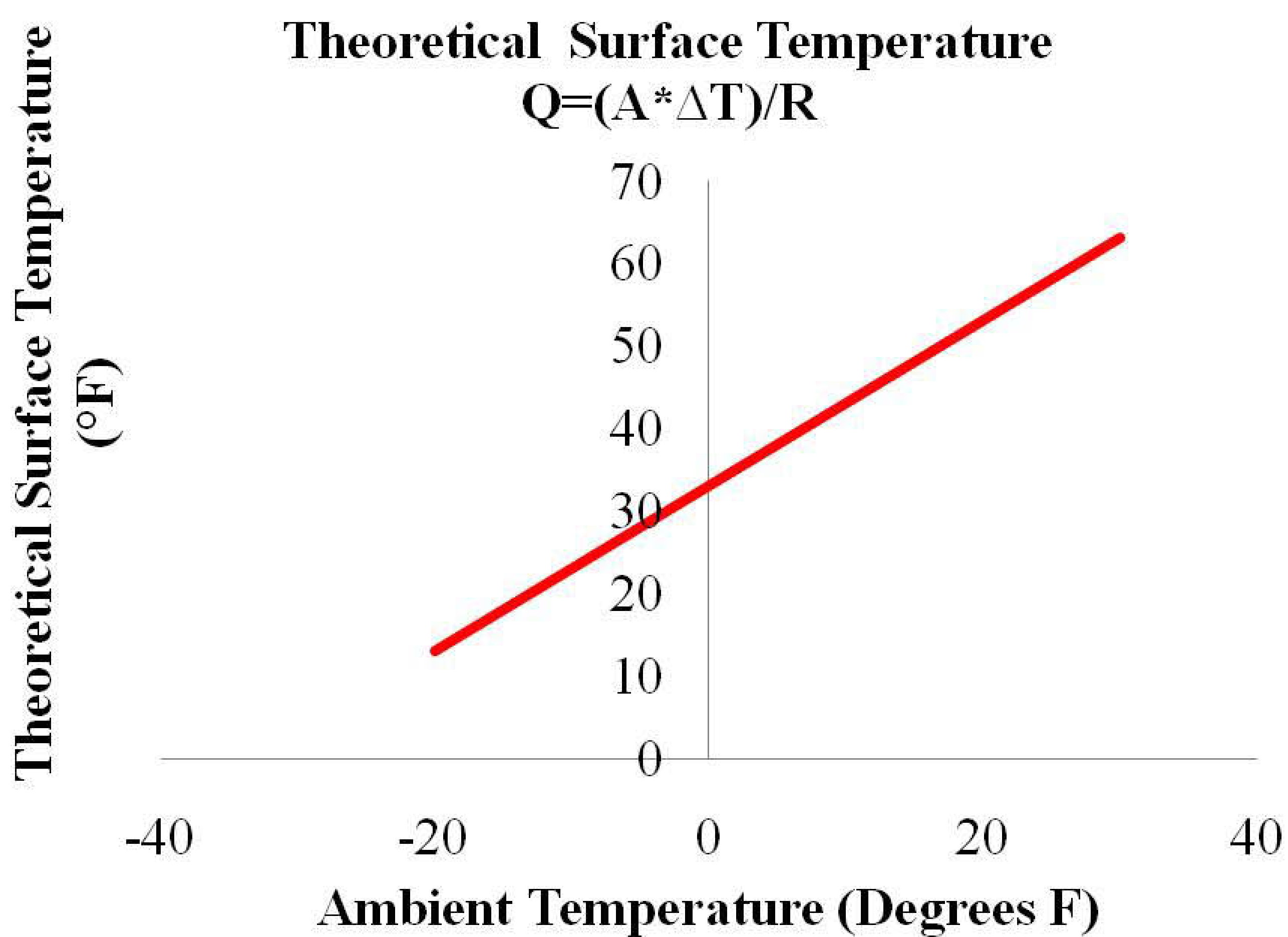


Temperature Analysis on Uncovered Tarp



### The Details

- Test was conducted in food stores freezer with an average temperature of about -5°F.
- We calculated that at -5 degrees, the maximum temperature we could achieve is 28°F.
- The average tarp temperature was calculated by taking the mean of the covered thermocouples. The same was done for the uncovered thermocouples and they were both graphed separately.
- The highest average temperature we actually achieved was approximately 25°F.
- The lowest average temperature in the lower 48 states is 5.9°F in North Dakota.
- The lowest average temperature in Indiana is 15.8°F.
- At 5 °F a temperature of 38 °F can be maintained.
- Based on the information we collected, we feel our tarp will work in almost all areas of the country.



Special Thanks to...  
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