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Small Footprint Solar/Wind-Powered CASTNET System

Office of Research and Development
National Exposure Research Laboratory

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Small Footprint Solar/Wind-Powered CASTNET System

RESEARCH AND DEVELOPMENT

Small Footprint Solar/Wind-Powered CASTNET System

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1.0 Introduction

The Clean Air Status and Trends Network (CASTNET) was established under the 1990 Clean Air Act Amendments, expanding the National Dry Deposition Network, which began in 1987. In 2016, the network operated 95 monitoring stations throughout the contiguous United States, Alaska, and Canada. CASTNET is managed and operated by the U.S. Environmental Protection Agency (EPA) in cooperation with the National Park Service, Bureau of Land Management-Wyoming State Office (BLM-WSO), and other federal, state, and local partners.

CASTNET performs long-term monitoring of air pollutant concentrations in rural areas across the United States to determine compliance with EPA's National Ambient Air Quality Standards (NAAQS) and to evaluate the effectiveness of national and regional emission control programs. CASTNET identifies temporal and spatial trends in rural atmospheric concentrations of ozone (O_3), nitrogen, and sulfur and deposition fluxes of nitrogen and sulfur pollutants. The network has measured weekly concentrations of gaseous nitric acid (HNO_3) and sulfur dioxide (SO_2) and particulate nitrate (NO_3^-), ammonium (NH_4^+), and sulfate (SO_4^{2-}) pollutants for more than 25 years.

Recent changes to the network include participation by BLM-WSO as a new sponsor for five CASTNET sites in Wyoming, and the addition of trace-level gas monitoring at six sites, one of which is Bondville, IL (BVL130), an official EPA National Core Monitoring (NCore) site for trace-level SO_2, nitrogen oxide (NO)/total reactive oxides of nitrogen (NO_y), and carbon monoxide, (CO).

The Clean Air Act identifies two types of NAAQS. Primary standards provide public health protection. Secondary standards provide public welfare protection, e.g., protection for animals, crops, vegetation, and buildings. In 2011 and 2012, EPA reviewed the secondary NAAQS for nitrogen dioxide (NO_2) and SO_2. In 2012, the final rule on the secondary NAAQS included using the Aquatic Acidification Index (AAI) as its basis to evaluate whether emission control programs effectively limit critical loading of sensitive ecosystems. The rule directed evaluation of the variability and uncertainty in the AAI input parameters, demonstration of how an AAI-based standard would be implemented, and improvement of measurements and models that would be used to determine compliance. The geographic location of many CASTNET sites, in or near sensitive ecosystems, and the network's well-established methods were considered when identifying site locations for a pilot program under the secondary NAAQS. As proposed, the AAI equation required measured data including SO_2 and particulate SO_4^{2-} measured by the CASTNET filter pack, NO_y measurements from CASTNET and other networks, and gaseous ammonia measured by the National Atmospheric Deposition Program's (NADP's) Ammonia Monitoring Network (AMoN). Uncertainties due to spatial gaps in ambient measurements and modeled flux estimates over complex terrain were considered during the NAAQS review. Many potential monitoring site locations were not amenable to the traditional CASTNET site design and footprint, which required a large shelter and electrical power from the grid. During this same

period, EPA also planned for the installation and operation of small footprint sites that are more easily deployed in remote areas. Small footprint, off-grid monitoring stations with an alternate power source, such as wind or solar, were considered to be a viable alternative.

Small footprint sites do not require a shelter. They include a filter pack system for measuring ambient concentrations and a temperature sensor for ambient temperature measurement, which is used for converting concentrations to local conditions. Both the filter pack and the temperature sensor are located on a single tower with only a small equipment control box near the tower base to house the data logger and other equipment (data logger, flow pump, rotameter, mass flow controller, and cellular modem). This allows for much more flexibility in site selection as well as installation. This design facilitates installation of new sites in areas of sparse coverage by making installation and operational expenses much more affordable. Additionally, the sites are more transportable than a traditional CASTNET site and, therefore, can be used for short-term, special studies.

CASTNET currently has eight small footprint sites in locations ranging from Idaho to North Carolina (Figures 1 and 2). The small footprint site at Screwdriver Knob, NC (COW005) was installed in mid-November 2014 near the Coweeta Hydrologic Laboratory CASTNET site (COW137) in North Carolina and is the latest design in the evolution of these small footprint sites. It is an alternative off-grid design that uses a wind turbine and solar panel for electricity generation. The off-grid design is even more suitable for use in remote locations than the original small footprint design because it can be deployed in locations where electrical access is not possible or would be cost-prohibitive. Besides eliminating the need for a traditional power supply, this system can be installed in rugged terrain, high elevation areas, over water bodies, and on top of scaffold towers with relative ease compared to designs requiring a shelter and a traditional power source.

An off-grid, small footprint site was installed at the Nez Perce Tribe, ID (NPT006) site in December 2015. The solar and wind powered equipment installed at the NPT006 site was not adequate to provide consistent power year-round. In the future, to operate an off-the-grid site for northern sites at high latitudes, upgraded equipment would have to be considered. Additionally, available solar and wind resource data will be analyzed to gauge power generation potential against site power requirements. The NPT006 site was converted to a traditional small footprint site with a regular power source when 40 CFR Part 58 O_3 measurements were added to the site.

Figure 1 shows all CASTNET sites as of June 2016, and Figure 2 shows only the small footprint sites. Measurements at COW005 ended during the week of August 9, 2016.

Figure 1. CASTNET Site Map as of June 2016

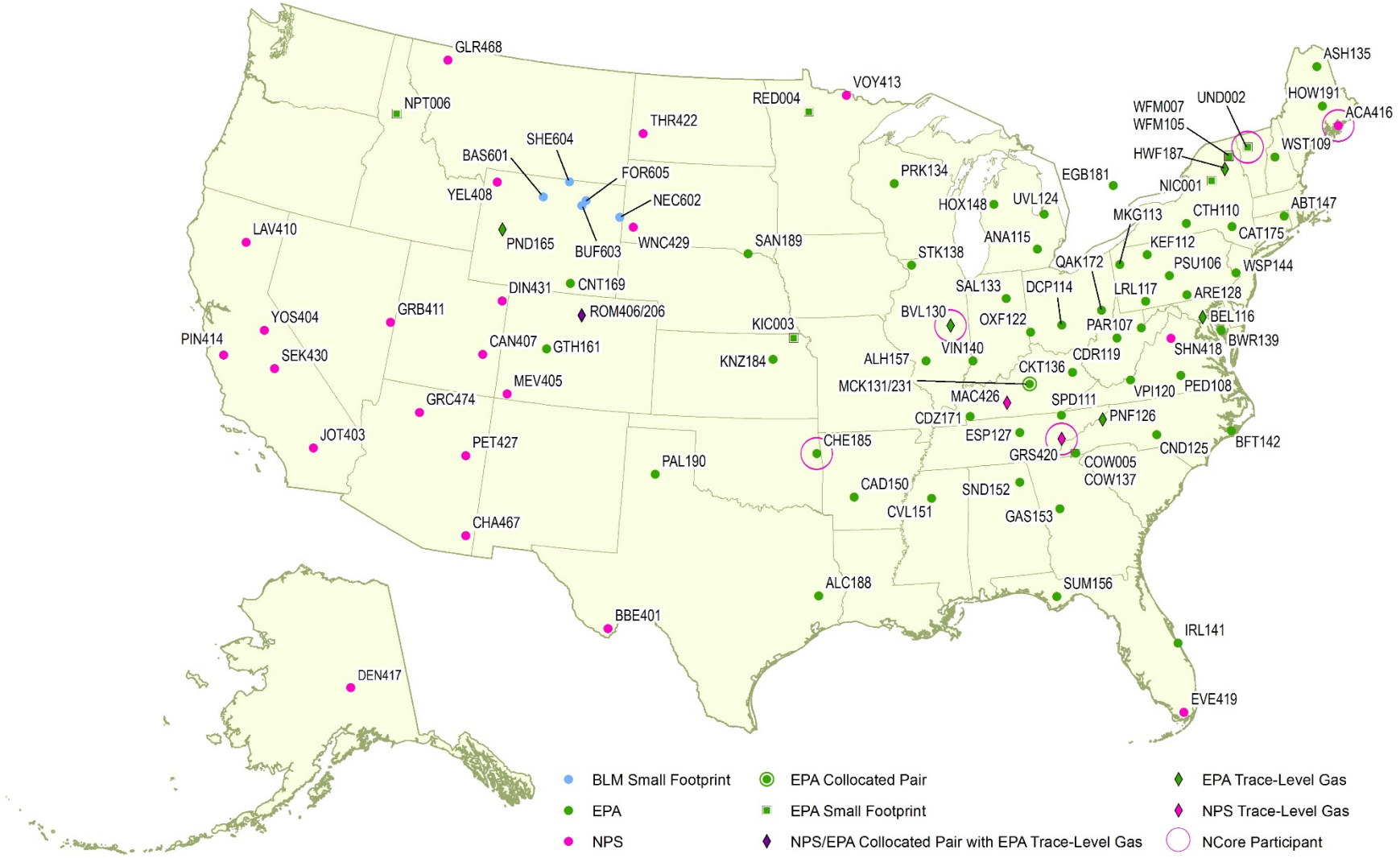
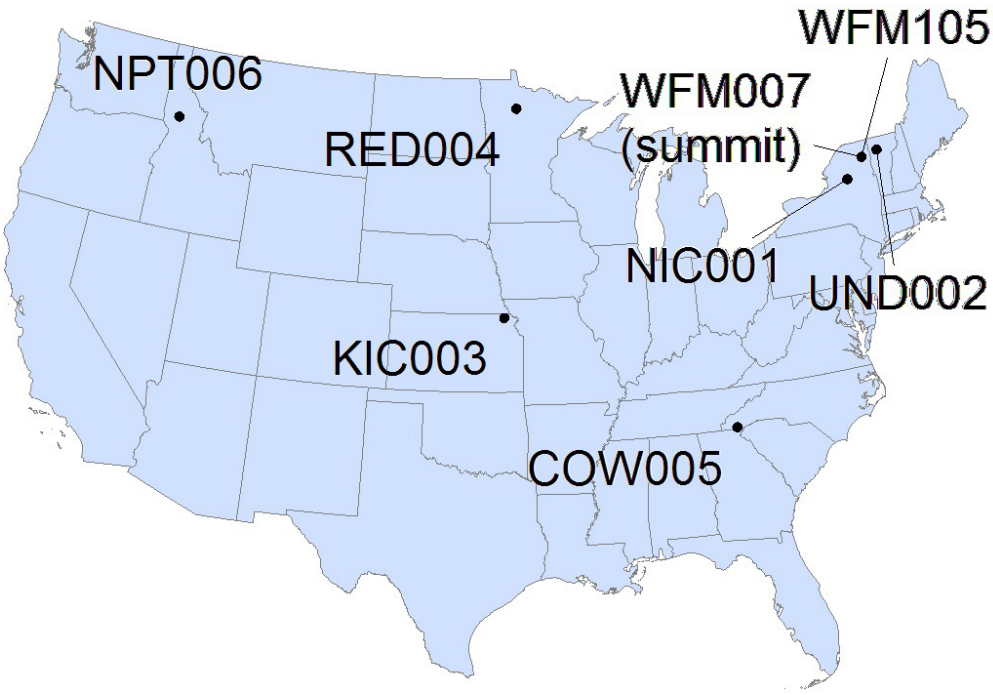


Figure 2. EPA-Sponsored CASTNET Small Footprint, Filter Pack-Only Sites as of June 2016



2.0 Site Characteristics and Monitoring Equipment

The small footprint monitoring site at COW005, NC was located about 3.5 kilometers (km) by road (2.6 km by air) southwest of the Coweeta Hydrologic Laboratory, which hosts the standard CASTNET site, COW137, NC. COW005 was situated on a dirt road on an exposed ridge (Figure 3) with an elevation of approximately 980 meters (m), about 302 m higher than COW137. Both sites are located in Macon County, NC less than 10 km north of the Georgia border (Figure 4). The sidebar summarizes the COW005 site characteristics. The Coweeta Hydrologic Laboratory operates under the Long Term Ecological Research (LTER) Network (LTER, 2016).

Figure 5 shows the COW005 10-m monitoring tower looking toward the west-northwest. Figure 6 depicts the tower looking toward the east. The tower supports a filter pack housed in a rain shield and a temperature sensor at approximately 10 m. Power is provided by a solar panel and wind turbine (top). The generated electricity is stored in two 12-volt, deep cycle batteries near the base of the tower. The equipment control box (Figure 7) near the base of the tower houses the data logger, flow pump, rotameter, mass flow controller, and cellular modem. A U.S. Forest Service-operated solar-powered meteorological station is located adjacent to the CASTNET tower. Appendix A, Small Footprint Filter Pack Site Installation, provides the standard operating procedure (SOP) for installation of a small footprint CASTNET site.

Coweeta, NC Site Characteristics

Site name and ID:
Coweeta Screwdriver Knob, NC
COW005

County:
Macon, NC

Latitude; decimal degrees:
35.04826

Longitude; decimal degrees:
-83.45428

Elevation:
985 meters

Operating agency and start date:
EPA, 11/18/2014

End date:
8/16/2016

Primary Land Use:
Forest

Terrain surrounding site:
Mountainous

Nearest NADP site code:
NC25

Distance to nearest NADP site:
2.6 kilometers

Does site conform to deposition model assumptions?
No

Figure 3. COW005, NC Site Location using Google Earth

Figure 4. COW005, NC Site Region using Google Maps

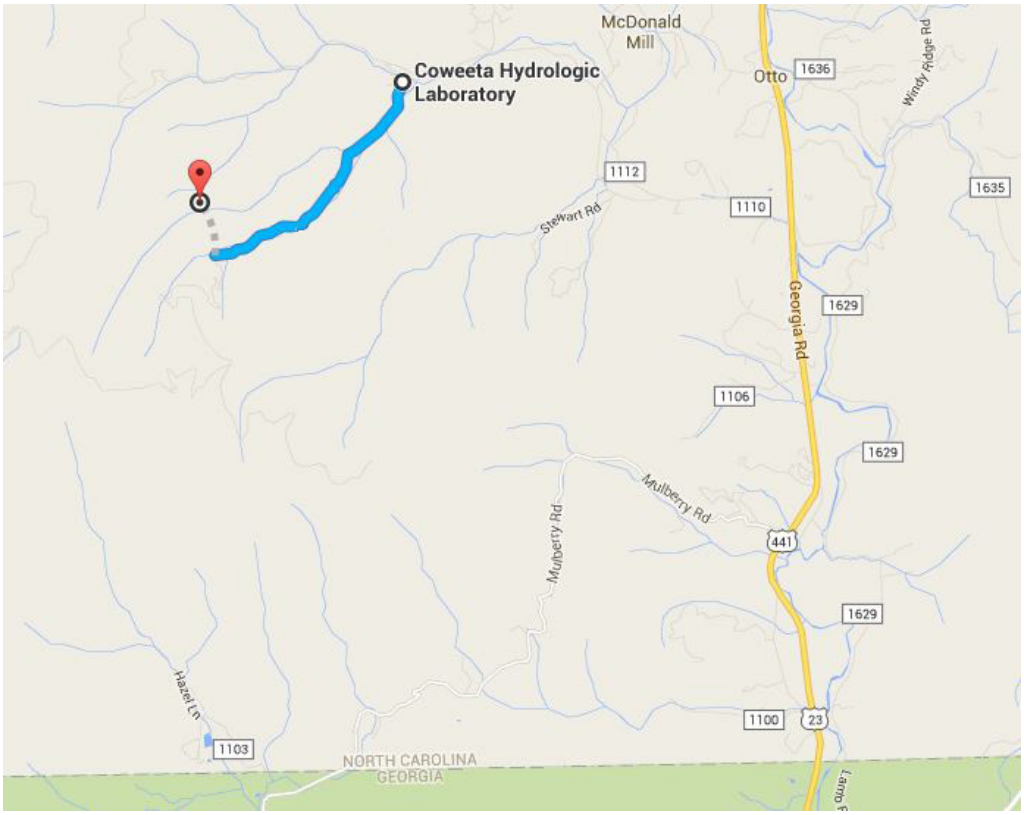
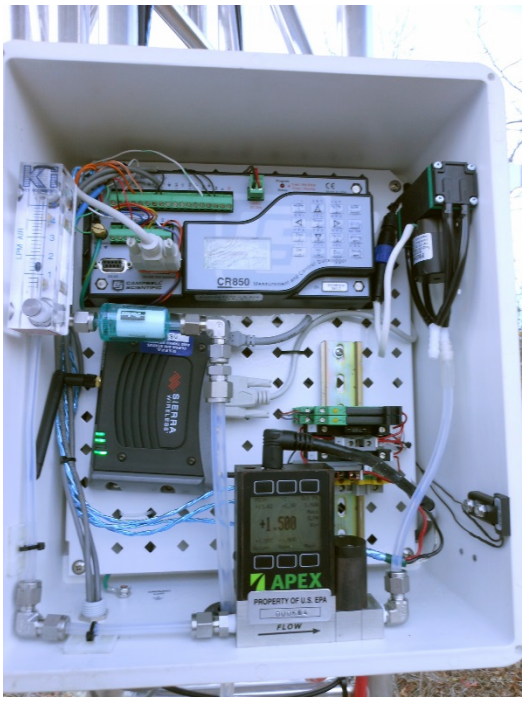


Figure 5. COW005, NC Monitoring Site Looking West-northwest

Figure 6. COW005, NC Monitoring Site Looking East

Figure 7. COW005, NC Monitoring Equipment inside the Control Box



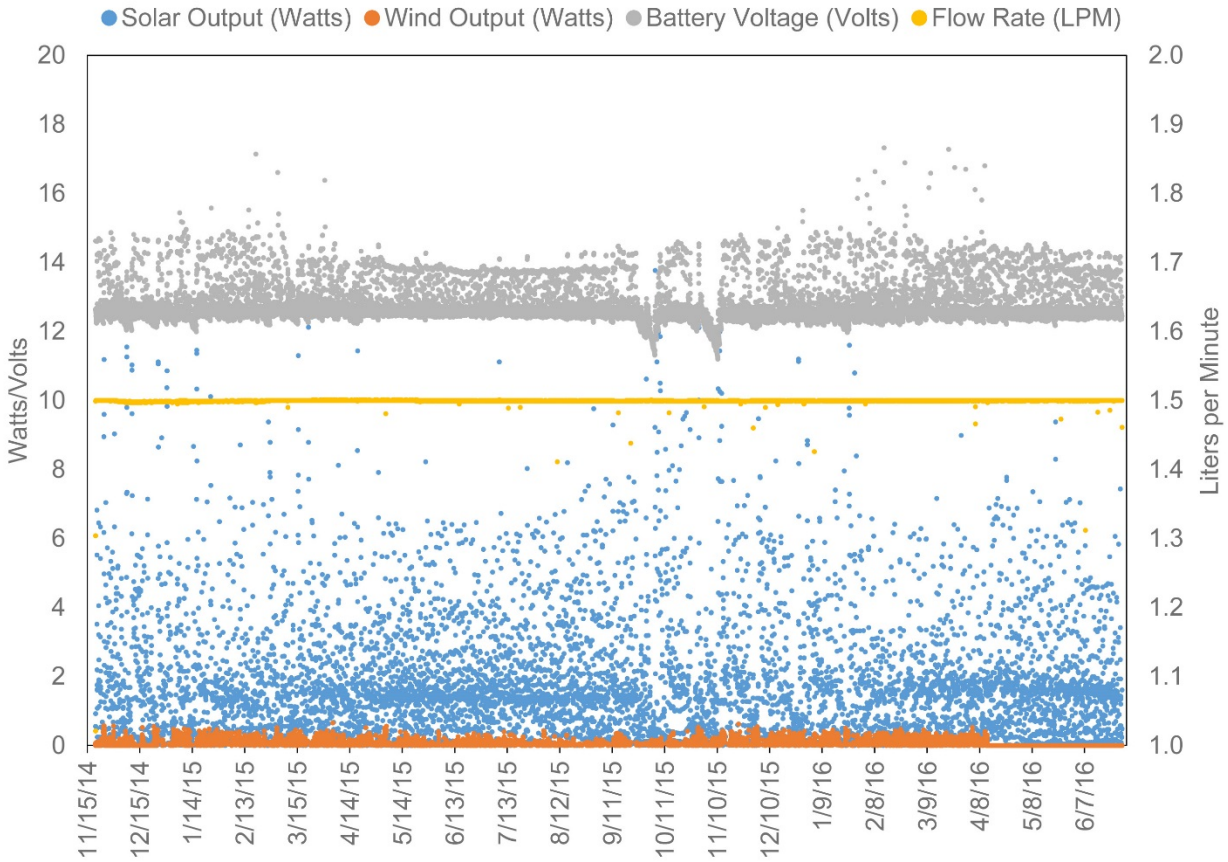
3.0 Design and Testing

The design and operation of small footprint sites have been refined since 2012 through the operation of eight sites (Figure 2; see also Rogers *et al*., 2015). The site at COW005 was designed to be an "off-the-grid" site that uses a solar panel and wind turbine for electricity generation (Figures 5 and 6). The design plan is provided in Appendix B. The system was tested at both Amec Foster Wheeler's Gainesville, FL field laboratory and onsite at COW005 over the period 9/2/2014 through 11/6/2014. Appendix C provides the 2014 COW005 test data, including battery voltage (volts), flow rate in liters per minute (lpm), ambient temperature in degrees Celsius (°C), solar output (watts), and wind output (watts). The results indicate a stable flow rate of 1.5 lpm (± 0.001) with 100 percent data completeness. The battery was stable at a voltage greater than 12.0 volts over the entire period. Solar power generation was reliable (100 percent) with sufficient generation during daylight. The wind generator operated satisfactorily, producing electricity when wind speeds exceeded 7 mph.

