

A photograph of a solar tower in a desert landscape. The sun is bright in the upper left corner, creating a lens flare effect. The solar tower is a tall, cylindrical structure on the right side of the image, with a flat base. The ground is a flat, light-colored desert floor. The sky is a clear, pale blue. The text is overlaid on the image in a white, monospace font.

# The Solar Solution

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# Introduction - *our project*

- Construct a small scale model solar chimney
- Test for ambient air temperatures effect on the internal velocities of the chimney
- Draw a conclusion by comparing ambient air temperature VS chimney velocity
- Draw possible conclusions on operability of solar chimney use in WA state

# Construction



- 1/100 Scale
- Polyethylene Plastic
- Stake perimeter
- Tower PVC
- Tower base from steel

# Deciding on the Scale



- Space available
- Cost of materials
- Manageable size

# The Test

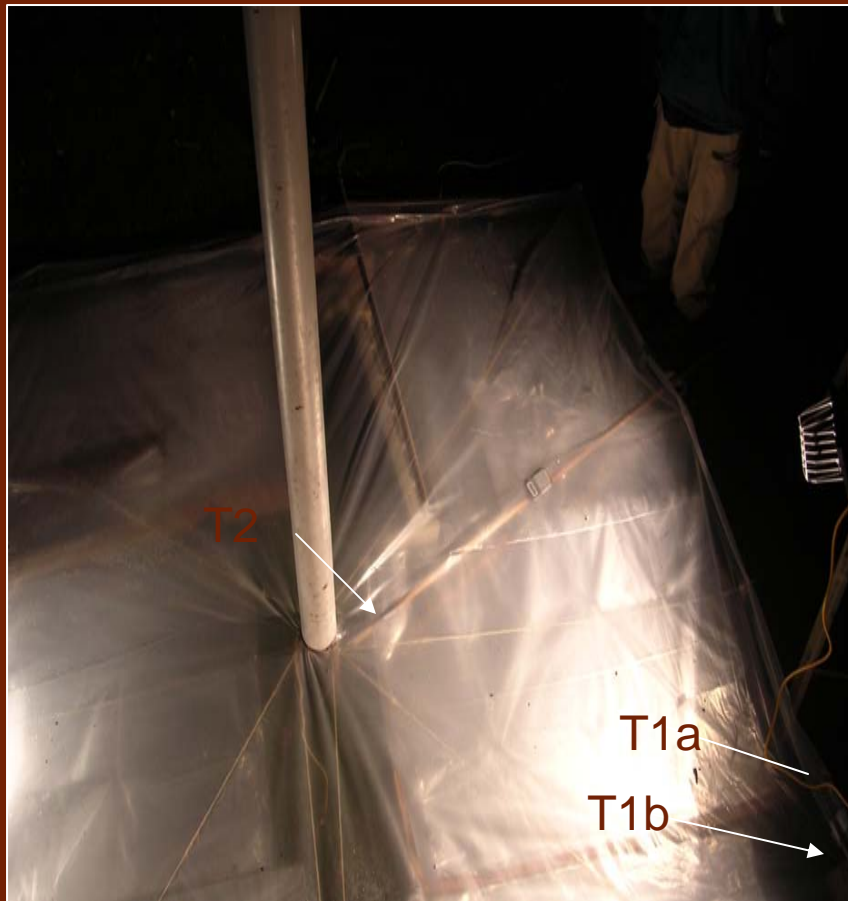
- Energy input remains constant through the use of 3 500W construction lamps
- Ambient air was varied according to natural weather conditions
- Temperature was monitored at two points
  - T1=Temperature at base of chimney
  - T2=Temperature at perimeter or ambient temp

# Data Recording



- Temp was recorded every 5 min. with velocity ranges recorded for 30 second periods again every 5 min.

