Weather Station Description

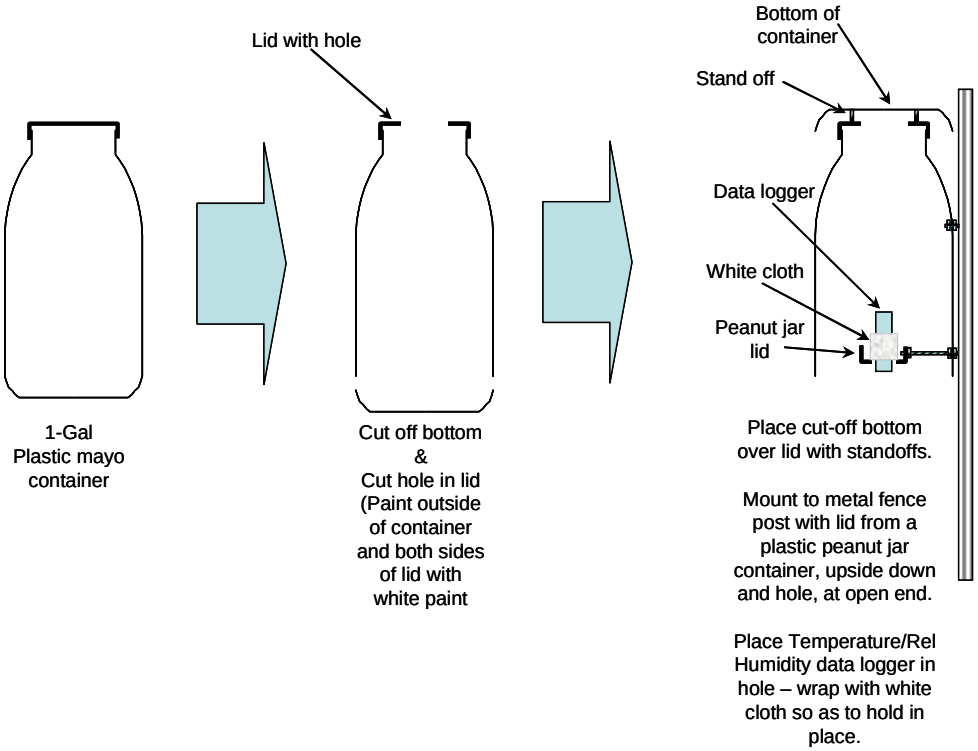
I describe three weather stations here, two being my design and the third being the one at the Staunton Water Treatment Plant. (Note: NOAA calls the latter the "Staunton Sewage Plant, 448062.)

I have limited funds, so buying a Stevenson Screen was out of the question. I have built two.

The first I built I called the "MAYO Station", and the second I call the "GAS VENT Station". (There is a design I found after building the MAYO since making the MAYO: (http://www.loganvillageweather.com/station/stevenson.html). When I saw this I decided to try it next, but when I visited a building supplier for the parts I found instead a ready-made housing which has become my GAS VENT version.

1 – MAYO Station

Instructions:
- Take a 1-gal plastic mayo jar and cut off the bottom, where the 'round' of the bottom begins
- Drill a hole in the lid, ~ 1.5-inch diameter.
- Paint the outside of the container, the cut-off bottom, and the inside & outside of the lid.
- Use the cut-off bottom as a lid cover using four standoffs.
- Cut a hole, slightly larger than the diameter of a Lascar Model EL-USB-2 data logger
  (I bought my data logger from Innovative Tech Works. You can buy directly from Lascar.)
- Paint the peanut butter jar lid white.
- Drive a metal fence post and paint white.
- Mount the modified container to the post using a short top bolt and a long bottom bolt that holds the peanut butter jar lid.
- Wrap white cloth around the data logger so that when the logger is placed in the hole of the peanut lid it does not slip through. (Hold the cloth around the logger using a long tie.
- The bottom of the data logger is 33.5" above the ground's surface.



A far view of the Mayo Weather Station is shown in Figure 1. The bottom of the station is 34 inches above the ground. (Yes, this is less than the 41-inch minimum.) Figure 2 is looking up, into the station, at the data logger. The bottom of the logger is about 0.25 inch above the bottom lip of the station.