Figure 8 shows operational data (time series of hourly values of solar power, wind power, battery voltage, and flow rate) from November 2014 through June 2016. The figure indicates stable, constant flow throughout the 20 months. The battery voltage was nearly constant above 12 volts with two short excursions. The lower voltage associated with these excursions did not affect the flow rate. The flow pumps are energy efficient and can generate flow at low voltage until the data logger turns off. A voltage of less than 9.0 will shut down the data logger, and no flow will be produced. Voltages in the 10 to 11 range will decrease flow to 2.0 to 2.5 lpm, but the reported flow will be accurate. Wind power generation was satisfactory through April 2016 when it was deactivated because of the increase in solar output with the change in seasons.

The operational data from CASTNET sites, including data from the COW005 site, are reviewed daily in accordance with the CASTNET Quality Assurance Project Plan (QAPP) by a data analyst. Any problems are noted on a problem ticket, which remains open until the problems are resolved. The operational measurements are guided by CASTNET SOPs and are evaluated using CASTNET data quality indicators.

Figure 8. Time Series of Hourly Values of Solar Power, Wind Power, Battery Voltage, and Flow Rate (November 2014 through June 2016)



4.0 Data Analysis of Pollutant Concentrations

Quarterly mean filter concentrations and the number of valid records by quarter for the COW005 and COW137 sites are listed in Table 1 for fourth quarter 2014 through second quarter 2016. Based on temporal coverage of filter packs scheduled versus actually run, the data completeness for both sites was 100 percent. COW005 had two filter packs that sampled for a 2-week period instead of a 1-week period. COW137 had one 2-week filter pack.

Table 2 lists quarterly mean relative percent differences between concentrations measured at the two sites (COW005 and COW137) for all pollutants. Figures 9 and 10 provide box plots that summarize the 11 concentrations measured at the two sites. Each box shows mean, median, 10^{th}, 25^{th}, 75^{th} and 90^{th} percentile values. SO_2, SO_4^{2-}, NO_3^-, HNO_3, and total NO_3^-, Ca^{2+}, and Na^+ concentrations were higher at COW005, which was the higher elevation, ridge site. Concentrations of NH_4^+, Mg^{2+}, and Cl^- were about the same at both sites, and quarterly mean concentrations of K^+ measured at COW137 were higher.

Time series of weekly concentrations of SO_2, SO_4^{2-}, HNO_3, total NO_3^-, and K^+ measured during the seven quarters are shown in Figures 11 through 15. The concentrations at the two sites track reasonably well, but the magnitudes varied as noted in the previous paragraph. Puchalski *et al*. (2015) hypothesized that interactions between meteorological phenomena associated with complex terrain (e.g., nocturnal inversions, drainage flows, and wind speed gradients) and deposition processes resulted in lower concentrations at lower elevations, i.e., at COW137. Dry deposition is considered an important removal process when air drains down the ridge. Some plants, such as rhododendrons, retain their leaves during the winter and produce dry deposition year-round. EPA scientists will continue to analyze the air quality and meteorological data collected at COW005, COW137, and nearby monitoring sites on the ridge and in the basin.

Table 1. Quarterly Mean Concentrations Measured at COW005 and COW137

Quarterly Averages

Site ID	Qtr	Year	Records	SO_2 ($\mu g/m^3$)	SO_4^{2-} ($\mu g/m^3$)	NO_3^- ($\mu g/m^3$)	NH_4^+ ($\mu g/m^3$)	HNO_3 ($\mu g/m^3$)	Total NO_3^- ($\mu g/m^3$)	Ca^{2+} ($\mu g/m^3$)	K^+ ($\mu g/m^3$)	Mg^{2+} ($\mu g/m^3$)	Na^+ ($\mu g/m^3$)	Cl^- ($\mu g/m^3$)
COW005	4	2014	6	0.68	0.89	0.31	0.32	0.44	0.74	0.09	0.03	0.02	0.11	0.06
COW005	1	2015	12	0.59	0.90	0.25	0.34	0.55	0.79	0.07	0.03	0.01	0.05	0.03
COW005	2	2015	13	0.48	1.41	0.36	0.48	0.60	0.95	0.14	0.06	0.04	0.15	0.07
COW005	3	2015	13	0.64	1.55	0.24	0.51	0.43	0.66	0.12	0.06	0.03	0.08	0.04
COW005	4	2015	13	0.67	0.56	0.22	0.21	0.35	0.57	0.08	0.03	0.02	0.10	0.09
COW005	1	2016	12	0.56	0.84	0.42	0.31	0.49	0.91	0.11	0.04	0.03	0.14	0.08
COW005	2	2016	10	0.43	1.15	0.33	0.39	0.70	1.02	0.17	0.05	0.04	0.13	0.05
COW137	4	2014	6	0.39	0.89	0.19	0.32	0.29	0.47	0.06	0.04	0.01	0.07	0.04
COW137	1	2015	12	0.46	0.92	0.22	0.36	0.36	0.58	0.06	0.04	0.01	0.04	0.03
COW137	2	2015	13	0.36	1.34	0.18	0.43	0.40	0.57	0.10	0.07	0.03	0.11	0.05
COW137	3	2015	13	0.57	1.37	0.11	0.45	0.26	0.36	0.07	0.08	0.02	0.05	0.03
COW137	4	2015	13	0.59	0.55	0.14	0.20	0.17	0.31	0.05	0.05	0.01	0.06	0.06
COW137	1	2016	13	0.45	0.83	0.29	0.29	0.36	0.64	0.08	0.05	0.02	0.10	0.04
COW137	2	2016	10	0.35	1.10	0.21	0.37	0.57	0.77	0.12	0.06	0.03	0.10	0.05

Table 2. Mean Relative Percent Differences between Concentrations Measured at COW005 and COW137

Mean Relative Percent Difference

Quarter	Year	Records	SO_2	SO_4^{2-}	NO_3^-	NH_4^+	HNO_3	Total NO_3^-	Ca^{2+}	K^+	Mg^{2+}	Na^+	Cl^-
4	2014	6	45%	-1%	38%	1%	40%	41%	27%	-32%	24%	30%	19%
1	2015	12	22%	-1%	4%	-3%	41%	31%	25%	-41%	10%	15%	-8%
2	2015	13	30%	3%	61%	6%	43%	50%	36%	-24%	17%	27%	4%
3	2015	13	13%	13%	62%	11%	42%	56%	56%	-29%	31%	51%	7%
4	2015	13	10%	6%	21%	5%	69%	51%	33%	-50%	19%	33%	22%
1	2016	12	21%	0%	32%	6%	33%	35%	25%	-33%	15%	16%	12%
2	2016	7	17%	4%	47%	5%	23%	31%	28%	-7%	21%	26%	3%
Overall		76	21%	4%	38%	5%	43%	44%	34%	-32%	19%	28%	8%

Figure 9. Box Plots of Pollutant Concentrations Measured at COW005 and COW137

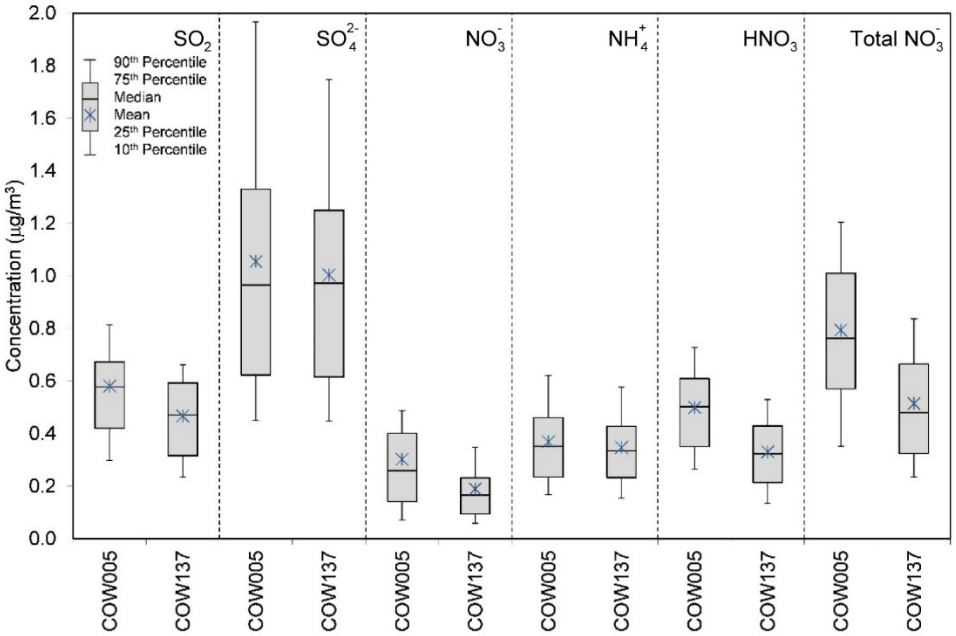


Figure 10. Box Plots of Particulate Cations and Chloride Measured at COW005 and COW137

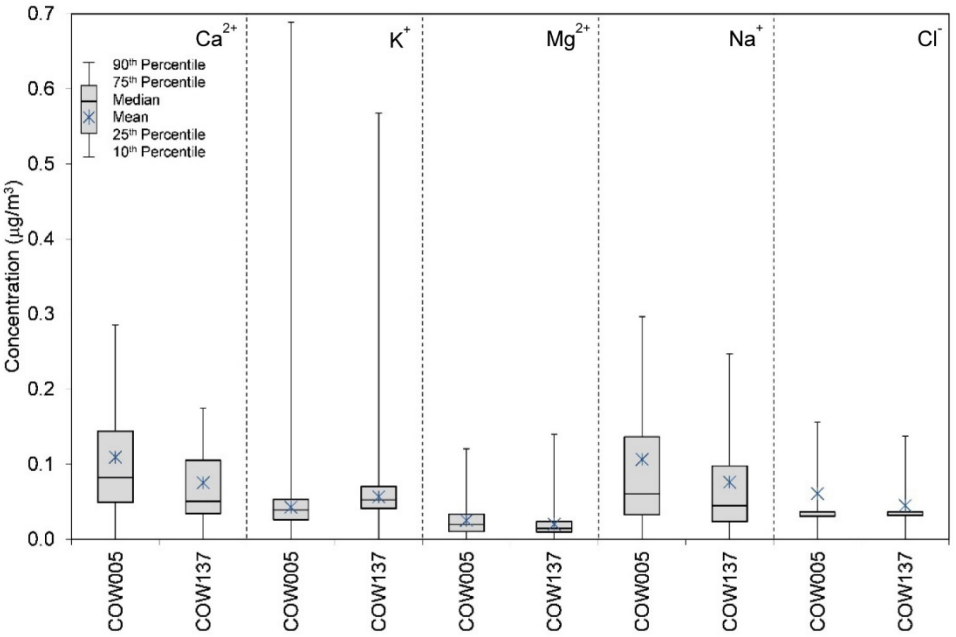


Figure 11. Time Series of SO_2 Concentrations (µg/m^3) at COW005 and COW137

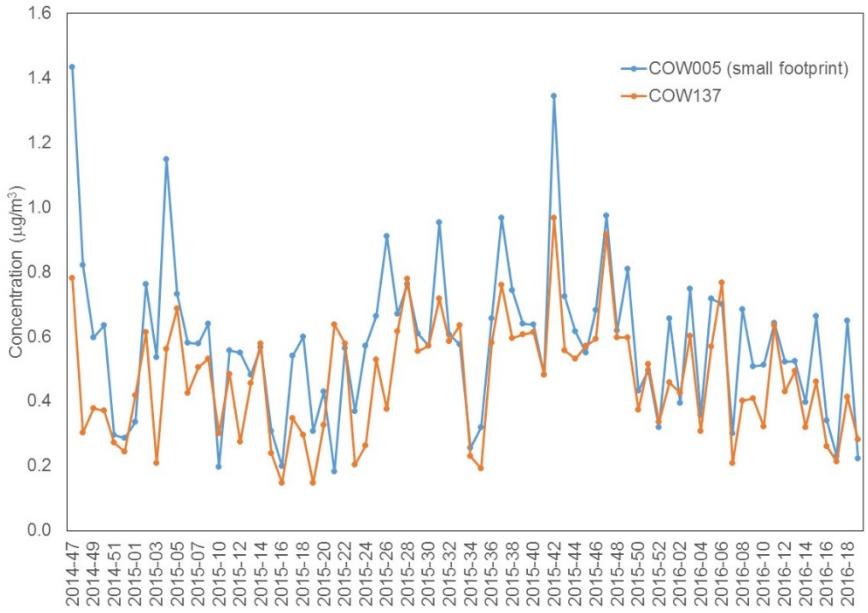


Figure 12. Time Series of SO_4^{2-} Concentrations (µg/m^3) at COW005 and COW137

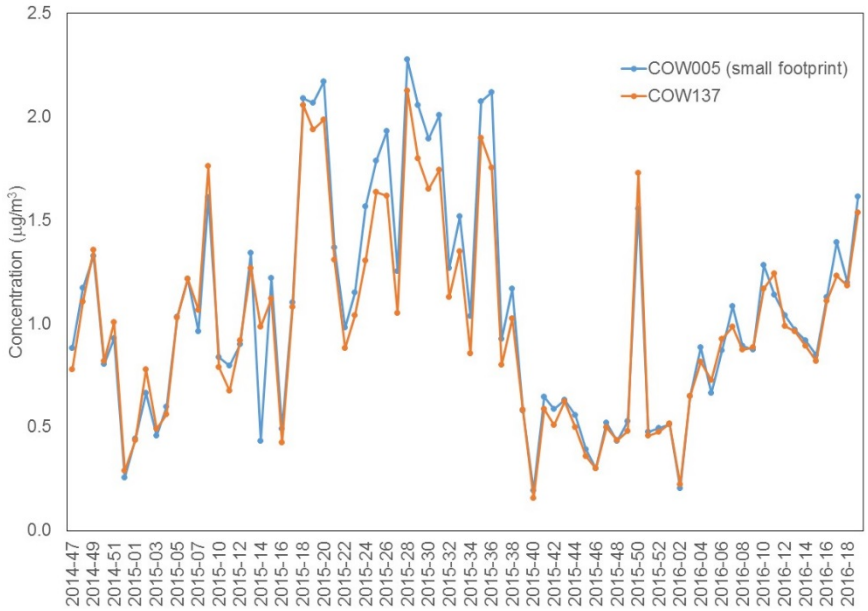


Figure 13. Time Series of HNO_3 Concentrations (µg/m^3) at COW005 and COW137

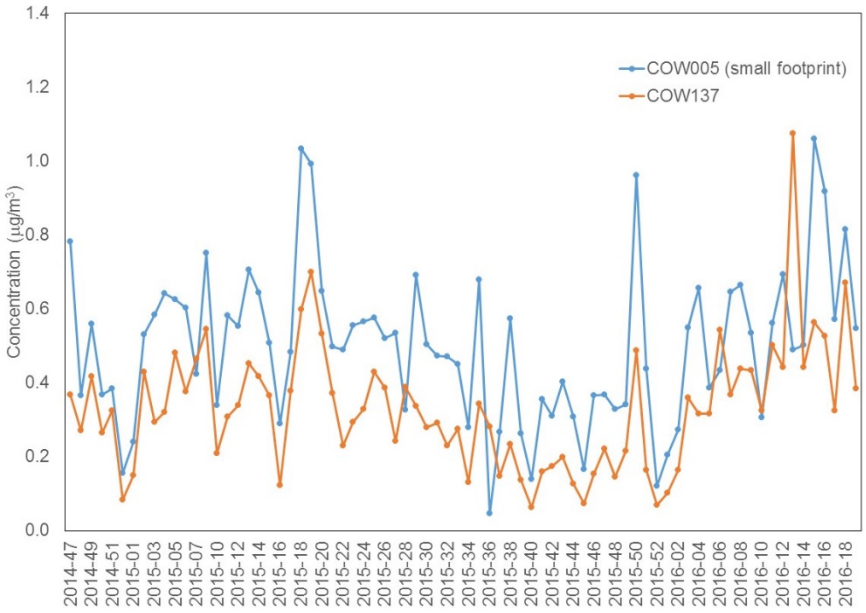


Figure 14. Time Series of Total NO_3^- Concentrations (µg/m^3) at COW005 and COW137