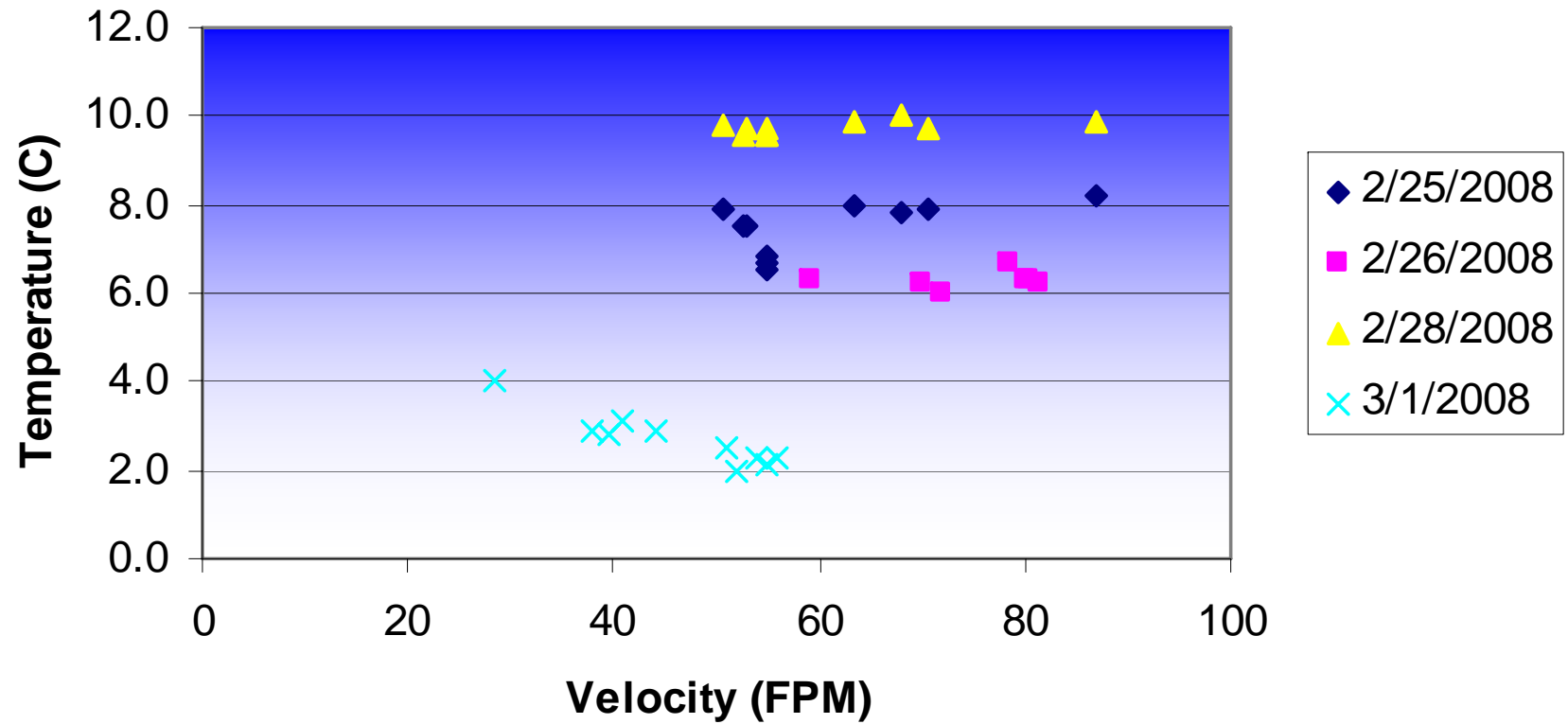
# Thermometer Placement



- The same thermometers were used in the same locations every day
- T1a and T1b ambient temperatures
- T2 tower temperature at the base

