



## An Energy Efficiency Experiment

In "Swords Into Plowshares - At Home in a Missile Silo" Tony Crossley says of his underground home:

The winters are bitterly cold, the summers feature spectacular afternoon thunderstorms and occasional tornadoes, and throughout the year we get days when the wind is very strong. Underground it's always quiet and peaceful, and no matter how cold it gets outside the interior never freezes even though we don't have any heating yet.

Even in an area with an extreme climate the ground maintains a relatively constant temperature. Because of this, a house that is built partly or entirely underground can be more energy efficient than an aboveground home. During the winter the ground is warmer than the air. During the summer it is cooler. Any large mass of earth tends to maintain a constant temperature. You can see for yourself how this works by testing how long it takes for a thermometer buried in sand or soil to reach the temperature of surrounding air.

You will need:

- a thermometer
- a cup of sand or soil
- a refrigerator or freezer

a chart like the one below to record your results

Here's what to do:

1. Make note of the room temperature as indicated on the thermometer.
2. Put the thermometer in the refrigerator or freezer. Check the thermometer at one-minute intervals until the temperature does not change from one reading to the next. Make note of this low reading.
3. Take the thermometer out of the refrigerator or freezer and allow it to return to room temperature.
4. Stick the thermometer into the cup of sand or soil and record the temperature on the first line of the chart opposite the word "start".
5. Put the cup into the refrigerator or freezer.
6. Check the temperature every ten minutes and record your results on the chart. Continue to do this until it reaches the temperature that you recorded in step 2 above.

It may take more or less than 120 minutes for the temperature of the sand



We used a cooking thermometer with a range of 0 to 220 degrees Fahrenheit (-18 to 104 degrees Celsius).

# An Energy Efficiency Experiment

## Temperature Change

Time in Minutes	Temperature
start	
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	
110	
120	
130	
140	
150	
160	
170	
180	