Figure 1

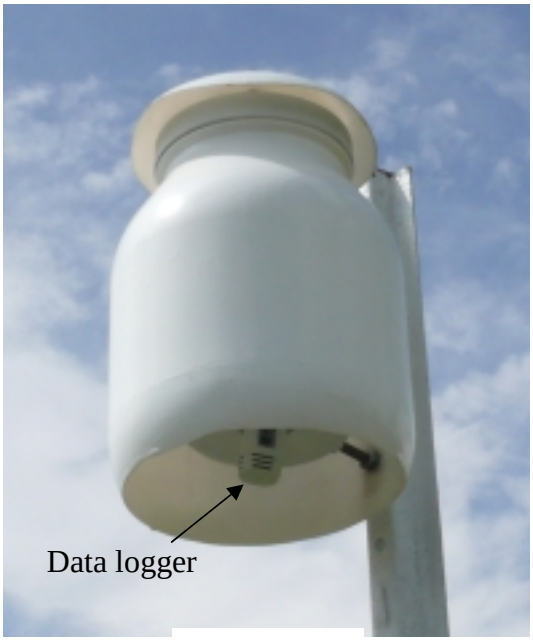


Figure 2

I have used a Fluke 2-thermocouple unit to frequently take temperature readings on the hour, but on an irregular basis, when the logger, called LTi1, takes a reading. One reading is made in contact at the bottom of the data logger and the other at the same height outside of the Station. Conditions were sometimes sunny, sometimes sunny with broken clouds, or sometimes with an overcast and cloudy. This is depicted in Figure 3. The purpose of the T/C measurements were to determine heating inside the station compared to outside.

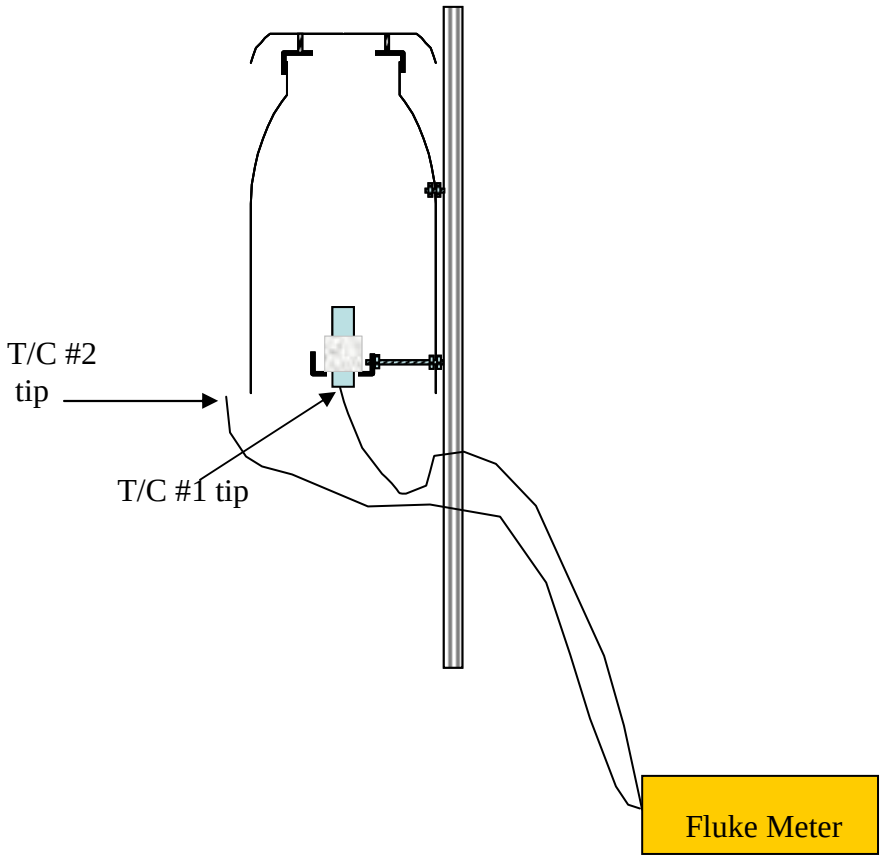


Figure 3

The readings indicated that the temperature at the bottom of the data logger was from 1 to 2 ^{o}F higher than outside. At the end of the first month of the data logger LTI1's recording on the hour I compared the Fluke readings to the data logger. LTi1's average daily values are from 0.7 to 4.0 ^{o}F higher than the average of the daylight values of the outside Fluke readings. (If I had been able to stay up all night and take readings with the Fluke meter then the average daily values of LTi1 would probably been from 0.2 to 3.0 ^{o}F higher. So there is heating, during the day, inside the MAYO Station. This I also gathered from comparing LTi1's average monthly value to that from the NOAA Staunton Sewage Plant site. The NOAA value was some 9 ^{o}F lower.

So, I went to a building supplier, Home Depot, for supplies to build the one, noted above, found on the WWW. What I found instead was something which looks as good, or better.

2 – GAS VENT Station

What I found was an aluminum Type B gas vent (by Selkirk). It's bottom is a 4-inch thin-walled tube that slips into the interior of 4-inch PVC pipe. The assembled station is shown in Figure 4. (It is also available in a 6-inch version, but there was no 6-inch PVC pipe at Home Depot, and the 6-to-4 inch converter would not slip into the 4-inch PVC pipe.