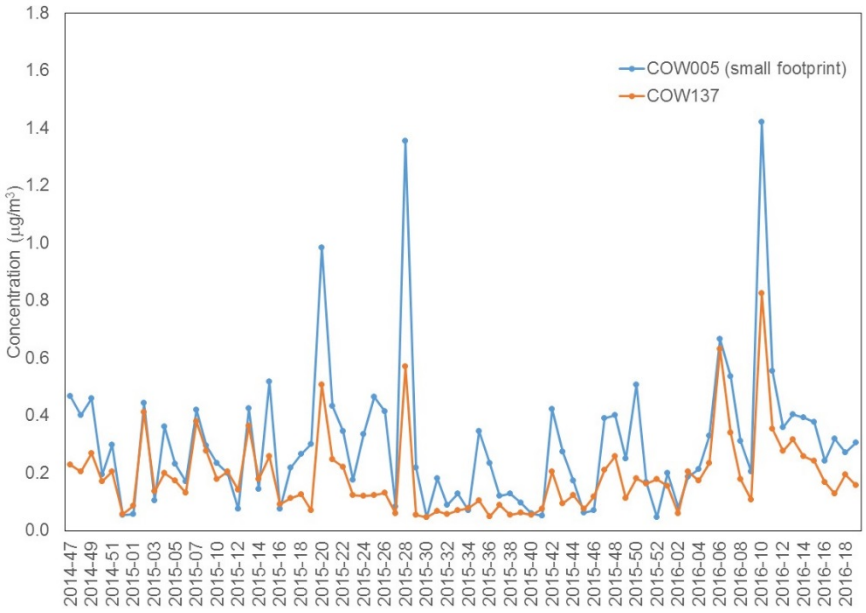
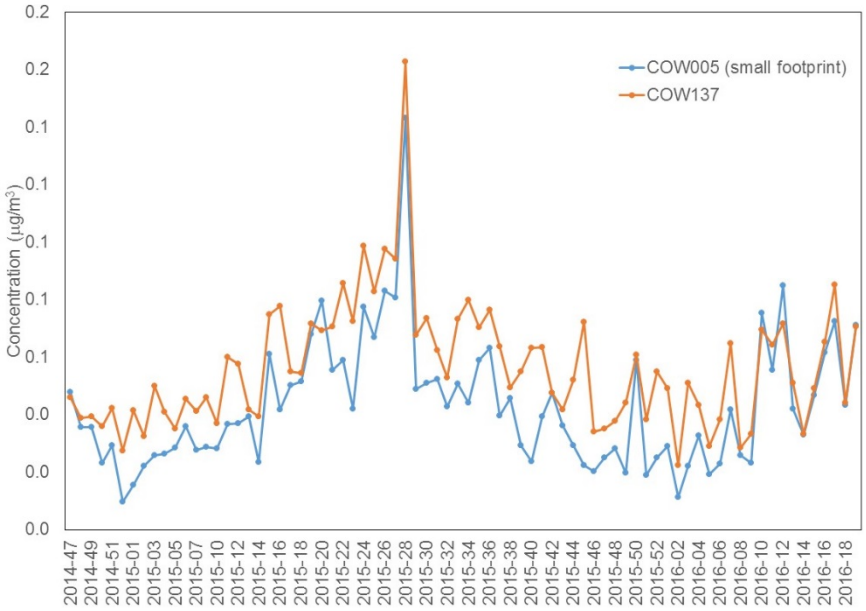


Figure 15. Time Series of K^+ Concentrations (µg/m^3) at COW005 and COW137



5.0 Future Plans

The small footprint system at COW005 was discontinued on August 16, 2016. The equipment will be available for use at another CASTNET site in January 2017. NPT006, ID was converted to a traditional small footprint site with a regular power source when 40 CFR Part 58 O_3 measurements were added to the site. The NPT006 off-grid power equipment is also available for a future site installation.

EPA scientists will continue analysis and modeling of air quality and meteorological conditions measured around COW005 and COW137 in order to better understand dispersion and deposition in the complex ridge-basin terrain setting.

EPA is reviewing the secondary NAAQS for SO_2 and NO_2 with a target date for a final rule in 2020 (Draft Integrated Review Plan; EPA, 2015). CASTNET data, including data from the small-footprint sites, may be used to assess whether the current standard is adequate to afford protection from deposition-related effects, such as those associated with acidification of aquatic and terrestrial ecosystems and nutrient enrichment of terrestrial and estuarine ecosystems. Additionally, the small footprint sites may be temporarily operated in selected locations to reduce uncertainties in critical loads exceedances by measuring ambient concentrations of nitrogen and sulfur pollutants within those areas.

6.0 References

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Appendix A
Small Footprint Filter Pack Site Installation Standard Operating Procedure

III. FIELD CALIBRATION MANUAL
ATTACHMENT: SMALL FOOTPRINT FILTER PACK SITE INSTALLATION

Effective Date: 10/31/16

Reviewed by: Kevin P. Mishoe
Field Operations Manager

Reviewed by: Marcus O. Stewart
QA Manager

Approved by: Holton K. Howell
Project Manager

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Annual Review			
Reviewed by:	Title:	Date:	Signature:

III. FIELD CALIBRATION MANUAL
ATTACHMENT: SMALL FOOTPRINT FILTER PACK SITE INSTALLATION

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide consistent guidance for installation and calibration of a small footprint filter pack sampling site. This SOP is designed to be used by the Clean Air Status and Trends Network (CASTNET) Field Calibration Laboratory and field personnel.

2.0 SCOPE

Applies to all CASTNET sites operating a filter pack sampling system without an enclosed shelter.

3.0 SUMMARY

Small footprint sites are defined as monitoring sites without an enclosed shelter. This document describes the procedures and equipment for installation, calibration and normal operation of a CASTNET small footprint monitoring site.

4.0 MATERIALS AND SUPPLIES

A complete site parts list is maintained in the Field Calibration Laboratory.
The following materials and supplies are required for auditing the site:

- National Institute of Standards and Technology (NIST) traceable flow transfer standard
- NIST traceable temperature transfer standard
- Temperature water bath (insulated container, stir plate, ice, water heater)
- Certified multi-meter

The following materials and supplies are required for acceptance testing:

- Adjustable flow restriction (e.g., needle valve or flow controller)

5.0 SAFETY

Electrical Shock – Always ensure equipment is disconnected or power is turned off at the outlet before performing any wiring tasks.
Weather – Always review weather forecasts before arriving onsite to reduce the risk of being trapped onsite by severe weather. If weather conditions prevent working safely onsite, leave the site and return when conditions have improved.
Tower Safety – The tilt down flow tower is NOT designed to be climbed. NEVER climb the tower. Use care when raising and lowering the tower to ensure the folding section does not fall out of control. NEVER erect the tower during installation without help.

6.0 PROCEDURE

6.1 Acceptance Testing

Upon receipt of the major components at the field calibration laboratory, use the following procedures to verify proper operation before the equipment is installed in a field setting.

6.1.1 Mass Flow Controller (MFC)

a) Configure the MFC settings as described in Section 6.2.2
b) Connect the MFC to a data logger using the following connections (See Section 6.3.1.4):
   - Red wire to C1
   - Yellow wire to C2
   - Blue wire to 12V
   - Purple wire to G
c) Calibrate the MFC using the standard 6 point procedure as described in the CASTNET Quality Assurance Project Plan (QAPP Appendix 1 Field SOP, Section III Field Calibration Manual, 6.15 Flow) and (QAPP Appendix 1 Field SOP, Section IV Calibration Laboratory, C Site Instrumentation, 4 Mass Flow Controller)
d) Verify all points audited are within 2% of expected
e) Include a copy of the acceptance testing form with the MFC

6.1.2 Pump

a) Connect the pump to the suction output of a flow meter with a range of at least 20 lpm, with an inline restriction and pressure gage as shown in Figure 1. Measure and record the flow rate and operating pressure at the pump maximum flow rate.
b) Adjust the needle valve or similar adjustable restriction between the flow meter and pump, adjust the flow rate to obtain at least three additional flow rates and operating pressures, including one point at the intended set point of the site (1.5 or 3.0 lpm).
c) Close the adjustable restriction fully and record the maximum pump vacuum at zero flow as a final point.
d) Using the measured test points, generate a pump curve similar to Figure 2 and compare to the manufacturers supplied pump curve. In addition, verify the operating load for the MFC at the target set point and the operating pressure at the target flow rate is greater than 4 in Hg. The target set point is the difference between the expected operating pressure at the site and site ambient pressure minus 2 in Hg.

Figure 1. Pump Test Pneumatic Setup

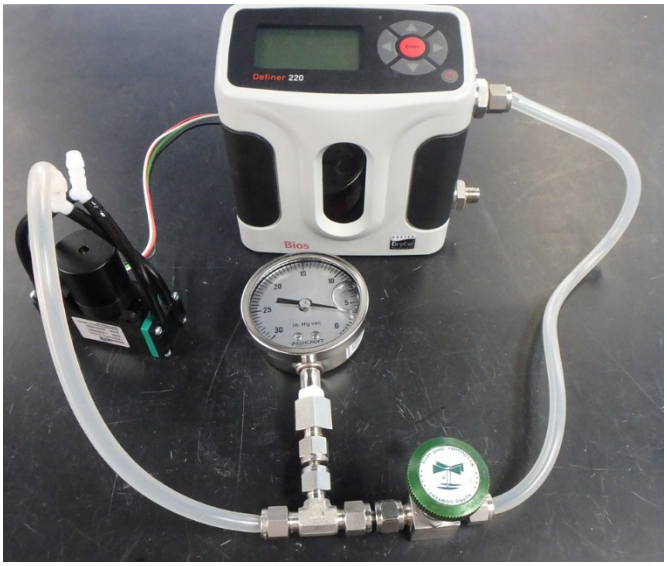
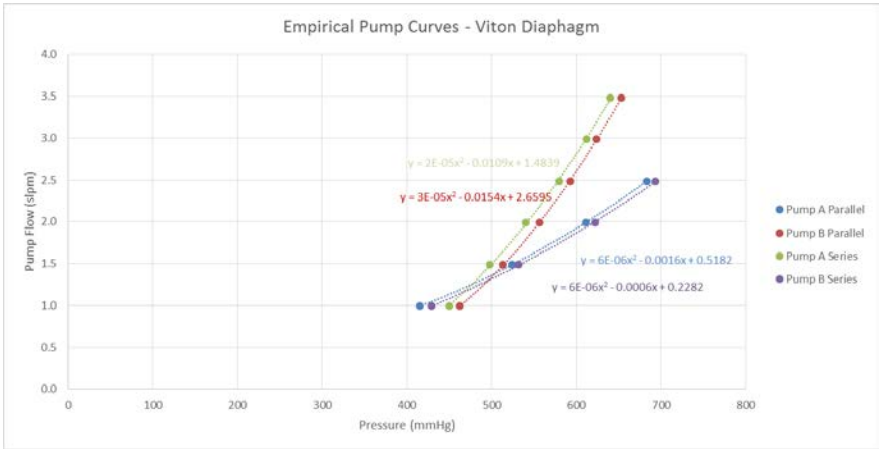
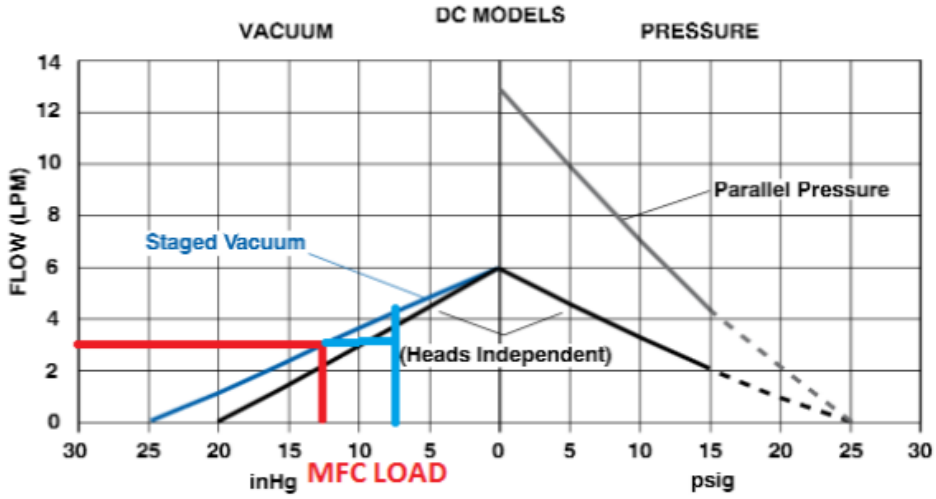


Figure 2. Pump Curve





6.1.3 Data logger

a) Audit the temperature voltage channel (SE2) as described in QAPP Appendix 1 Field SOP, Section III Field Calibration Manual, 6.2 Data Logger
b) Verify the connected MFC receives data and is able to update the MFC set point using Com1 (C1/C2)
c) Verify control port 3 (C3) is functioning by ensuring the 'Door_Open' parameter corresponds to the door position.
d) Verify control port 4 (C4) is functioning by ensuring the relay is closed when 'Pump_ON' is set to *True* and open when 'Pump_ON' is set to *False*.
e) Verify the 12V port is functioning by ensuring the Raven and MFC are powered when the data logger is powered.

6.1.4 Temperature

a) Adjust the zero potentiometer until the sensor reads 0ºC±0.2ºC in an ice bath. (See QAPP Appendix 1 Field SOP, Section IV Calibration Laboratory, C Site Instrumentation, c. temperature.
b) Adjust the span potentiometer until the sensor reads within 0.2ºC of the transfer standard near 50ºC.
c) Repeat steps a and b until no further adjustments are required
d) Blend the 50ºC and 0ºC temperature baths to generate three additional points spaced across the range.

6.2 Configuration

6.2.1 Cellular Modem

Because the small footprint sites do not utilize an Ethernet network, the incoming connection to the cellular modem must be passed to the serial port of the data logger. Connections to the data logger can be made from a local computer by connecting to the cellular modem's WiFi access point. Instructions for configuring the cellular modem for these uses are described in the Cellular Modem Configuration Instructions included on the USB drive in the calibration kit.

6.2.2 MFC

The mass flow controller must be configured to use serial communications for the flow set point. From the main display, press the lower right hand soft key (may say 'Mode'). Then press the top center soft key labeled 'Control Setup' or 'Select'. Press top right soft key labeled 'Input' until the caret '>' is next to 'Serial'. Press the bottom right soft key twice to return to the main display. See QAPP Appendix 1 Field SOP, Section III Field Calibration Manual, 6.4 Flow.

6.3 Set-Up/Installation

6.3.1 Site Preparation

Before arriving onsite for installation, perform the following tasks:

6.3.1.1 Pour the Concrete for the Tower Base

For the Aluma Tower AT-516B 10 meter tilt-down tower that will typically be used, a minimum pad size of 18" square by the greater of 2 feet or to the local frost line is needed. The larger capacity Aluma Tower AT-516D requires a minimum pad size of 30" square and the greater of 2 feet or to the local frost line. The frost line for the area can be determined by calling a local construction contractor. If possible, contact a local contractor to pour and set the concrete footer for the tower before arriving onsite for the equipment installation. Six 3/8" diameter anchor bolts must be embedded a minimum depth of 12" to secure the tower base plate. The base plate should be used to position the bolts. For the larger capacity tower, use six (6), 1/2" diameter bolts embedded to a minimum depth of 16".

6.3.1.2 Install Electrical Supply

Contact a local certified electrical contractor to install an electrical connection (with a minimum of 5A capacity if shared circuit) within two feet of the tower pad. The outlet must be weatherproof while in-use. ***Note:*** Low power installations will not need the connection.

6.3.1.3 Coordinate with Field Site Operator

Contact the field site operator and coordinate a time to meet onsite after installation is completed for training.

6.3.1.4 Assemble and pre-wire enclosure

Install the data logger, cellular modem, flow pump, rotameter and MFC as shown in the following Figures 3 and 4. The major component locations are identical for both the small footprint and low power sites.

Figure 3. Enclosure

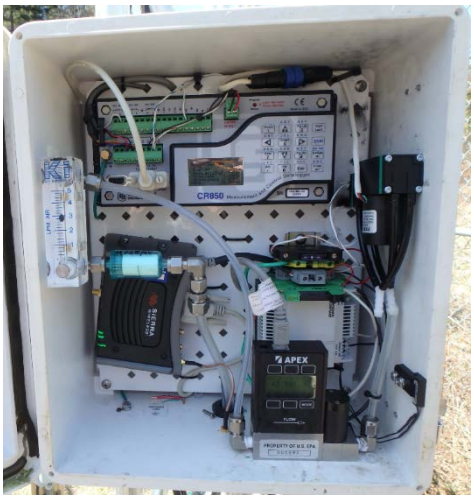
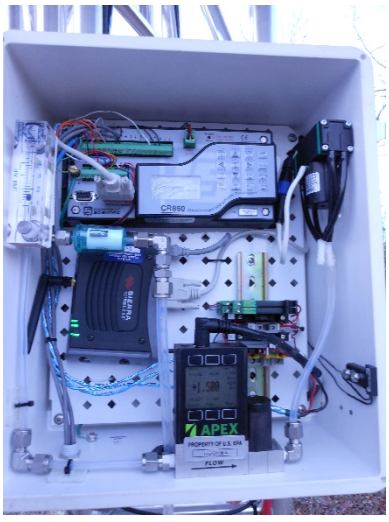
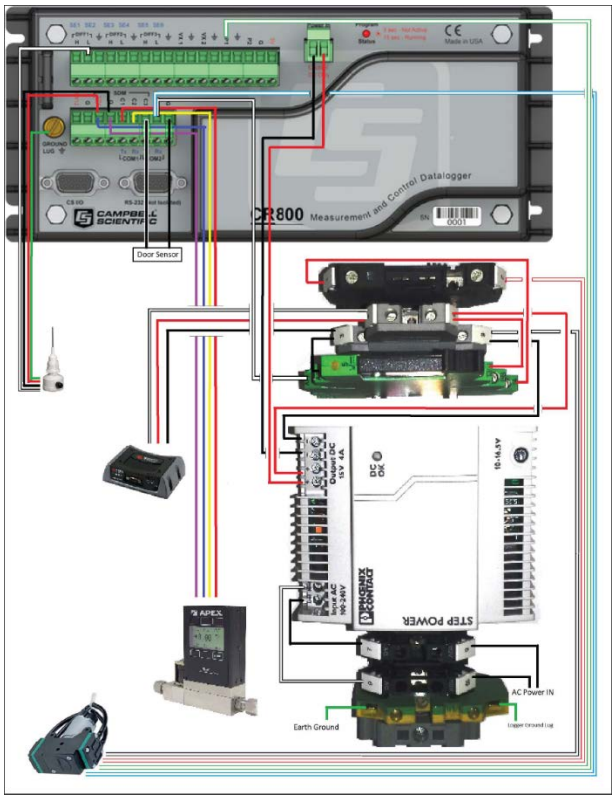


Figure 4. Low Power Enclosure



Connect the equipment according to the wiring diagram (Figure 5) shown below for the small footprint site.