# Results

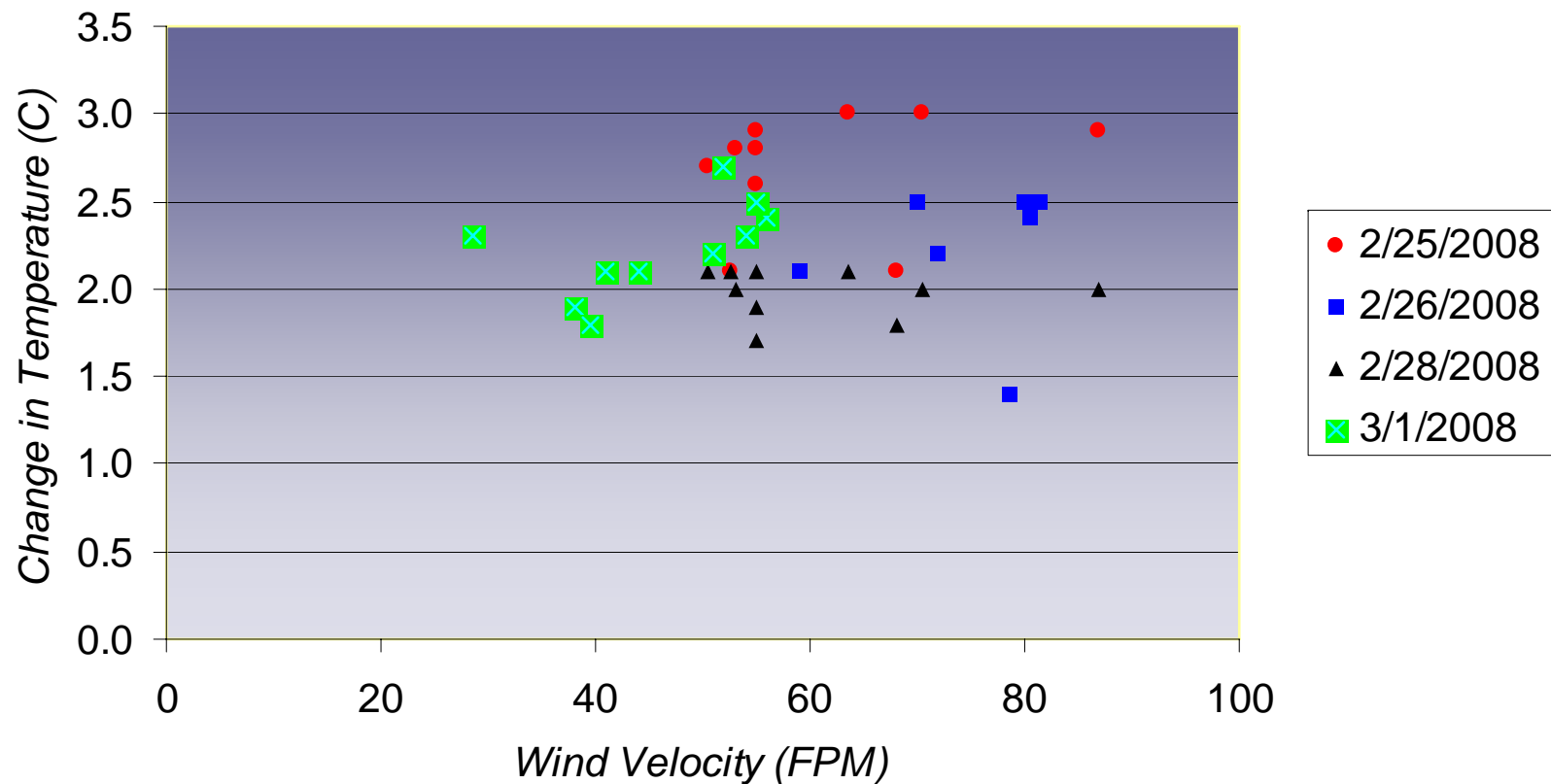
## Temperature Versus Air Velocity





# More Data

## Air Velocity VS Change in Temperature



# The Limitations

- The weather and moisture was an uncontrollable factor
- Humidity were not taken into account
- No density gradient that accurately represents the one found in the atmosphere
- The anemometer was not a fixed
- More accurate thermometers

## Things to Consider

- Minimum US wind velocity for mass energy production facility is 6.4m/s(1260ft/m)
- Our average velocity is 50ft/m
- Our solar input is 1/9<sup>th</sup> the average global input
- Our model is 1/100<sup>th</sup> the scale

# Conclusion

- Ambient air has no effect on air velocity thus solar chimneys have the capacity to function on a grand scale in Washington state.

# References

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