Figure 4 – GAS VENT station beside MAYO station

The aluminum gas vent, painted white, is mounted on a length of 4-inch PVC pipe by slipping the vent's bottom sleave into the PVC pipe. The pipe is bolted to a steel fence post. The height-above-the-ground of the data logger, LTi2, inside the gas vent is 61 inches. Holes are drilled into the PVC pipe to prevent a chimney effect, although that may be a good thing. (Eventually, I may reduce the length of the PVC pipe, thus lowering the data logger, but not less than 41 inches above the ground.

Figure 5 is a close-up of the gas vent, already christened by a mocking bird.

Figure 4 – Close-up of GAS VENT station.

The gas vent has two sets of openings, 360 degrees. The sensor of the data logger, LTi2, is at the height depicted by the dashed line. The logger is held in the middle of the 4-inch interior sleeve by a thin copper, painted white, plate.

3 – NOAA Station at the Staunton Sewage Treatment Plant

To set the record straight, the location is the Staunton Water Treatment Plant. This weather station was moved to here, from the Sewage Treatment Plant, back in 1995 (I think) when the Sewage Plant was moved to Verona Virginia. This NOAA station is approximately 6 as-a-crow-flies miles from me

Figure 5 is a photograph of this NOAA station, looking in a northeasterly direction. This is a similar angle to the photograph that appears at Anthony Watt's www.surfacestations.org web site. The Watts photo may also be found on page 26 in the Heartland Institute's publication of Watts paper "Is the U. S. Temperature Record Reliable?", ISBN 13:978-1-93471-29-5.

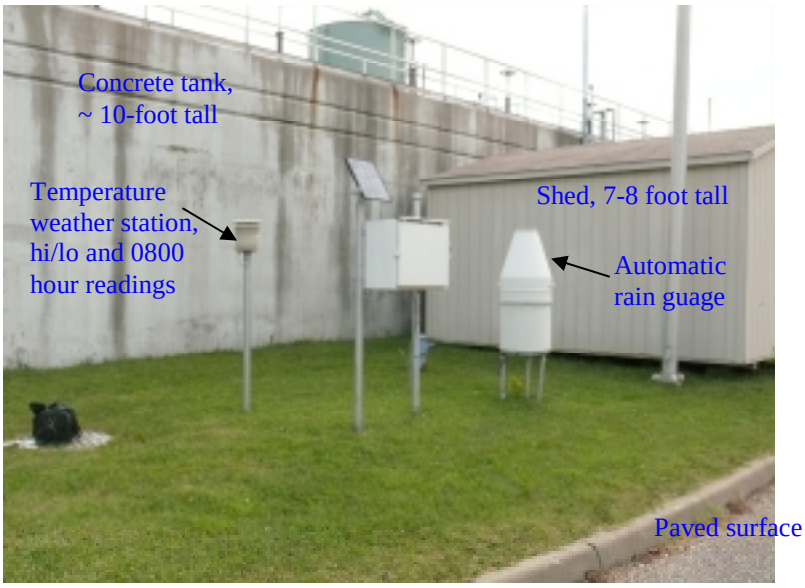


Figure 5 – NOAA station 448062, Staunton, VA Station Sewage Treatment Plant.

As Watts correctly points out, there is a large concrete structure on one side and an paved road surface on the other. The premise is that these are sources of heat, and thus elevated temperature. It certainly does not comply with NOAA's own locating standards.

But, there is likely more to this, called shade, which is offsetting the heating effect. That does not excuse the poor location, but I think the shade is leading to a lower average temperature than would be if the station was out in the open as it should be.

Figure 6 is a Google Map image of the location. The temperature station is approximately 7 feet from both the shed and the concrete tank. It is approximately 72 feet from the nearest corner of the office building, and 112 feet from the tree line. Given the distances from the shed and the concrete tank, and the heights of these two, then at 0800 hours the sensor is likely still in the shade of one or both. Note also the shade of the office building. The photograph was probably taken mid afternoon of a summer day – the angle of the shade and the trees have leaves. So, a considerable portion of the paved surface is in shade too. During the winter the sun is at a lower angle, so there is more shade. Finally, at some point late in the day the tree line should be providing shade, thus there is some early cooling each day. These are the aspects that suggest to me that shade may be more than offsetting the heating effect of the concrete building and the paved surface.

Figure 6 – Google Earth image of NOAA station 448062, Staunton, VA Station Sewage Treatment Plant.

I want to make it clear that I am not arguing for NOAA and against Watts. I am convinced that NOAA is making serious errors in their methods of measuring and reporting temperatures. Anthony Watts has provided an outstanding effort in showing how poorly NOAA is doing, that there are serious errors in the locations of NOAA station, and, consequently, likely all of the reported "warming" inferred from the NOAA data is due to poor locating and erroneous methodologies.

But I do know that temperature can be from 3 to 6, or more, ^{o}F cooler in shade. The NOAA average monthly values are from 2 to 7 degrees lower than LTi1, which is more than the 0.8 to 4 ^{o}F the average of the outside thermocouple data was lower than LTi1.