Figure 5. Wiring Diagram



CR 800 filter pack only wiring

Sensor	Cable Type	Wire Color	Function	Din Rail	Relay	Logger side
9m Temp	Four Conductor Data Cable	White	Sens +			DIFF 1L (SE2)
		Green	GND			GND Lug
		Red	12V+			12V (SDM)
		Black	12V GND			G (SDM)
MFC		Green				DIFF 1H (SE1)
		Blue	12V+			12V (SDM)
		Purple	12V GND			G (SDM)
		Red	Serial			C1 (SDM)
		Yellow	Serial			C2 (SDM)
Door Sens		Black/Wht wrting				C3
		Black				G
Flow Pump T-Pump 1420VP		White/Red	12V+	2		
		White/Black	12V GND	6		
		White/Green	Tach			P1
		White/Blue	Spd Cntrl			C4
Raven		White	12V+	4		
		Red	12V+	4		
		Black	12V GND	3		
Power Suppy	110V AC Input	White	N	9		
		Black	L	7		
	15VDC Output	Red	VDC +	5		
		Red	VDC +			Pwr In 12V+
		Black	VDC -	6		
		Black	VDC -			Pwr In G

	Port	Wire Color	Function	Din Rail	Other	Logger Side
Relay	A1+	White/Black				C4
	A2-	Black	12V GND	3		
	13+	Red	12V+	5		
	BB					
	14	Red	12V+	1	Fuse	

	Port	Wire Color	Function	Other	Relay	
Fuse	1	Red	12VDC+	Relay	14	
	2	Red	12VDC+	Pump		
Terminal Block	3	Black	12V GND		A2- Relay	
		Black	12V GND	Raven		
	4	Red	12V+	Raven		
		White	12V+	Raven		
	5	Red	12V+		13+ Relay	
		Red	12V+	Power Supply		
	6	Black	12V GND	Power Supply		
		Grey	12V GND	Pump		
Surge Supression	7	Black	110AC	Power Supply [N(-)]		
	8	Black	110AC	Power Cord in		
Surge Supression	9	White	110AC	Power Supply [L(+)]		
	10	White	110AC	Power Cord in		

Connect the equipment according to the wiring diagram (Figure 6) for the low power site.

Figure 6. Low Power Data Logger Connections

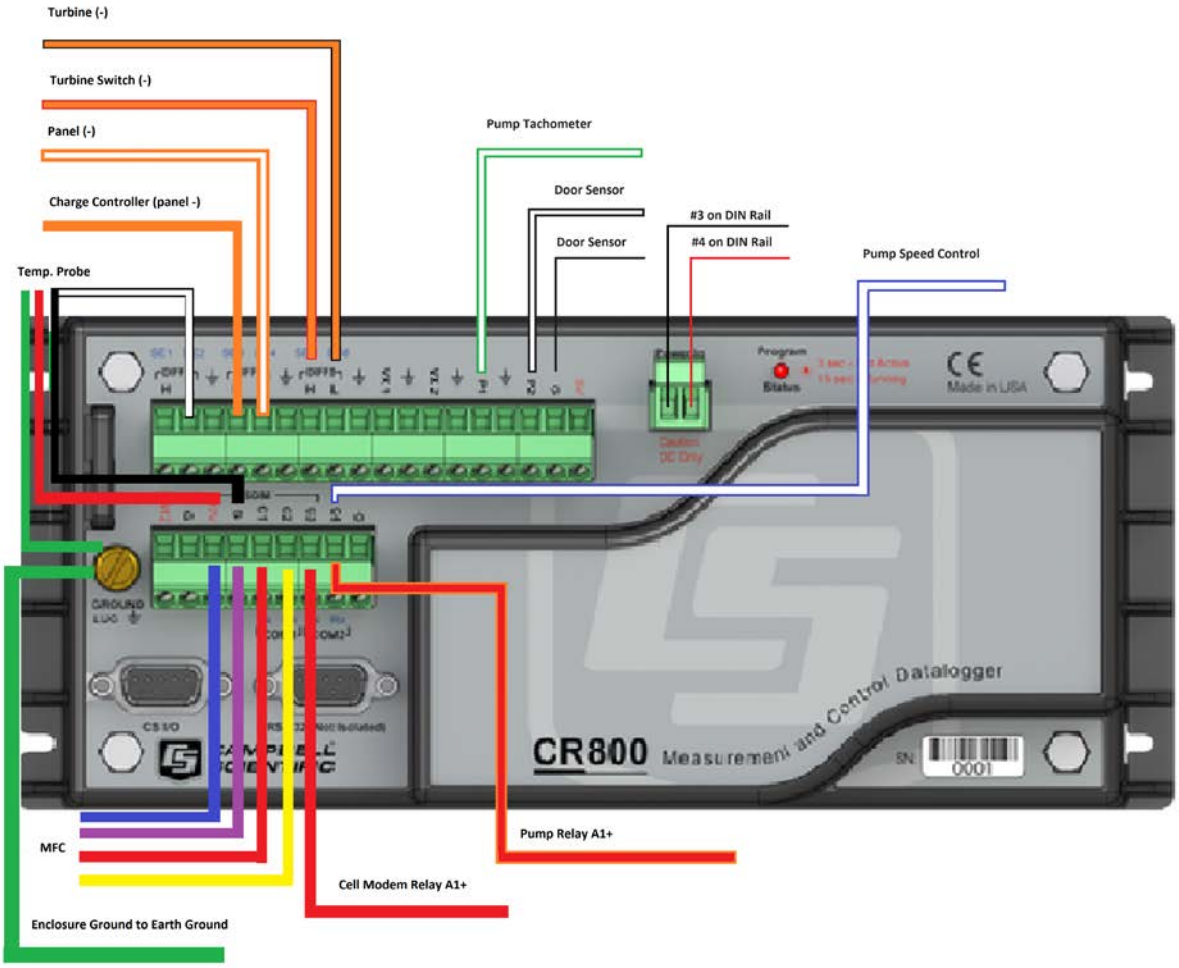
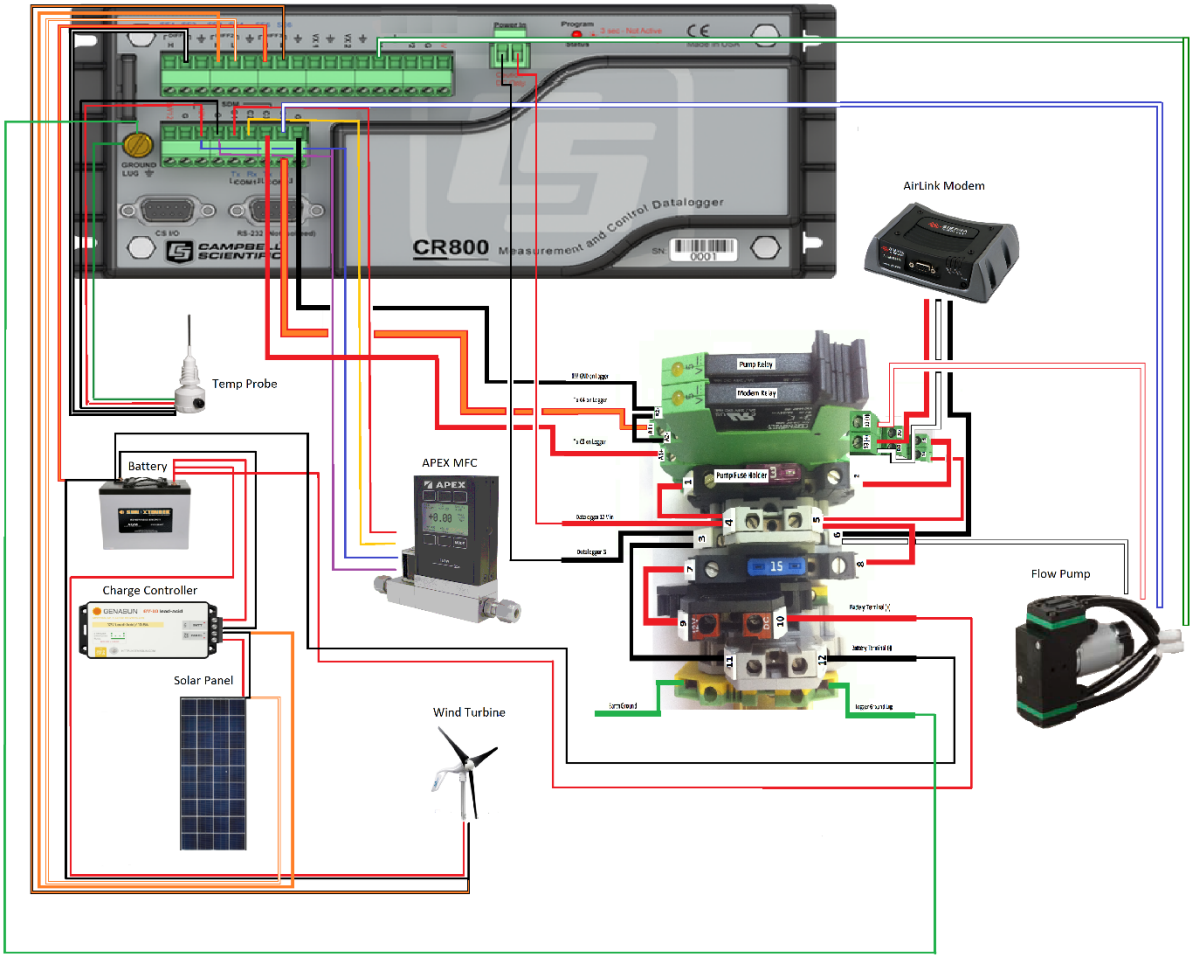


Figure 7. Low Power Enclosure Diagram



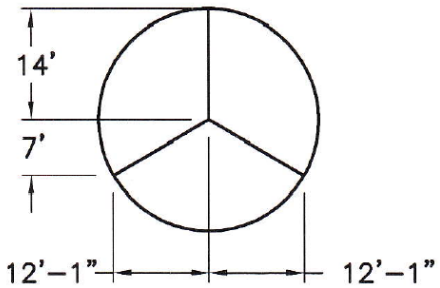
6.3.2 Tower Installation

- Assemble the tower sections horizontally with the base near the concrete pad and clearance overhead to later raise the tower.
- Attach the following equipment to tower:
  - Flow tubing
  - Temperature wiring
  - Antenna cable
  - Upper guy wires
- Erect tower

  At least two people are required to erect the tower. Align two legs of the tower with two of the supports in the tower base. Ensure the base is securely attached to the concrete pad and level. While one person holds the tower legs aligned with the base plate, ‘walk’ the tower upright. Once all three tower legs are in the base plate, immediately secure the legs with the

provided bolts and lock nuts. DO NOT release the tower until the legs are completely secured.

- Install ground anchors
  Install the ground anchors as closely as possible to the following diagram. Occasionally, it is necessary to move the anchors slightly because of landscape (e.g., rocks, grade, etc). Verify the tower will be able to tilt without interfering with the front guy wire. The front anchor might have to be moved slightly offset from center and slightly closer to the tower base. Tilt the tower to the correct position to use as a guide.



GUY PATTERN

- Attach lower guy wire attachment
  Attach the guy wires to the ground anchors using the supplied turnbuckles (fully loosened) and wire clamps. Flag the wires if they are near walking paths.
  Tighten the turnbuckles to level the tower vertically in all directions. The intended tension in the guy wire is around 200 lbs. While an exact measurement is not important, there should be no slack in any wire and they should offer strong resistance to pressure from the side. ***Note:*** The guy wires will stretch slightly and the turnbuckles may have to be loosened and reattached.
- Attach remaining equipment to tower
  - Enclosure
  - Pot head with wind generator
  - Temperature Shield
  - Antenna
  - Battery Enclosure
- Connect flow tubing and temperature wiring – See Figure 5.
- Connect antenna
- Standard Installations
    - Connect main power supply to surge suppression terminals – See Figure 5
    - Connect main power supply to outlet

  Ensure the outlet is weatherproof while in-use and GFCI protected.

  Low Power Installations
    - Install the solar panel facing due south (not magnetic south)
    - Tilt the angle of the panel according to the location, between 25 and 50 degrees. A steeper tilt is needed in northern locations and a shallower tilt is needed in southern locations. Likewise, a steeper tilt is needed during winter months and a shallower tilt is needed in summer months.

- Record the estimated tilt angle to be verified and seasonally adjusted during the semi-annual audit.
- Connect the output of the solar panels to the charge controller.
- Connect the output of the charge controller to the battery bank.
- Connect the output of the wind generator directly to the battery bank. A separate charge controller is not needed.
- Connect the positive and negative terminals of the battery bank to the data logger power supply input.
- Connect the output monitoring leads from the negative (-) terminal of the solar charge controller and the negative output of the solar panel to the data logger terminals 2H and 2L as shown in Figures 5, 6 and 7.
- Connect the output monitoring leads from the negative (-) terminal of the battery bank and the negative output of the wind generator to the data logger terminals 3H and 3L

- Perform equipment audit as described in section 6.5

6.4 Operation

6.4.1 Data Logger Data Access

- From a blank screen, press any soft key to light the display.
- From the main screen, press the *Enter* soft key.
- With the > next to Data, press the *Enter* soft key.
- Enter the Security Code, and press the *Enter* soft key.
- With the > next to Real Time Tables, press the *Enter* soft key.
- With the > next to Public, press the *Enter* soft key.
- To back in the menu tree, press the *ESC* soft key.

6.4.2 Field Site Operator Procedures

6.4.2.1 Upon arrival:

Record the date, time, personnel onsite and any equipment/site modifications performed in the site narrative log. Check the current flow rate reported by the MFC and data logger and the current temperature for reasonableness. Call AMEC immediately with any unexpected results.

Note date and time of arrival, personnel onsite and any relevant nearby activities, such as controlled burning or other source of local emissions, on the site status report form (SSRF) corresponding to the filter being removed.

6.4.2.2 To Remove Currently Sampling Filter Pack:

- Record the current data logger flow and rotameter reading in the Filter Off section of the SSRF
- Turn off the flow pump by setting the *Pump_On* parameter to *false*.
- Down the flow and temperature channels using the data logger display.

- Record the current MFC display value in the Pump Off field in the filter off section of the SSRF
- For sites with a wind generator, move the switch mounted to the battery enclosure to the OFF position. This engages a brake in the turbine to prevent the blades from spinning when lowered. ***Note:*** The switch must always be in either the RUN or OFF positions and not left in the middle position.
- Carefully lower the tower
- Wearing clean gloves, attach the black filter cap to the filter pack
- Remove the filter pack at the quick disconnect and attach the red cap to the filter pack quick disconnect.
- Reseal the filter pack in the provided plastic bag

6.4.2.3 Perform a leak check on the flow system:

- With no filter pack installed in the quick disconnect, turn on the flow pump by setting the *Pump_On* parameter to *True*
- Record the lowest reading from the MFC display on the SSRF as the leak check result for both the filter pack being removed as well as the SSRF for the filter to be installed.
- Verify the leak check result is within 0.1 standard liter per minute (slpm) of the previously recorded Pump Off value.
- Turn off the flow pump by setting the *Pump_On* parameter to *false*.

6.4.2.4 To install the filter pack:

- Remove the filter pack and SSRF chain of custody from the shipping container and verify the filter pack ID on the filter matches the SSRF.
- Print your name on the chain of custody on the ‘Shipment Opened By’ line.
- Carefully lower the tower if not already down
- Perform a leak check of the flow system as described above or copy the result from the previous weeks’ SSRF if available.
- Wearing clean gloves, remove the filter pack from the plastic bag and remove the red cap from the filter pack quick disconnect
- Leaving the black inlet side cap in place, install the filter pack in the quick connect fitting until the locking ring clicks into place and the filter pack cannot be pulled free
- Remove the black inlet side cap and reseal both the red and black caps in the plastic bag
- Raise and secure the tower
- For sites with a wind generator, move the switch mounted to the battery enclosure to the RUN position. This allows the turbine generate power. ***Note:*** The switch must always be in either the RUN or OFF positions and not left in the middle position.
- Record the current MFC display value in the Pump Off field in the Filter On section of the SSRF
- Up the flow and temperature channels using the data logger display.
- Turn on the flow pump by setting the *Pump_On* parameter to *true*.

- Record the current data logger flow in the filter on section of the SSRF
- Record the current rotameter value in the Filter On section of the SSRF

6.5 Calibration

Perform an “as found” audit of the data logger using the acceptance testing procedure described in section 6.1. Record all results in the electronic calibration forms.

Perform an “as found” audit of the flow system as described in QAPP Appendix 1 Field SOP, Section III Field Calibration Manual, 6.4 Flow and QAPP Appendix 1 Field SOP, Section IV Calibration Laboratory, C Site Instrumentation, 4 Mass Flow Controller. Record all results in the electronic calibration forms.

Perform an “as found” audit of the temperature system as described in QAPP Appendix 1 Field SOP, Section IV Calibration Laboratory, C Site Instrumentation, 5 temperature sensor. ***Note:*** An “as found” audit is not required if the sensor has not been operating (e.g., during the initial installation or installation of a replacement sensor). Calibrate the temperature sensor and perform a multipoint audit as described in Section 6.1.4. Record all results in the electronic calibration forms.

6.6 Maintenance, Repair and Troubleshooting

After the “as found” MFC audit, but before the final flow verification check, replace the Balston filter preceding the MFC during the semi-annual audit.

Annually, following the “as found” MFC audit, but before the final flow verification check, replace the flow pump during the semi-annual audit. The pump will be rebuilt upon return to the field laboratory.

Clean the surface of the solar panels as accumulated dust and debris can significantly reduce output.

7.0 REFERENCES

Cellular Modem Configuration Instructions

8.0 ATTACHMENTS

This sop has no attachments.

Appendix B
Low Power Filter Pack Site Design Plan

1.0 Design Process

The initial design follows the small footprint design with the exceptions described in the following paragraphs.

A description of each major component follows. For part number, suppliers, and cost, see the attached parts list. This design is specific to the COW005, NC site. The energy requirements for a proposed site will depend on its setting, local weather conditions, and estimated solar and wind energy resources.

Flow System
The current GAST 15D Twin pump will be replaced with a Brailsford 4X2 12V pump. The Brailsford pump has been proven to be capable of maintaining the nominal flow rate of 1.5 lpm and uses significantly less power than the GAST pump. The original small footprint design did not include a rotameter or Balston filter. The serial connected mass flow controller (allowing remote control and improved monitoring with some housekeeping data) and rotameter and Balston are now at all EPA-sponsored filter pack sites, including the small footprint sites.

Cellular modem relay
A data logger-controlled relay will be added to the cellular modem to periodically turn the modem off to save system power.

Supply Power
The phoenix contact STEP series DC power supply to the data logger, pump, cellular modem, and mass flow controller and 120V GFCI outlet will replaced with the battery system described in the following section.

2.0 Battery System Design

Figure 1 provides a schematic of the energy system, albeit with two solar panels and two batteries. One solar panel, a wind turbine, and one battery were used at COW005.

A breakdown of estimated power requirements is listed below
Data logger – 50 mA
Pump – 250 mA
Cellular modem – 500 mA peak (250 mA nominal)
APEX mass flow controller – 400 mA
Total – 1200 mA at 12 VDC
Power required – 350 watts per day

Battery Capacity
A 79 Ahr (20 hour) sealed AGM lead acid battery will be used, which will provide at least 1.35 days of continuous operation without added input power.

Estimated Solar Output
A Kyrocera KD140SX 140W solar panel will be installed generating the following estimated daily output:
600 watts per day
Actual output will be determined during the evaluation period by measuring the voltage drop across the one leg of the charging cables.
Voltage Drop = Resistance of cable x current output
With a resistance of 5 mOhm, the maximum voltage drop is expected to be 50 mV at 10 A

Estimated Wind Output
The wind generator is not expected to produce significant output at wind speeds < 7 mph. Actual output will be measured in the same manner as solar output. Wind speed will be measured using a calibrated RM Young Wind Monitor AQ during the evaluation period.

Charging Controller
The wind generator includes a built-in charging circuit and will be directly connected to the battery. The solar panel will connect through a 10.5A MPPT charging controller.

3.0 Standard Equipment

Tower
Aluma Tower aluminum 10m FOT-10-B/AT-516D-1. When guyed, the maximum sail area is 3 ft^2 at 90 mph and 8 ft^2 at 70 mph.

The tower is grounded to mitigate some lightning damage using a fully buried 8-foot copper grounding rod bonded to the tower using 12 AWG stranded copper wire.

Enclosure
An operator-accessible 12x14 inch enclosure containing the major components will be installed at approximately 1.5 m on the tower. A schematic of the system is shown in Figure B-1.

Temperature Measurement
Temperature measurements will be made using an RM Young 1000 ohm platinum RTD in a passively aspirated shield. All power requirements will be supplied by the data logger. Because the CR850 data logger does not have current excitation capability and thus the ability to make a

direct resistance measurement, the RTD will require a voltage excitation and adjustable translator card.

Communication

Internet communication will be supplied using a Sierra wireless GX440 cellular modem. The modem has a built in WiFi router, which will be utilized to communicate with the data logger from a laptop computer. Since the data logger does not have an Ethernet connection, the modem will be connected serially to the data logger and incoming TCP traffic on port 6785 will be forwarded to the serial port of the modem. The operating temperature range of the modem is -30^0C to 70^0C.

4.0 Evaluation Period

Routine Operation

During the weekly site operator visit, the following tasks will be completed:

- Replace the filter pack and complete the SSRF
- Inspect and wipe clean the solar panel – accumulated dust can reduce output
- Verify communications are working

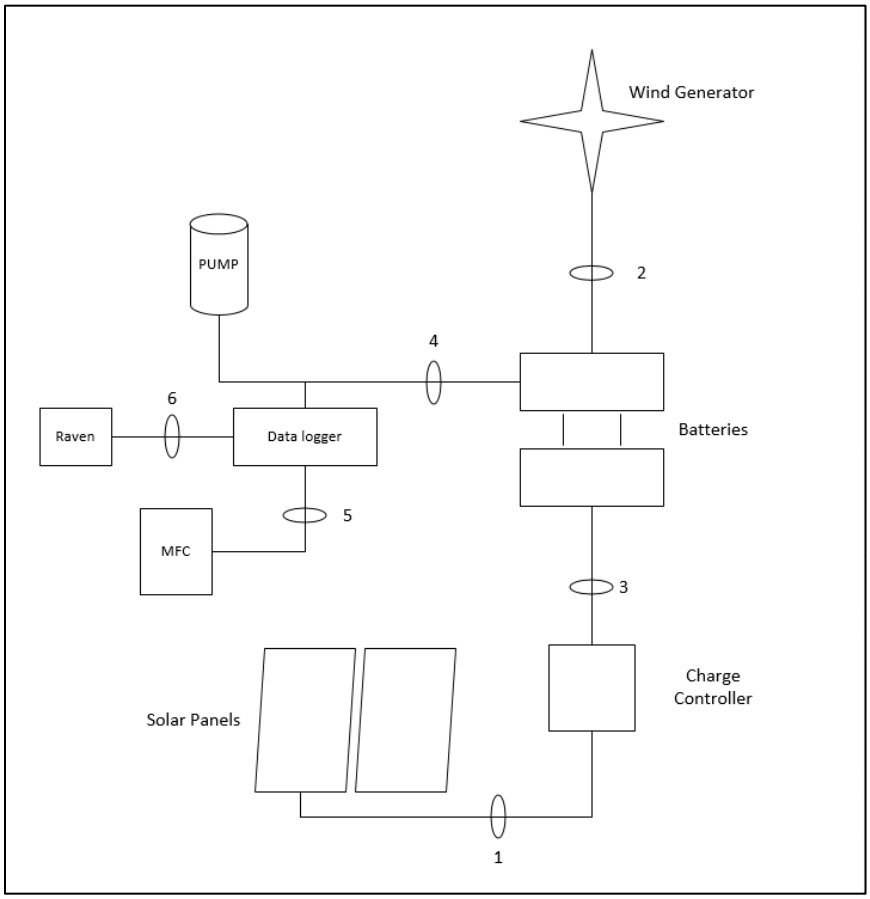
Data Review

During the evaluation period, daily data review will be performed using the standard CASTNET procedures for flow rate and temperature. In addition, the data logger battery voltage, which is a direct measurement for the AGM battery voltage, will be reviewed for stability and consistency with solar output and wind output. Battery depth of discharge will be calculated as Amp hours deficit (watts generated - watts used) / 79 Amp hour capacity.

Evaluation Period Criteria

The evaluation period will be considered successful if data completeness is greater than 95 percent during the period, the flow rate maintains the nominal flow rate during valid hours, and the charging system is able to maintain operation without the depth of discharge of the battery falling below 50 percent.

Figure B-1. Schematic of Energy System



Appendix C
Test Data

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/2/2014 11:00	13.46	0.351	30.98	3.034	0
9/2/2014 12:00	13.47	1.5	31.67	1.462	0
9/2/2014 13:00	13.26	1.5	32.19	1.052	0
9/2/2014 14:00	13.54	1.5	31.58	0.894	0.001
9/2/2014 15:00	13.48	1.5	31.54	0.822	0
9/2/2014 16:00	13.31	1.5	33.12	0.855	0
9/2/2014 17:00	12.48	1.5	31.1	0.828	0
9/2/2014 18:00	12.45	1.501	28.41	0.23	0.007
9/2/2014 19:00	12.52	1.501	26.5	0	0
9/2/2014 20:00	12.35	1.501	25.25	-0.01	0
9/2/2014 21:00	12.43	1.501	24.77	-0.01	0
9/2/2014 22:00	12.39	1.501	24.55	-0.01	0
9/2/2014 23:00	12.42	1.501	24.3	-0.01	0
9/3/2014 0:00	12.27	1.501	24.38	-0.01	0
9/3/2014 1:00	12.22	1.501	24.43	-0.01	0
9/3/2014 2:00	12.4	1.501	24.16	-0.01	0
9/3/2014 3:00	12.26	1.501	23.9	-0.01	0
9/3/2014 4:00	12.19	1.501	23.55	-0.01	0
9/3/2014 5:00	12.19	1.501	23.43	-0.01	0
9/3/2014 6:00	12.12	1.501	23.34	-0.009	0
9/3/2014 7:00	12.39	1.501	23.78	0.229	0
9/3/2014 8:00	12.95	1.501	25.7	2.337	0
9/3/2014 9:00	13.37	1.5	27.54	4.56	0
9/3/2014 10:00	13.21	1.5	28.85	3.278	0
9/3/2014 11:00	13.26	1.5	30.17	2.446	0
9/3/2014 12:00	13.39	1.5	31.1	1.742	0
9/3/2014 13:00	13.27	1.5	31.23	1.279	0
9/3/2014 14:00	13.31	1.501	26.46	0.911	0
9/3/2014 15:00	13.4	1.5	29.17	0.827	0
9/3/2014 16:00	13.5	1.5	31.34	0.833	0.002
9/3/2014 17:00	13.35	1.501	28.63	0.808	0.011
9/3/2014 18:00	12.51	1.501	27.56	0.649	0
9/3/2014 19:00	12.32	1.501	26.08	0.158	0
9/3/2014 20:00	12.51	1.501	24.84	-0.01	0
9/3/2014 21:00	12.45	1.501	24.59	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/3/2014 22:00	12.27	1.501	24.41	-0.01	0
9/3/2014 23:00	12.44	1.501	24.12	-0.01	0
9/4/2014 0:00	12.47	1.501	23.87	-0.01	0
9/4/2014 1:00	12.37	1.501	23.47	-0.01	0
9/4/2014 2:00	12.22	1.501	23.04	-0.01	0
9/4/2014 3:00	12.27	1.501	22.94	-0.01	0
9/4/2014 4:00	12.4	1.501	22.64	-0.01	0
9/4/2014 5:00	12.18	1.5	22.49	-0.01	0
9/4/2014 6:00	12.36	1.501	22.27	-0.009	0
9/4/2014 7:00	12.17	1.501	22.7	0.15	0
9/4/2014 8:00	13.12	1.501	25.46	2.608	0
9/4/2014 9:00	13.41	1.5	27.46	4.624	0
9/4/2014 10:00	13.39	1.5	28.12	2.913	0
9/4/2014 11:00	13.5	1.5	29.26	2.062	0
9/4/2014 12:00	13.51	1.5	30.26	1.492	0
9/4/2014 13:00	13.46	1.5	31.19	1.112	0
9/4/2014 14:00	13.43	1.5	31.47	0.92	0
9/4/2014 15:00	13.5	1.5	32.48	0.865	0
9/4/2014 16:00	13.48	1.5	30.59	0.844	0.02
9/4/2014 17:00	13.45	1.501	27.91	0.819	0
9/4/2014 18:00	12.48	1.501	28.32	0.532	0
9/4/2014 19:00	12.57	1.501	27.23	0.03	0
9/4/2014 20:00	12.4	1.501	25.93	-0.01	0
9/4/2014 21:00	12.52	1.501	24.99	-0.01	0
9/4/2014 22:00	12.51	1.501	24.36	-0.01	0
9/4/2014 23:00	12.46	1.501	24.01	-0.01	0
9/5/2014 0:00	12.46	1.501	23.64	-0.01	0
9/5/2014 1:00	12.46	1.501	23.46	-0.01	0
9/5/2014 2:00	12.45	1.501	23.09	-0.01	0
9/5/2014 3:00	12.4	1.501	22.97	-0.01	0
9/5/2014 4:00	12.35	1.501	22.59	-0.01	0
9/5/2014 5:00	12.22	1.501	22.38	-0.01	0
9/5/2014 6:00	12.25	1.501	22.3	-0.01	0
9/5/2014 7:00	12.29	1.501	22.5	0.122	0
9/5/2014 8:00	13.11	1.5	25.28	2.315	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/5/2014 9:00	13.4	1.5	27.32	4.637	0
9/5/2014 10:00	13.35	1.501	28.85	3.196	0
9/5/2014 11:00	13.44	1.5	29.94	2.324	0
9/5/2014 12:00	13.51	1.5	30.91	1.625	0.001
9/5/2014 13:00	12.83	1.5	31.19	1.177	0
9/5/2014 14:00	13.51	1.501	24.84	0.908	0.047
9/5/2014 15:00	12.65	1.501	24.5	0.587	0
9/5/2014 16:00	12.54	1.501	23.91	0.486	0
9/5/2014 17:00	12.61	1.501	23.93	0.429	0
9/5/2014 18:00	12.56	1.501	23.9	0.315	0
9/5/2014 19:00	12.54	1.501	23.94	0.046	0
9/5/2014 20:00	12.51	1.501	23.92	-0.01	0
9/5/2014 21:00	12.5	1.501	23.98	-0.01	0
9/5/2014 22:00	12.48	1.501	23.96	-0.01	0
9/5/2014 23:00	12.25	1.501	23.85	-0.01	0
9/6/2014 0:00	12.37	1.501	23.67	-0.01	0
9/6/2014 1:00	12.38	1.5	23.46	-0.01	0
9/6/2014 2:00	12.17	1.499	23.36	-0.01	0
9/6/2014 3:00	12.37	1.501	23.33	-0.01	0
9/6/2014 4:00	12.29	1.5	23.27	-0.01	0
9/6/2014 5:00	12.17	1.501	23.23	-0.01	0
9/6/2014 6:00	12.36	1.5	23.21	-0.01	0
9/6/2014 7:00	12.19	1.5	23.25	0.267	0
9/6/2014 8:00	12.14	1.501	23.4	0.356	0
9/6/2014 9:00	12.51	1.501	23.51	0.618	0
9/6/2014 10:00	12.51	1.5	23.77	0.997	0
9/6/2014 11:00	12.56	1.5	23.83	0.736	0
9/6/2014 12:00	12.87	1.501	23.76	1.464	0
9/6/2014 13:00	13	1.501	23.78	2.783	0
9/6/2014 14:00	13.38	1.501	24.08	3.765	0
9/6/2014 15:00	13.35	1.5	24.84	3.379	0
9/6/2014 16:00	13.29	1.501	25.76	2.278	0
9/6/2014 17:00	13.47	1.501	26.18	1.738	0
9/6/2014 18:00	12.56	1.501	25.72	0.843	0
9/6/2014 19:00	12.55	1.501	24.93	0.129	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/6/2014 20:00	12.57	1.501	24.33	-0.01	0
9/6/2014 21:00	12.52	1.501	24.32	-0.01	0
9/6/2014 22:00	12.54	1.501	24.11	-0.01	0
9/6/2014 23:00	12.4	1.501	23.57	-0.01	0
9/7/2014 0:00	12.38	1.501	23.55	-0.01	0
9/7/2014 1:00	12.4	1.501	23.59	-0.01	0
9/7/2014 2:00	12.43	1.501	23.55	-0.01	0
9/7/2014 3:00	12.42	1.501	23.54	-0.01	0
9/7/2014 4:00	12.34	1.501	23.3	-0.01	0
9/7/2014 5:00	12.37	1.501	23.3	-0.01	0
9/7/2014 6:00	12.35	1.501	23.27	-0.01	0
9/7/2014 7:00	12.42	1.501	23.13	0.23	0
9/7/2014 8:00	12.9	1.501	24.22	1.599	0
9/7/2014 9:00	13	1.501	26.06	3.24	0
9/7/2014 10:00	13.02	1.501	25.94	1.46	0
9/7/2014 11:00	13.35	1.501	25.45	3.268	0.001
9/7/2014 12:00	13.43	1.501	25.9	2.463	0.003
9/7/2014 13:00	13.46	1.501	26.82	1.783	0
9/7/2014 14:00	13.27	1.5	27.9	1.379	0
9/7/2014 15:00	13.21	1.5	28.94	1.161	0
9/7/2014 16:00	13.26	1.5	29.78	1.029	0
9/7/2014 17:00	12.73	1.501	29.06	0.935	0.01
9/7/2014 18:00	12.5	1.501	24.11	0.863	0.031
9/7/2014 19:00	12.54	1.501	24.39	0.062	0
9/7/2014 20:00	12.5	1.501	23.7	-0.01	0
9/7/2014 21:00	12.29	1.501	23.06	-0.01	0
9/7/2014 22:00	12.52	1.501	22.8	-0.01	0
9/7/2014 23:00	12.49	1.501	23	-0.01	0
9/8/2014 0:00	12.46	1.501	23.27	-0.01	0
9/8/2014 1:00	12.42	1.501	23.45	-0.01	0
9/8/2014 2:00	12.27	1.501	23.44	-0.01	0
9/8/2014 3:00	12.39	1.5	23.34	-0.01	0
9/8/2014 4:00	12.2	1.501	23.26	-0.01	0
9/8/2014 5:00	12.18	1.5	23.04	-0.01	0
9/8/2014 6:00	12.37	1.5	22.75	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/8/2014 7:00	12.19	1.5	22.67	0.279	0
9/8/2014 8:00	12.78	1.5	23.15	0.997	0
9/8/2014 9:00	13.16	1.5	24.97	4.143	0
9/8/2014 10:00	13.47	1.5	27.03	3.48	0.001
9/8/2014 11:00	13.38	1.5	28.24	2.409	0.004
9/8/2014 12:00	13.5	1.5	29.18	1.732	0.005
9/8/2014 13:00	13.54	1.501	30.12	1.232	0.015
9/8/2014 14:00	13.45	1.5	30.9	0.972	0.029
9/8/2014 15:00	13.38	1.5	30.51	0.884	0.032
9/8/2014 16:00	13.35	1.5	29.73	0.85	0.026
9/8/2014 17:00	13.43	1.501	28.73	0.857	0
9/8/2014 18:00	12.57	1.501	28.03	0.683	0
9/8/2014 19:00	12.4	1.501	26.85	0.1	0
9/8/2014 20:00	12.55	1.501	25.69	-0.01	0
9/8/2014 21:00	12.51	1.501	25.48	-0.01	0
9/8/2014 22:00	12.5	1.501	25.22	-0.01	0
9/8/2014 23:00	12.4	1.501	24.76	-0.01	0
9/9/2014 0:00	12.26	1.501	24.43	-0.01	0
9/9/2014 1:00	12.32	1.501	24.09	-0.01	0
9/9/2014 2:00	12.23	1.501	23.5	-0.01	0
9/9/2014 3:00	12.35	1.501	23.44	-0.01	0
9/9/2014 4:00	12.34	1.501	23.43	-0.01	0
9/9/2014 5:00	12.33	1.501	23.49	-0.01	0
9/9/2014 6:00	12.27	1.501	23.5	-0.01	0
9/9/2014 7:00	12.27	1.501	23.64	0.291	0
9/9/2014 8:00	12.89	1.5	24.96	2.232	0
9/9/2014 9:00	13.18	1.501	26.92	3.838	0
9/9/2014 10:00	13.13	1.501	28.23	3.635	0
9/9/2014 11:00	13.34	1.5	28.82	2.306	0
9/9/2014 12:00	13.39	1.5	30.03	1.648	0
9/9/2014 13:00	13.23	1.5	30.99	1.19	0
9/9/2014 14:00	13.33	1.5	29.75	0.999	0.008
9/9/2014 15:00	12.72	1.501	24.69	0.852	0
9/9/2014 16:00	12.38	1.501	23.51	0.049	0.001
9/9/2014 17:00	12.48	1.501	22.82	0.043	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/9/2014 18:00	12.38	1.501	22.76	0.123	0
9/9/2014 19:00	12.46	1.501	22.92	0.015	0
9/9/2014 20:00	12.45	1.501	22.96	-0.01	0
9/9/2014 21:00	12.46	1.501	22.93	-0.01	0
9/9/2014 22:00	12.23	1.5	22.84	-0.01	0
9/9/2014 23:00	12.21	1.501	22.78	-0.01	0
9/10/2014 0:00	12.32	1.5	22.61	-0.01	0
9/10/2014 1:00	12.38	1.5	22.47	-0.01	0
9/10/2014 2:00	12.13	1.5	22.39	-0.01	0
9/10/2014 3:00	12.29	1.5	22.29	-0.01	0
9/10/2014 4:00	12.17	1.5	22.27	-0.01	0
9/10/2014 5:00	12.14	1.5	22.35	-0.01	0
9/10/2014 6:00	12.24	1.5	22.25	-0.01	0
9/10/2014 7:00	12.21	1.501	22.41	0.173	0
9/10/2014 8:00	12.86	1.5	24.72	2.498	0
9/10/2014 9:00	13.25	1.501	26.78	5.181	0
9/10/2014 10:00	13.44	1.5	28.25	3.66	0.001
9/10/2014 11:00	13.28	1.5	29.22	2.465	0.002
9/10/2014 12:00	13.49	1.5	30.14	1.73	0
9/10/2014 13:00	13.5	1.5	31.11	1.223	0
9/10/2014 14:00	13.29	1.5	31.79	0.986	0
9/10/2014 15:00	13.51	1.5	32.16	0.888	0
9/10/2014 16:00	13.57	1.5	31.89	0.867	0
9/10/2014 17:00	13.33	1.5	31.6	0.847	0.006
9/10/2014 18:00	12.61	1.501	29.56	0.754	0.016
9/10/2014 19:00	12.56	1.501	28.26	0.117	0
9/10/2014 20:00	12.37	1.501	27.24	-0.01	0
9/10/2014 21:00	12.51	1.501	26.9	-0.01	0
9/10/2014 22:00	12.34	1.501	26.37	-0.01	0
9/10/2014 23:00	12.41	1.501	25.72	-0.01	0
9/11/2014 0:00	12.44	1.501	25.04	-0.01	0
9/11/2014 1:00	12.32	1.501	24.46	-0.01	0
9/11/2014 2:00	12.2	1.501	23.96	-0.01	0
9/11/2014 3:00	12.46	1.501	23.59	-0.01	0
9/11/2014 4:00	12.22	1.501	23.39	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/11/2014 5:00	12.4	1.501	22.99	-0.01	0
9/11/2014 6:00	12.18	1.501	22.68	-0.01	0
9/11/2014 7:00	12.15	1.501	22.95	0.192	0
9/11/2014 8:00	13.06	1.501	26.76	2.432	0
9/11/2014 9:00	13.12	1.5	28.4	4.732	0
9/11/2014 10:00	13.44	1.5	29.43	2.98	0
9/11/2014 11:00	13.2	1.5	30.12	2.135	0
9/11/2014 12:00	13.48	1.5	31.22	1.456	0
9/11/2014 13:00	13.43	1.5	31.58	1.077	0
9/11/2014 14:00	13.49	1.5	32.61	0.917	0.001
9/11/2014 15:00	13.45	1.5	32.98	0.869	0
9/11/2014 16:00	13.48	1.5	30.63	0.82	0.041
9/11/2014 17:00	13	1.501	27.43	0.825	0.017
9/11/2014 18:00	12.6	1.501	25.94	0.564	0
9/11/2014 19:00	12.44	1.501	26.26	0.112	0
9/11/2014 20:00	12.47	1.501	25.6	-0.01	0
9/11/2014 21:00	12.46	1.501	24.98	-0.01	0
9/11/2014 22:00	12.43	1.501	24.07	-0.01	0
9/11/2014 23:00	12.43	1.501	23.6	-0.01	0
9/12/2014 0:00	12.45	1.501	23.32	-0.01	0
9/12/2014 1:00	12.2	1.501	22.99	-0.01	0
9/12/2014 2:00	12.23	1.501	22.62	-0.01	0
9/12/2014 3:00	12.42	1.501	22.41	-0.01	0
9/12/2014 4:00	12.35	1.501	22.28	-0.01	0
9/12/2014 5:00	12.37	1.5	22.12	-0.01	0
9/12/2014 6:00	12.3	1.5	21.97	-0.01	0
9/12/2014 7:00	12.44	1.501	22.46	0.302	0
9/12/2014 8:00	13.11	1.5	24.54	2.347	0
9/12/2014 9:00	13.28	1.5	27.19	4.499	0
9/12/2014 10:00	13.32	1.5	29.37	3.152	0
9/12/2014 11:00	13.43	1.5	30.52	2.145	0.012
9/12/2014 12:00	13.27	1.5	31.22	1.487	0.007
9/12/2014 13:00	13.23	1.5	32.33	1.087	0
9/12/2014 14:00	13.29	1.5	32.93	0.92	0.001
9/12/2014 15:00	13.43	1.5	33.14	0.898	0.003

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/12/2014 16:00	13.49	1.5	29.8	0.814	0.015
9/12/2014 17:00	13.52	1.5	31.34	0.817	0
9/12/2014 18:00	12.58	1.501	31.11	0.784	0.001
9/12/2014 19:00	12.6	1.501	28.93	0.097	0
9/12/2014 20:00	12.38	1.501	27.7	-0.01	0
9/12/2014 21:00	12.33	1.501	26.68	-0.01	0
9/12/2014 22:00	12.38	1.501	26.01	-0.01	0
9/12/2014 23:00	12.28	1.501	25.27	-0.01	0
9/13/2014 0:00	12.33	1.501	24.97	-0.01	0
9/13/2014 1:00	12.26	1.501	24.57	-0.01	0
9/13/2014 2:00	12.39	1.501	24.09	-0.01	0
9/13/2014 3:00	12.42	1.501	23.82	-0.01	0
9/13/2014 4:00	12.17	1.501	23.55	-0.01	0
9/13/2014 5:00	12.36	1.501	23.83	-0.01	0
9/13/2014 6:00	12.36	1.501	23.65	-0.01	0
9/13/2014 7:00	12.27	1.5	23.92	0.163	0
9/13/2014 8:00	13.09	1.501	26.22	2.54	0
9/13/2014 9:00	13.39	1.5	27.64	4.521	0
9/13/2014 10:00	13.39	1.5	29.03	2.949	0.003
9/13/2014 11:00	13.3	1.5	29.9	2.004	0.002
9/13/2014 12:00	13.3	1.5	31	1.438	0
9/13/2014 13:00	13.43	1.5	31.7	1.064	0
9/13/2014 14:00	13.46	1.5	32.29	0.913	0
9/13/2014 15:00	13.37	1.5	32.37	0.85	0
9/13/2014 16:00	13.33	1.5	32.6	0.838	0
9/13/2014 17:00	13.47	1.5	32.8	0.842	0
9/13/2014 18:00	12.56	1.5	32.22	0.847	0
9/13/2014 19:00	12.34	1.501	29.73	0.135	0.002
9/13/2014 20:00	12.56	1.501	28.09	-0.013	0
9/13/2014 21:00	12.53	1.501	26.99	-0.01	0
9/13/2014 22:00	12.26	1.501	25.64	-0.01	0
9/13/2014 23:00	12.42	1.501	24.84	-0.01	0
9/14/2014 0:00	12.33	1.501	24.75	-0.01	0
9/14/2014 1:00	12.19	1.501	24.7	-0.01	0
9/14/2014 2:00	12.4	1.501	24.65	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/14/2014 3:00	12.37	1.501	24.15	-0.01	0
9/14/2014 4:00	12.38	1.501	23.91	-0.01	0
9/14/2014 5:00	12.2	1.501	23.61	-0.01	0
9/14/2014 6:00	12.11	1.501	23.19	-0.01	0
9/14/2014 7:00	12.2	1.501	23.05	0.135	0
9/14/2014 8:00	12.92	1.501	26.27	2.55	0
9/14/2014 9:00	13.22	1.5	27.49	4.658	0
9/14/2014 10:00	13.31	1.5	28.94	3.034	0
9/14/2014 11:00	13.34	1.5	30.07	2.044	0
9/14/2014 12:00	13.47	1.5	30.88	1.425	0
9/14/2014 13:00	13.49	1.5	31.17	1.047	0.001
9/14/2014 14:00	13.29	1.5	31.78	0.881	0.002
9/14/2014 15:00	13.33	1.5	32.37	0.85	0.001
9/14/2014 16:00	13.51	1.5	32.23	0.828	0
9/14/2014 17:00	13.43	1.5	32.34	0.833	0
9/14/2014 18:00	12.62	1.5	31.62	0.857	0
9/14/2014 19:00	12.38	1.501	29.37	0.298	0
9/14/2014 20:00	12.37	1.501	27.76	-0.012	0
9/14/2014 21:00	12.45	1.501	27.47	-0.01	0
9/14/2014 22:00	12.31	1.501	26.87	-0.01	0
9/14/2014 23:00	12.47	1.501	26.17	-0.01	0
9/15/2014 0:00	12.49	1.501	25.29	-0.01	0
9/15/2014 1:00	12.3	1.501	24.5	-0.01	0
9/15/2014 2:00	12.45	1.501	24.16	-0.01	0
9/15/2014 3:00	12.41	1.501	23.69	-0.01	0
9/15/2014 4:00	12.3	1.501	23.36	-0.01	0
9/15/2014 5:00	12.29	1.501	23.17	-0.01	0
9/15/2014 6:00	12.37	1.501	22.79	-0.01	0
9/15/2014 7:00	12.32	1.501	22.86	0.165	0
9/15/2014 8:00	13.06	1.501	24.61	2.412	0
9/15/2014 9:00	13.33	1.5	27.29	4.468	0
9/15/2014 10:00	13.31	1.5	28.73	3.104	0
9/15/2014 11:00	13.48	1.5	30.03	2.103	0
9/15/2014 12:00	13.22	1.5	30.88	1.491	0
9/15/2014 13:00	13.39	1.5	28.98	1.028	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/15/2014 14:00	13.49	1.5	30.28	0.877	0.025
9/15/2014 15:00	13.26	1.501	29.77	0.809	0.113
9/15/2014 16:00	13.25	1.5	27.69	0.788	0.033
9/15/2014 17:00	13.49	1.501	26.91	0.809	0.001
9/15/2014 18:00	12.45	1.501	26.57	0.669	0
9/15/2014 19:00	12.42	1.501	25.69	0.117	0
9/15/2014 20:00	12.31	1.501	25.24	-0.01	0
9/15/2014 21:00	12.45	1.501	25.09	-0.01	0
9/15/2014 22:00	12.42	1.501	24.61	-0.01	0
9/15/2014 23:00	12.4	1.501	24.48	-0.01	0
9/16/2014 0:00	12.43	1.501	24.19	-0.01	0
9/16/2014 1:00	12.37	1.501	24.24	-0.01	0
9/16/2014 2:00	12.42	1.501	24.24	-0.01	0
9/16/2014 3:00	12.38	1.501	24.2	-0.01	0
9/16/2014 4:00	12.26	1.501	24.06	-0.01	0.005
9/16/2014 5:00	12.35	1.501	23.33	-0.01	0
9/16/2014 6:00	12.34	1.501	23.13	-0.01	0
9/16/2014 7:00	12.41	1.501	23.06	0.113	0
9/16/2014 8:00	12.62	1.501	24.17	2.145	0
9/16/2014 9:00	12.83	1.501	24.91	1.572	0
9/16/2014 10:00	12.57	1.501	24.99	0.79	0
9/16/2014 11:00	12.62	1.501	25.03	0.68	0
9/16/2014 12:00	12.69	1.501	24.82	0.881	0.001
9/16/2014 13:00	12.8	1.501	23.8	1.131	0
9/16/2014 14:00	13.12	1.501	23.51	1.98	0
9/16/2014 14:00	13.12	1.501	23.51	1.98	0
9/16/2014 15:00	13.16	1.5	24.46	3.566	0.004
9/16/2014 16:00	13.25	1.5	25.01	2.622	0.002
9/16/2014 17:00	12.84	1.501	25.18	1.393	0
9/16/2014 18:00	12.38	1.501	24.8	0.226	0.007
9/16/2014 19:00	12.35	1.5	23.29	-0.008	0.004
9/16/2014 20:00	12.5	1.5	22.62	-0.01	0
9/16/2014 21:00	12.46	1.501	22.44	-0.01	0
9/16/2014 22:00	12.26	1.501	22.44	-0.01	0
9/16/2014 23:00	12.32	1.5	22.36	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/17/2014 0:00	12.39	1.5	22.36	-0.01	0
9/17/2014 1:00	12.3	1.5	22.21	-0.01	0
9/17/2014 2:00	12.33	1.501	22.2	-0.01	0
9/17/2014 3:00	12.37	1.5	22.23	-0.01	0
9/17/2014 4:00	12.27	1.5	22.36	-0.01	0
9/17/2014 5:00	12.32	1.501	22.1	-0.01	0
9/17/2014 6:00	12.12	1.5	21.89	-0.01	0
9/17/2014 7:00	12.21	1.501	22.05	0.161	0
9/17/2014 8:00	12.54	1.501	23.96	2.459	0
9/17/2014 9:00	13.04	1.5	25.6	4.596	0
9/17/2014 10:00	13.49	1.5	26.84	3.49	0
9/17/2014 11:00	13.5	1.5	27.55	2.489	0
9/17/2014 12:00	13.48	1.501	27.6	1.798	0
9/17/2014 13:00	13.55	1.5	27.83	1.362	0
9/17/2014 14:00	13.52	1.5	28.72	1.159	0
9/17/2014 15:00	13.32	1.5	29.52	0.992	0
9/17/2014 16:00	13.48	1.5	30.38	0.882	0.001
9/17/2014 17:00	13.32	1.5	30.37	0.841	0.001
9/17/2014 18:00	12.52	1.501	29.33	0.722	0
9/17/2014 19:00	12.47	1.501	26.92	0.108	0
9/17/2014 20:00	12.5	1.501	25.41	-0.01	0
9/17/2014 21:00	12.46	1.501	24.82	-0.01	0
9/17/2014 22:00	12.34	1.501	24.93	-0.01	0
9/17/2014 23:00	12.28	1.501	24.2	-0.01	0
9/18/2014 0:00	12.48	1.501	23.53	-0.01	0
9/18/2014 1:00	12.42	1.501	23.03	-0.01	0
9/18/2014 2:00	12.27	1.501	22.68	-0.01	0
9/18/2014 3:00	12.33	1.501	22.42	-0.01	0
9/18/2014 4:00	12.41	1.501	22.04	-0.01	0
9/18/2014 5:00	12.31	1.501	21.73	-0.01	0
9/18/2014 6:00	12.31	1.501	21.54	-0.01	0
9/18/2014 7:00	12.16	1.501	21.46	0.178	0
9/18/2014 8:00	12.87	1.501	23.11	1.493	0
9/18/2014 9:00	13.24	1.501	26.28	4.814	0
9/18/2014 10:00	13.49	1.5	28.33	3.299	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/18/2014 11:00	13.43	1.5	29.47	2.195	0
9/18/2014 12:00	13.53	1.5	30.59	1.571	0
9/18/2014 13:00	13.48	1.5	31.82	1.157	0
9/18/2014 14:00	13.52	1.5	32.36	0.963	0
9/18/2014 15:00	13.32	1.5	32.67	0.879	0
9/18/2014 16:00	13.42	1.501	32.39	0.855	0
9/18/2014 17:00	13.36	1.5	31.81	0.838	0
9/18/2014 18:00	12.45	1.501	30.21	0.813	0
9/18/2014 19:00	12.49	1.501	27.87	0.206	0
9/18/2014 20:00	12.54	1.501	27.15	-0.01	0
9/18/2014 21:00	12.53	1.501	26.28	-0.01	0
9/18/2014 22:00	12.32	1.501	24.83	-0.01	0
9/18/2014 23:00	12.48	1.501	23.89	-0.01	0
9/19/2014 0:00	12.24	1.501	22.98	-0.01	0
9/19/2014 1:00	12.23	1.501	22.41	-0.01	0
9/19/2014 2:00	12.23	1.501	21.97	-0.01	0
9/19/2014 3:00	12.4	1.501	21.47	-0.01	0
9/19/2014 4:00	12.26	1.501	21.51	-0.01	0
9/19/2014 5:00	12.36	1.501	21.87	-0.01	0
9/19/2014 6:00	12.14	1.501	22.21	-0.01	0
9/19/2014 7:00	12.21	1.5	22.46	0.091	0
9/19/2014 8:00	12.48	1.501	23.19	0.64	0
9/19/2014 9:00	12.77	1.501	24.73	1.669	0
9/19/2014 10:00	12.83	1.501	25.63	1.64	0
9/19/2014 11:00	12.72	1.501	26.21	1.642	0
9/19/2014 12:00	12.78	1.501	26.21	1.434	0
9/19/2014 13:00	13.15	1.501	26.32	2.534	0
9/19/2014 14:00	13.45	1.501	26.73	3.143	0
9/19/2014 15:00	13.2	1.501	27.29	2.4	0
9/19/2014 16:00	13.46	1.501	27.4	1.648	0
9/19/2014 17:00	12.61	1.501	26.49	1.113	0
9/19/2014 18:00	12.33	1.501	24.47	0.296	0.004
9/19/2014 19:00	12.45	1.501	23.25	0.009	0
9/19/2014 20:00	12.54	1.5	22.92	-0.01	0
9/19/2014 21:00	12.52	1.5	22.73	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/19/2014 22:00	12.48	1.501	22.55	-0.01	0
9/19/2014 23:00	12.31	1.501	22.45	-0.01	0
9/20/2014 0:00	12.35	1.501	22.4	-0.01	0
9/20/2014 1:00	12.38	1.501	22.5	-0.01	0
9/20/2014 2:00	12.32	1.501	22.25	-0.01	0
9/20/2014 3:00	12.4	1.501	22.05	-0.01	0
9/20/2014 4:00	12.38	1.501	21.6	-0.01	0
9/20/2014 5:00	12.36	1.501	21.32	-0.01	0
9/20/2014 6:00	12.32	1.501	21.17	-0.01	0
9/20/2014 7:00	12.17	1.5	21.08	0.043	0
9/20/2014 8:00	12.39	1.501	21.42	0.461	0
9/20/2014 9:00	12.92	1.501	22.28	2.777	0.004
9/20/2014 10:00	13.36	1.501	23.76	4.449	0.011
9/20/2014 11:00	13.44	1.501	25.54	3.339	0.012
9/20/2014 12:00	13.33	1.5	27.52	2.228	0.015
9/20/2014 13:00	13.47	1.5	27.81	1.546	0.034
9/20/2014 14:00	13.35	1.501	27.74	1.169	0.004
9/20/2014 15:00	13.56	1.501	26.98	0.988	0.049
9/20/2014 16:00	13.48	1.501	24.77	0.889	0.016
9/20/2014 17:00	13.5	1.501	25.78	0.833	0.014
9/20/2014 18:00	12.65	1.501	25.32	0.778	0.001
9/20/2014 19:00	12.52	1.501	24.24	0.065	0
9/20/2014 20:00	12.55	1.501	23.28	-0.01	0
9/20/2014 21:00	12.39	1.5	22.68	-0.01	0
9/20/2014 22:00	12.34	1.501	22.05	-0.01	0
9/20/2014 23:00	12.35	1.501	21.62	-0.01	0
9/21/2014 0:00	12.28	1.501	21.23	-0.01	0
9/21/2014 1:00	12.37	1.501	20.97	-0.01	0
9/21/2014 2:00	12.23	1.501	20.57	-0.01	0
9/21/2014 3:00	12.18	1.501	20.09	-0.01	0
9/21/2014 4:00	12.18	1.501	19.8	-0.01	0
9/21/2014 5:00	12.27	1.501	19.47	-0.01	0
9/21/2014 6:00	12.22	1.501	19.07	-0.01	0
9/21/2014 7:00	12.18	1.501	19	0.124	0
9/21/2014 8:00	13.18	1.501	22.37	2.335	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/21/2014 9:00	13.48	1.501	24.29	4.746	0
9/21/2014 10:00	13.37	1.501	26.2	2.985	0.001
9/21/2014 11:00	13.42	1.501	27.76	1.966	0.002
9/21/2014 12:00	13.33	1.5	28.55	1.361	0
9/21/2014 13:00	13.37	1.501	29.26	1.043	0
9/21/2014 14:00	13.59	1.5	30.08	0.918	0
9/21/2014 15:00	13.32	1.501	30.81	0.876	0
9/21/2014 16:00	13.54	1.501	29.79	0.862	0
9/21/2014 17:00	13.57	1.501	29.18	0.847	0
9/21/2014 18:00	12.51	1.501	28.89	0.711	0
9/21/2014 19:00	12.5	1.501	25.63	0.069	0
9/21/2014 20:00	12.58	1.501	23.96	-0.01	0
9/21/2014 21:00	12.36	1.501	22.92	-0.01	0
9/21/2014 22:00	12.25	1.501	22.18	-0.01	0
9/21/2014 23:00	12.49	1.501	21.38	-0.01	0
9/22/2014 0:00	12.49	1.501	20.77	-0.01	0
9/22/2014 1:00	12.25	1.501	20.48	-0.01	0
9/22/2014 2:00	12.25	1.501	20.23	-0.01	0
9/22/2014 3:00	12.38	1.501	20.05	-0.01	0
9/22/2014 4:00	12.38	1.501	19.91	-0.01	0
9/22/2014 5:00	12.18	1.501	19.63	-0.01	0
9/22/2014 6:00	12.28	1.501	19.72	-0.01	0
9/22/2014 7:00	12.15	1.5	19.87	0.142	0
9/22/2014 8:00	13.15	1.501	22.48	2.143	0
9/22/2014 9:00	13.48	1.501	25.72	4.808	0
9/22/2014 10:00	13.5	1.5	27.4	3.413	0
9/22/2014 11:00	13.41	1.5	28.99	2.12	0
9/22/2014 12:00	13.42	1.501	29.16	1.404	0
9/22/2014 13:00	13.42	1.5	28.62	1.027	0.001
9/22/2014 14:00	13.34	1.501	29.43	0.911	0.001
9/22/2014 15:00	13.35	1.501	29.22	0.835	0
9/22/2014 16:00	13.59	1.501	28.15	0.829	0
9/22/2014 17:00	12.61	1.501	26.42	0.686	0.002
9/22/2014 18:00	12.48	1.501	22.98	0.048	0.006
9/22/2014 19:00	12.38	1.501	22.68	0.022	0.001

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/22/2014 20:00	12.51	1.501	22.56	-0.01	0
9/22/2014 21:00	12.49	1.501	22.66	-0.01	0
9/22/2014 22:00	12.3	1.501	22.74	-0.01	0
9/22/2014 23:00	12.42	1.501	22.57	-0.01	0
9/23/2014 0:00	12.36	1.501	22.29	-0.01	0
9/23/2014 1:00	12.35	1.501	22.08	-0.01	0
9/23/2014 2:00	12.27	1.5	21.94	-0.01	0
9/23/2014 3:00	12.35	1.501	21.96	-0.01	0
9/23/2014 4:00	12.39	1.5	22.13	-0.01	0
9/23/2014 5:00	12.34	1.5	22.26	-0.01	0
9/23/2014 6:00	12.29	1.5	22.46	-0.01	0
9/23/2014 7:00	12.31	1.5	22.02	0.03	0
9/23/2014 8:00	12.32	1.501	21.86	0.212	0
9/23/2014 9:00	12.98	1.5	22.4	1.643	0
9/23/2014 10:00	12.86	1.5	23.04	2.89	0
9/23/2014 11:00	13.08	1.501	23.38	2.634	0
9/23/2014 12:00	13.12	1.501	23.23	2.196	0.008
9/23/2014 13:00	13.25	1.501	24.29	3.19	0.001
9/23/2014 14:00	13.51	1.501	24.36	1.793	0.007
9/23/2014 15:00	13.49	1.501	24.78	1.831	0.013
9/23/2014 16:00	13.28	1.501	24.82	1.31	0.008
9/23/2014 17:00	13.35	1.501	24.99	1.039	0.001
9/23/2014 18:00	12.54	1.501	25.86	0.806	0.003
9/23/2014 19:00	12.44	1.501	24.32	0.085	0.001
9/23/2014 20:00	12.39	1.501	23.1	-0.01	0.001
9/23/2014 21:00	12.3	1.501	22.08	-0.01	0
9/23/2014 22:00	12.26	1.501	21.58	-0.01	0
9/23/2014 23:00	12.46	1.501	21.47	-0.01	0
9/24/2014 0:00	12.33	1.501	21.66	-0.01	0.007
9/24/2014 1:00	12.21	1.501	21.39	-0.01	0.005
9/24/2014 2:00	12.25	1.501	20.92	-0.01	0.007
9/24/2014 3:00	12.36	1.501	20.44	-0.01	0.005
9/24/2014 4:00	12.38	1.501	20.47	-0.01	0.013
9/24/2014 5:00	12.37	1.501	20.29	-0.01	0.017
9/24/2014 6:00	12.15	1.5	19.97	-0.01	0.019

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/24/2014 7:00	12.33	1.501	19.54	0.041	0.025
9/24/2014 8:00	12.74	1.501	19.61	0.983	0.009
9/24/2014 9:00	13.23	1.5	20.11	3.006	0.01
9/24/2014 10:00	13.35	1.501	22.29	4.192	0.008
9/24/2014 11:00	13.43	1.501	23.13	2.592	0.01
9/24/2014 12:00	13.52	1.501	23.76	1.71	0.01
9/24/2014 13:00	13.62	1.501	23.87	1.223	0.008
9/24/2014 14:00	13.61	1.501	24.24	0.969	0.003
9/24/2014 15:00	13.61	1.501	25.15	0.882	0.003
9/24/2014 16:00	13.58	1.501	25.39	0.841	0.003
9/24/2014 17:00	13.63	1.501	25.36	0.82	0.003
9/24/2014 18:00	12.62	1.501	24.3	0.725	0.001
9/24/2014 19:00	12.59	1.501	23.08	0.045	0.003
9/24/2014 20:00	12.35	1.501	21.95	-0.01	0.007
9/24/2014 21:00	12.36	1.501	21.1	-0.01	0.002
9/24/2014 22:00	12.39	1.501	20.54	-0.01	0.003
9/24/2014 23:00	12.27	1.501	20.08	-0.01	0.006
9/25/2014 0:00	12.45	1.501	19.62	-0.01	0.005
9/25/2014 1:00	12.42	1.501	19.38	-0.01	0.001
9/25/2014 2:00	12.2	1.501	19.09	-0.01	0.002
9/25/2014 3:00	12.18	1.501	18.83	-0.01	0
9/25/2014 4:00	12.35	1.501	18.54	-0.01	0.002
9/25/2014 5:00	12.15	1.501	18.41	-0.01	0.001
9/25/2014 6:00	12.35	1.501	18.31	-0.01	0
9/25/2014 7:00	12.31	1.501	18.34	0.067	0.001
9/25/2014 8:00	12.69	1.501	18.78	0.846	0.001
9/25/2014 9:00	13.01	1.5	19.8	2.729	0.008
9/25/2014 10:00	13.09	1.501	20.39	2.516	0.007
9/25/2014 11:00	13.46	1.501	21.15	3.668	0.004
9/25/2014 12:00	13.61	1.501	21.94	2.38	0.002
9/25/2014 13:00	13.46	1.501	23.08	1.643	0
9/25/2014 14:00	13.5	1.501	24.04	1.198	0.001
9/25/2014 15:00	13.57	1.501	24.56	0.971	0.002
9/25/2014 16:00	13.47	1.501	25.37	0.873	0
9/25/2014 17:00	13.43	1.501	25.31	0.832	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/25/2014 18:00	12.63	1.501	24.59	0.509	0
9/25/2014 19:00	12.42	1.501	23.39	0.024	0
9/25/2014 20:00	12.54	1.501	22.46	-0.01	0
9/25/2014 21:00	12.52	1.501	21.74	-0.01	0
9/25/2014 22:00	12.44	1.501	21.41	-0.01	0
9/25/2014 23:00	12.31	1.501	20.93	-0.01	0
9/26/2014 0:00	12.43	1.501	20.57	-0.01	0
9/26/2014 1:00	12.21	1.501	20.12	-0.01	0
9/26/2014 2:00	12.41	1.501	19.74	-0.01	0
9/26/2014 3:00	12.42	1.501	19.54	-0.01	0
9/26/2014 4:00	12.28	1.501	19.42	-0.01	0
9/26/2014 5:00	12.34	1.501	19.39	-0.01	0
9/26/2014 6:00	12.16	1.501	19.74	-0.01	0
9/26/2014 7:00	12.34	1.501	20.01	0.106	0
9/26/2014 8:00	12.18	1.5	20.74	0.476	0
9/26/2014 9:00	12.95	1.501	21.76	1.463	0.003
9/26/2014 10:00	12.97	1.501	23.21	3.4	0.005
9/26/2014 11:00	13.11	1.501	24.69	4.167	0.004
9/26/2014 12:00	13.52	1.501	25.76	3.057	0.004
9/26/2014 13:00	13.56	1.501	26.44	1.849	0.003
9/26/2014 14:00	13.43	1.501	28.32	1.289	0.006
9/26/2014 15:00	13.35	1.501	28.93	1.012	0.01
9/26/2014 16:00	13.56	1.501	27.75	0.872	0.005
9/26/2014 17:00	13.55	1.501	27.73	0.86	0.02
9/26/2014 18:00	12.53	1.501	26.75	0.582	0.006
9/26/2014 19:00	12.56	1.501	25.42	0.029	0
9/26/2014 20:00	12.32	1.501	24.78	-0.01	0
9/26/2014 21:00	12.45	1.501	24.2	-0.01	0.001
9/26/2014 22:00	12.49	1.501	24.01	-0.01	0.001
9/26/2014 23:00	12.49	1.501	23.88	-0.01	0
9/27/2014 0:00	12.28	1.501	23.48	-0.01	0
9/27/2014 1:00	12.45	1.501	23.47	-0.01	0.001
9/27/2014 2:00	12.27	1.5	23.52	-0.01	0.001
9/27/2014 3:00	12.2	1.501	23.53	-0.01	0.001
9/27/2014 4:00	12.32	1.501	23.46	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/27/2014 5:00	12.37	1.501	23.31	-0.01	0
9/27/2014 6:00	12.15	1.501	23.21	-0.01	0
9/27/2014 7:00	12.36	1.501	23.09	0.074	0
9/27/2014 8:00	12.35	1.501	23.19	0.628	0.001
9/27/2014 9:00	12.73	1.501	23.83	1.923	0.002
9/27/2014 10:00	12.98	1.501	24.82	2.417	0.001
9/27/2014 11:00	13.14	1.501	25.6	2.478	0.002
9/27/2014 12:00	13.33	1.501	27	3.951	0.012
9/27/2014 13:00	13.45	1.5	28.74	2.43	0.015
9/27/2014 14:00	13.12	1.501	29.44	1.523	0.009
9/27/2014 15:00	13.28	1.501	26.78	1.123	0.001
9/27/2014 16:00	12.66	1.501	27	0.922	0
9/27/2014 17:00	12.59	1.501	26.35	0.391	0.005
9/27/2014 18:00	12.31	1.501	23.89	0.001	0.002
9/27/2014 19:00	12.51	1.501	23.98	-0.008	0
9/27/2014 20:00	12.48	1.501	24.05	-0.01	0
9/27/2014 21:00	12.42	1.501	23.82	-0.01	0
9/27/2014 22:00	12.29	1.501	23.52	-0.01	0
9/27/2014 23:00	12.2	1.5	23.28	-0.01	0
9/28/2014 0:00	12.43	1.501	23.1	-0.01	0
9/28/2014 1:00	12.42	1.501	23.05	-0.01	0
9/28/2014 2:00	12.38	1.5	23.11	-0.01	0
9/28/2014 3:00	12.29	1.5	23.21	-0.01	0
9/28/2014 4:00	12.16	1.501	23.27	-0.01	0
9/28/2014 5:00	12.27	1.501	23.4	-0.01	0
9/28/2014 6:00	12.11	1.501	23.53	-0.01	0
9/28/2014 7:00	12.15	1.501	23.72	0.055	0
9/28/2014 8:00	12.31	1.501	24.12	0.594	0
9/28/2014 9:00	12.84	1.5	24.8	1.377	0
9/28/2014 10:00	12.93	1.5	25.54	2.272	0
9/28/2014 11:00	13.23	1.5	27.03	4.731	0
9/28/2014 12:00	13.36	1.501	28.5	3.856	0.001
9/28/2014 13:00	13.47	1.5	29.81	2.342	0
9/28/2014 14:00	12.83	1.501	28.6	1.408	0.004
9/28/2014 15:00	13.43	1.501	26.23	1.106	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/28/2014 16:00	13.45	1.5	27.74	0.965	0.002
9/28/2014 17:00	12.47	1.501	24.85	0.67	0.018
9/28/2014 18:00	12.55	1.501	23.88	0.299	0
9/28/2014 19:00	12.54	1.501	23.6	-0.006	0
9/28/2014 20:00	12.37	1.501	23.6	-0.01	0
9/28/2014 21:00	12.29	1.501	23.54	-0.01	0
9/28/2014 22:00	12.42	1.501	23.45	-0.01	0
9/28/2014 23:00	12.35	1.501	22.76	-0.01	0
9/29/2014 0:00	12.44	1.501	22.48	-0.01	0
9/29/2014 1:00	12.22	1.501	22.46	-0.01	0
9/29/2014 2:00	12.34	1.501	22.4	-0.01	0
9/29/2014 3:00	12.32	1.501	22.34	-0.01	0
9/29/2014 4:00	12.14	1.501	22.34	-0.01	0
9/29/2014 5:00	12.35	1.5	22.44	-0.01	0
9/29/2014 6:00	12.19	1.5	22.48	-0.01	0
9/29/2014 7:00	12.32	1.501	22.55	0.103	0
9/29/2014 8:00	12.38	1.5	22.94	0.815	0
9/29/2014 9:00	12.62	1.501	23.79	1.806	0
9/29/2014 10:00	13.09	1.501	24.02	1.985	0
9/29/2014 11:00	12.97	1.501	24.82	2.932	0
9/29/2014 12:00	12.89	1.501	25.41	2.209	0
9/29/2014 13:00	12.78	1.501	25.27	1.134	0
9/29/2014 14:00	12.69	1.501	24.86	0.693	0
9/29/2014 15:00	13.47	1.501	25.03	2.533	0
9/29/2014 16:00	13.13	1.501	25.68	2.313	0
9/29/2014 17:00	12.46	1.501	25.25	0.769	0
9/29/2014 18:00	12.48	1.501	24.56	0.121	0
9/29/2014 19:00	12.38	1.5	24.21	-0.007	0
9/29/2014 20:00	12.5	1.501	23.88	-0.01	0
9/29/2014 21:00	12.44	1.501	23.65	-0.01	0
9/29/2014 22:00	12.34	1.501	23.61	-0.01	0
9/29/2014 23:00	12.43	1.501	23.54	-0.01	0
9/30/2014 0:00	12.22	1.501	23.54	-0.01	0
9/30/2014 1:00	12.24	1.501	23.52	-0.01	0
9/30/2014 2:00	12.35	1.5	23.48	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
9/30/2014 3:00	12.29	1.5	23.5	-0.01	0
9/30/2014 4:00	12.29	1.5	23.46	-0.01	0
9/30/2014 5:00	12.35	1.5	23.39	-0.01	0
9/30/2014 6:00	12.32	1.5	23.06	-0.01	0
9/30/2014 7:00	12.08	1.5	23.06	0.023	0
9/30/2014 8:00	12.67	1.5	23.22	0.686	0
9/30/2014 9:00	12.87	1.501	23.46	1.642	0
9/30/2014 10:00	12.73	1.5	24.32	4.063	0
9/30/2014 11:00	13.04	1.501	23.99	1.819	0
9/30/2014 12:00	13.29	1.501	24.93	3.408	0
9/30/2014 13:00	13.19	1.5	26.54	2.518	0
9/30/2014 14:00	13.39	1.501	27.14	2.02	0
9/30/2014 15:00	13.31	1.5	26.79	1.608	0
9/30/2014 16:00	13.39	1.501	26.98	1.261	0
9/30/2014 17:00	13.45	1.501	26.03	1.106	0.002
9/30/2014 18:00	12.61	1.501	25.23	0.61	0
9/30/2014 19:00	12.58	1.501	24.5	0.002	0.001
9/30/2014 20:00	12.49	1.501	23.88	-0.01	0
9/30/2014 21:00	12.36	1.501	23.47	-0.01	0
9/30/2014 22:00	12.51	1.501	23.01	-0.01	0
9/30/2014 23:00	12.47	1.501	23.03	-0.01	0
10/1/2014 0:00	12.46	1.501	23.09	-0.01	0
10/1/2014 1:00	12.42	1.501	23.09	-0.01	0
10/1/2014 2:00	12.44	1.501	22.94	-0.01	0
10/1/2014 3:00	12.22	1.501	22.77	-0.01	0
10/1/2014 4:00	12.23	1.501	22.58	-0.01	0
10/1/2014 5:00	12.23	1.501	22.43	-0.01	0
10/1/2014 6:00	12.18	1.5	22.41	-0.01	0
10/1/2014 7:00	12.33	1.501	22.51	0.088	0
10/1/2014 8:00	12.26	1.501	22.93	0.672	0
10/1/2014 9:00	13.08	1.501	23.89	1.996	0
10/1/2014 10:00	13.27	1.501	25.36	3.59	0
10/1/2014 11:00	13.17	1.5	26.59	3.674	0.003
10/1/2014 12:00	13.46	1.501	27.38	2.577	0.011
10/1/2014 13:00	13.47	1.5	28.45	1.775	0.004

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/1/2014 14:00	13.47	1.5	28.6	1.281	0.003
10/1/2014 15:00	13.41	1.5	28.79	1.049	0
10/1/2014 16:00	13.23	1.5	29.05	0.965	0
10/1/2014 17:00	13.48	1.5	28.86	0.937	0
10/1/2014 18:00	12.41	1.501	27.11	0.653	0
10/1/2014 19:00	12.49	1.501	25.68	0.005	0
10/1/2014 20:00	12.52	1.501	25.11	-0.01	0
10/1/2014 21:00	12.34	1.501	24.52	-0.01	0
10/1/2014 22:00	12.49	1.501	23.68	-0.01	0
10/1/2014 23:00	12.29	1.501	23.06	-0.01	0
10/2/2014 0:00	12.42	1.501	23.09	-0.01	0
10/2/2014 1:00	12.47	1.501	23.48	-0.01	0
10/2/2014 2:00	12.27	1.501	23.17	-0.01	0
10/2/2014 3:00	12.4	1.501	22.86	-0.01	0
10/2/2014 4:00	12.27	1.501	22.57	-0.01	0
10/2/2014 5:00	12.37	1.501	22.46	-0.01	0
10/2/2014 6:00	12.19	1.501	22.15	-0.01	0
10/2/2014 7:00	12.19	1.5	22.15	0.185	0
10/2/2014 8:00	12.95	1.501	24.22	1.862	0
10/2/2014 9:00	13.14	1.501	26.56	4.147	0
10/2/2014 10:00	13.19	1.501	28	3.35	0
10/2/2014 11:00	13.17	1.5	28.76	2.556	0
10/2/2014 12:00	13.39	1.501	29.47	1.676	0
10/2/2014 13:00	13.28	1.5	30.13	1.168	0
10/2/2014 14:00	13.48	1.5	31.29	0.985	0.003
10/2/2014 15:00	13.32	1.5	31.64	0.929	0
10/2/2014 16:00	13.4	1.5	31.5	0.915	0
10/2/2014 17:00	13.51	1.5	31.89	0.884	0.002
10/2/2014 18:00	12.32	1.5	29.06	0.597	0.005
10/2/2014 19:00	12.55	1.501	26.78	0.005	0
10/2/2014 20:00	12.49	1.501	25.97	-0.01	0
10/2/2014 21:00	12.26	1.501	25.47	-0.01	0
10/2/2014 22:00	12.43	1.501	25.03	-0.01	0
10/2/2014 23:00	12.22	1.501	24.18	-0.01	0
10/3/2014 0:00	12.46	1.501	23.41	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/3/2014 1:00	12.2	1.501	22.94	-0.01	0
10/3/2014 2:00	12.41	1.501	22.71	-0.01	0
10/3/2014 3:00	12.27	1.501	22.53	-0.01	0
10/3/2014 4:00	12.4	1.501	22.18	-0.01	0
10/3/2014 5:00	12.23	1.5	22.3	-0.01	0
10/3/2014 6:00	12.29	1.501	22.32	-0.01	0
10/3/2014 7:00	12.42	1.501	22.36	0.135	0
10/3/2014 8:00	12.75	1.501	23.48	1.052	0
10/3/2014 9:00	13.02	1.501	25.27	3.062	0
10/3/2014 10:00	13.38	1.501	27.4	4.04	0.01
10/3/2014 11:00	13.43	1.501	28.82	2.967	0.002
10/3/2014 12:00	13.25	1.5	30.15	2.068	0.014
10/3/2014 13:00	13.28	1.5	30.43	1.413	0.017
10/3/2014 14:00	13.35	1.5	30.03	1.067	0.031
10/3/2014 15:00	13.31	1.501	30.18	0.931	0.043
10/3/2014 16:00	12.66	1.501	27.79	0.874	0.005
10/3/2014 17:00	12.6	1.501	24.49	0.302	0.031
10/3/2014 18:00	12.5	1.501	23.93	0.179	0
10/3/2014 19:00	12.36	1.501	23.45	-0.007	0
10/3/2014 20:00	12.51	1.501	23.16	-0.01	0
10/3/2014 21:00	12.32	1.501	23.24	-0.01	0
10/3/2014 22:00	12.47	1.501	23.24	-0.01	0
10/3/2014 23:00	12.43	1.501	23.3	-0.01	0
10/4/2014 0:00	12.45	1.501	23.43	-0.01	0
10/4/2014 1:00	12.24	1.501	23.54	-0.01	0
10/4/2014 2:00	12.31	1.5	23.38	-0.01	0
10/4/2014 3:00	12.34	1.501	23.47	-0.01	0
10/4/2014 4:00	12.38	1.5	23.19	-0.01	0
10/4/2014 5:00	12.28	1.501	23.04	-0.01	0
10/4/2014 6:00	12.06	1.501	22.96	-0.01	0
10/4/2014 7:00	12.24	1.5	22.59	0.064	0
10/4/2014 8:00	12.74	1.501	23	1.38	0
10/4/2014 9:00	12.96	1.5	23.4	3.81	0
10/4/2014 10:00	13.39	1.501	23.94	3.956	0.008
10/4/2014 11:00	13.27	1.5	25.18	2.75	0.004

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/4/2014 12:00	13.37	1.5	25.29	1.808	0.016
10/4/2014 13:00	13.55	1.5	26.27	1.263	0.012
10/4/2014 14:00	13.47	1.501	26.92	1.002	0.009
10/4/2014 15:00	13.33	1.5	27.04	0.867	0.018
10/4/2014 16:00	13.54	1.501	27.02	0.816	0.022
10/4/2014 17:00	13.23	1.501	26.65	0.8	0.009
10/4/2014 18:00	12.49	1.501	25.11	0.653	0
10/4/2014 19:00	12.35	1.501	20.78	0.009	0
10/4/2014 20:00	12.32	1.501	18.51	-0.01	0
10/4/2014 21:00	12.35	1.501	18.59	-0.01	0
10/4/2014 22:00	12.26	1.5	18.18	-0.01	0
10/4/2014 23:00	12.27	1.5	16.85	-0.01	0
10/5/2014 0:00	12.26	1.5	14.49	-0.009	0
10/5/2014 1:00	12.41	1.5	12.37	-0.007	0
10/5/2014 2:00	12.19	1.5	11.1	-0.006	0
10/5/2014 3:00	12.11	1.5	10.55	-0.005	0
10/5/2014 4:00	12.09	1.5	10.01	-0.004	0
10/5/2014 5:00	12.33	1.5	9.38	-0.004	0
10/5/2014 6:00	12.27	1.5	8.97	-0.003	0
10/5/2014 7:00	12.12	1.499	8.85	0.082	0
10/5/2014 8:00	13.35	1.5	11.98	2.146	0
10/5/2014 9:00	13.55	1.5	15.52	4.208	0
10/5/2014 10:00	13.8	1.5	18.15	2.684	0.003
10/5/2014 11:00	13.74	1.501	19.76	1.86	0.004
10/5/2014 13:00	13.69	1.501	21.82	1.123	0.004
10/5/2014 14:00	13.86	1.501	22.65	0.961	0.005
10/5/2014 15:00	13.73	1.501	23.18	0.874	0.001
10/5/2014 16:00	13.85	1.501	23.36	0.832	0.002
10/5/2014 17:00	13.89	1.501	23.54	0.822	0
10/5/2014 18:00	12.62	1.501	21.36	0.623	0
10/5/2014 19:00	12.57	1.5	16.88	0.005	0
10/5/2014 20:00	12.32	1.5	15.02	-0.01	0
10/5/2014 21:00	12.54	1.5	13.85	-0.01	0
10/5/2014 22:00	12.4	1.501	13.01	-0.01	0
10/5/2014 23:00	12.32	1.5	12.21	-0.008	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/6/2014 0:00	12.44	1.5	11.56	-0.007	0
10/6/2014 1:00	12.4	1.5	10.87	-0.007	0
10/6/2014 2:00	12.17	1.5	10.58	-0.007	0
10/6/2014 3:00	12.36	1.5	10.22	-0.006	0
10/6/2014 4:00	12.23	1.5	9.94	-0.005	0
10/6/2014 5:00	12.27	1.5	9.61	-0.004	0
10/6/2014 6:00	12.14	1.5	9.39	-0.004	0
10/6/2014 7:00	12.26	1.5	9.44	0.084	0
10/6/2014 8:00	13.4	1.5	13.14	2.085	0
10/6/2014 9:00	13.66	1.5	19.63	4.723	0
10/6/2014 10:00	13.69	1.501	21.48	3.045	0.008
10/6/2014 11:00	13.76	1.501	22.99	1.937	0.015
10/6/2014 12:00	13.6	1.501	24.44	1.338	0.011
10/6/2014 13:00	13.84	1.501	25.14	1.057	0.006
10/6/2014 14:00	13.63	1.501	25.33	0.906	0.01
10/6/2014 15:00	13.67	1.501	25.54	0.848	0.001
10/6/2014 16:00	13.66	1.501	25.79	0.838	0
10/6/2014 17:00	13.67	1.501	24.91	0.864	0
10/6/2014 18:00	12.58	1.501	22.05	0.441	0
10/6/2014 19:00	12.55	1.501	20.57	-0.007	0
10/6/2014 20:00	12.31	1.501	19.61	-0.01	0
10/6/2014 21:00	12.44	1.501	19.25	-0.01	0
10/6/2014 22:00	12.4	1.501	18.89	-0.01	0
10/6/2014 23:00	12.29	1.501	18.85	-0.01	0
10/7/2014 0:00	12.33	1.501	19.07	-0.01	0
10/7/2014 1:00	12.41	1.501	18.81	-0.01	0
10/7/2014 2:00	12.22	1.5	18.62	-0.01	0
10/7/2014 3:00	12.26	1.501	18.66	-0.01	0
10/7/2014 4:00	12.36	1.501	18.31	-0.01	0
10/7/2014 5:00	12.33	1.501	18.3	-0.01	0
10/7/2014 6:00	12.12	1.501	18.71	-0.01	0
10/7/2014 7:00	12.12	1.501	19.19	0.087	0
10/7/2014 8:00	13.11	1.501	21.22	2.151	0
10/7/2014 9:00	12.85	1.501	22.83	2.509	0
10/7/2014 10:00	13.51	1.501	24.62	4.676	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/7/2014 11:00	13.5	1.501	25.94	3.012	0.001
10/7/2014 12:00	13.57	1.501	26.83	1.656	0
10/7/2014 13:00	13.52	1.501	27.53	1.154	0.001
10/7/2014 14:00	13.52	1.501	27.67	0.933	0
10/7/2014 15:00	13.47	1.501	28.18	0.85	0
10/7/2014 16:00	13.35	1.501	28.4	0.829	0
10/7/2014 17:00	13.44	1.501	27.93	0.836	0
10/7/2014 18:00	12.4	1.501	26.3	0.568	0
10/7/2014 19:00	12.51	1.501	24.49	-0.004	0
10/7/2014 20:00	12.49	1.501	23.53	-0.01	0
10/7/2014 21:00	12.29	1.501	22.88	-0.01	0
10/7/2014 22:00	12.4	1.501	22.34	-0.01	0
10/7/2014 23:00	12.31	1.501	22.02	-0.01	0
10/8/2014 0:00	12.19	1.501	21.43	-0.01	0
10/8/2014 1:00	12.41	1.501	20.94	-0.01	0
10/8/2014 2:00	12.39	1.501	20.5	-0.01	0
10/8/2014 3:00	12.18	1.501	20.07	-0.01	0
10/8/2014 4:00	12.31	1.501	19.57	-0.01	0
10/8/2014 5:00	12.22	1.501	19.14	-0.01	0
10/8/2014 6:00	12.35	1.501	18.81	-0.01	0
10/8/2014 7:00	12.35	1.5	18.51	0.074	0
10/8/2014 8:00	13.13	1.501	21.48	1.991	0
10/8/2014 9:00	13.29	1.501	25.76	5.146	0
10/8/2014 10:00	13.45	1.5	27.83	3.549	0
10/8/2014 11:00	13.55	1.5	28.99	2.05	0
10/8/2014 12:00	13.44	1.5	29.8	1.338	0
10/8/2014 13:00	13.55	1.5	30.64	1.021	0
10/8/2014 14:00	13.39	1.5	31.01	0.902	0
10/8/2014 15:00	13.61	1.5	31.24	0.879	0
10/8/2014 16:00	13.57	1.5	31.67	0.865	0
10/8/2014 17:00	13.6	1.501	31.08	0.856	0
10/8/2014 18:00	12.55	1.501	29.25	0.564	0
10/8/2014 19:00	12.58	1.501	25.32	-0.004	0
10/8/2014 20:00	12.53	1.501	23.68	-0.01	0
10/8/2014 21:00	12.53	1.501	22.82	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/8/2014 22:00	12.34	1.501	22.16	-0.01	0
10/8/2014 23:00	12.48	1.501	21.42	-0.01	0
10/9/2014 0:00	12.33	1.501	20.82	-0.01	0
10/9/2014 1:00	12.33	1.501	20.38	-0.01	0
10/9/2014 2:00	12.25	1.501	20	-0.01	0
10/9/2014 3:00	12.34	1.501	19.71	-0.01	0
10/9/2014 4:00	12.35	1.501	19.36	-0.01	0
10/9/2014 5:00	12.19	1.501	18.98	-0.01	0
10/9/2014 6:00	12.31	1.501	18.6	-0.01	0
10/9/2014 7:00	12.23	1.5	18.31	0.104	0
10/9/2014 8:00	13	1.5	22.11	2.056	0
10/9/2014 9:00	13.5	1.501	25.66	4.985	0
10/9/2014 10:00	13.52	1.5	27.71	3.462	0
10/9/2014 11:00	13.62	1.5	29.29	2.044	0
10/9/2014 12:00	13.6	1.5	30.12	1.355	0.005
10/9/2014 14:00	13.62	1.282	30.77	1.076	0.239
10/9/2014 15:00	13.42	1.5	30.87	0.983	0.362
10/9/2014 16:00	13.59	1.5	31.03	0.859	0.224
10/9/2014 17:00	13.02	1.5	30.91	0.803	0.157
10/9/2014 18:00	12.63	1.501	28.75	0.414	0.339
10/9/2014 19:00	12.6	1.501	25.56	-0.007	0.259
10/9/2014 21:00	12.55	1.501	24.11	-0.01	0.483
10/9/2014 22:00	12.41	1.501	23.88	-0.01	0.344
10/9/2014 23:00	12.43	1.5	22.93	-0.01	0.348
10/10/2014 0:00	12.38	1.501	21.71	-0.01	0.369
10/10/2014 1:00	12.46	1.501	21.08	-0.01	0.369
10/10/2014 2:00	12.34	1.501	20.6	-0.01	0.356
10/10/2014 3:00	12.21	1.501	20.28	-0.01	0.373
10/10/2014 4:00	12.31	1.501	19.87	-0.01	0.336
10/10/2014 5:00	12.32	1.501	19.57	-0.01	0.284
10/10/2014 6:00	12.37	1.501	19.25	-0.01	0.051
10/10/2014 7:00	12.27	1.501	19.12	0.092	0.318
10/10/2014 8:00	13.06	1.501	20.81	1.741	-0.091
10/10/2014 9:00	13.45	1.5	25.61	5.329	0.236
10/10/2014 10:00	13.45	1.5	27.74	3.547	0.366

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/10/2014 11:00	13.42	1.5	28.43	2.038	0.266
10/10/2014 12:00	13.4	1.5	29.11	1.331	0.291
10/10/2014 13:00	13.57	1.5	29.71	1.034	0.204
10/10/2014 14:00	13.57	1.5	30.5	0.907	0.297
10/10/2014 15:00	13.65	1.5	30.9	0.859	0.243
10/10/2014 16:00	13.62	1.5	31.51	0.841	0.278
10/10/2014 17:00	12.94	1.5	31.34	0.86	0.289
10/10/2014 18:00	12.45	1.501	29.28	0.535	0.369
10/10/2014 19:00	12.36	1.5	26.38	-0.003	0.253
10/10/2014 20:00	12.32	1.5	25.38	-0.01	0.348
10/10/2014 21:00	12.32	1.5	25.04	-0.01	0.379
10/10/2014 22:00	12.43	1.5	24.94	-0.01	0.42
10/10/2014 23:00	12.5	1.5	23.87	-0.01	0.225
10/11/2014 0:00	12.49	1.501	22.72	-0.01	0.38
10/11/2014 1:00	12.37	1.501	21.63	-0.01	0.334
10/11/2014 2:00	12.35	1.501	21.06	-0.01	0.418
10/11/2014 3:00	12.42	1.501	20.37	-0.01	0.418
10/11/2014 4:00	12.23	1.501	19.68	-0.01	0.278
10/11/2014 5:00	12.38	1.501	19.05	-0.01	0.293
10/11/2014 6:00	12.15	1.501	18.43	-0.01	0.007
10/11/2014 7:00	12.32	1.501	17.86	0.09	0.179
10/11/2014 8:00	13.05	1.501	20.52	1.894	0.353
10/11/2014 9:00	13.37	1.5	24.87	5.326	0.348
10/11/2014 10:00	13.43	1.5	26.29	3.235	0.259
10/11/2014 11:00	13.63	1.5	27.91	1.869	0.281
10/11/2014 12:00	13.44	1.5	29.61	1.308	0.29
10/11/2014 13:00	13.59	1.5	30.5	1.035	0.293
10/11/2014 14:00	13.62	1.5	31.01	0.907	0.335
10/11/2014 15:00	13.51	1.5	31.54	0.857	0.314
10/11/2014 16:00	13.58	1.5	31.74	0.841	0.28
10/11/2014 17:00	12.45	1.5	30.98	0.789	0.299
10/11/2014 18:00	12.43	1.501	28.55	0.282	0.213
10/11/2014 19:00	12.4	1.501	24.08	-0.007	0.318
10/11/2014 20:00	12.56	1.501	22.32	-0.01	0.468
10/11/2014 21:00	12.53	1.501	21.5	-0.01	0.447

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/11/2014 22:00	12.36	1.501	21.16	-0.01	0.342
10/11/2014 23:00	12.44	1.501	20.93	-0.01	0.371
10/12/2014 0:00	12.34	1.501	20.87	-0.01	0.37
10/12/2014 1:00	12.46	1.501	21.04	-0.01	0.419
10/12/2014 2:00	12.42	1.501	20.64	-0.01	0.436
10/12/2014 3:00	12.42	1.501	20.4	-0.01	0.228
10/12/2014 4:00	12.37	1.501	20.15	-0.01	0.229
10/12/2014 5:00	12.41	1.501	19.81	-0.01	0.211
10/12/2014 6:00	12.37	1.501	19.58	-0.01	0.032
10/12/2014 7:00	12.35	1.501	19.28	0.089	-0.17
10/12/2014 8:00	13.13	1.501	21.57	1.848	0.025
10/12/2014 9:00	13.59	1.5	25.35	5.413	0.302
10/12/2014 10:00	13.54	1.5	26.91	3.415	0.387
10/12/2014 11:00	13.5	1.5	28.43	1.941	0.278
10/12/2014 12:00	13.6	1.5	29.76	1.345	0.277
10/12/2014 13:00	13.61	1.5	30.08	1.052	0.199
10/12/2014 14:00	13.65	1.5	30.52	0.904	0.261
10/12/2014 15:00	13.64	1.5	30.84	0.846	0.126
10/12/2014 16:00	13.54	1.5	30.72	0.834	0.093
10/12/2014 17:00	12.45	1.5	30.56	0.797	0.293
10/12/2014 18:00	12.36	1.501	28.66	0.3	0.189
10/12/2014 19:00	12.53	1.501	26.61	-0.007	0.184
10/12/2014 20:00	12.34	1.501	26.24	-0.01	0.345
10/12/2014 21:00	12.53	1.501	25.55	-0.01	0.414
10/12/2014 22:00	12.41	1.501	24.85	-0.01	0.375
10/12/2014 23:00	12.36	1.501	24.21	-0.01	0.406
10/13/2014 0:00	12.42	1.501	23.48	-0.01	0.294
10/13/2014 1:00	12.38	1.501	22.96	-0.01	0.407
10/13/2014 2:00	12.42	1.501	22.24	-0.01	0.37
10/13/2014 2:00	12.42	1.501	22.24	-0.01	0.37
10/13/2014 3:00	12.41	1.501	21.86	-0.01	0.53
10/13/2014 4:00	12.17	1.501	21.22	-0.01	0.409
10/13/2014 5:00	12.36	1.501	20.81	-0.01	0.277
10/13/2014 6:00	12.36	1.501	20.84	-0.01	0.096
10/13/2014 7:00	12.32	1.501	20.73	0.069	0.087

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/13/2014 8:00	12.99	1.5	22.94	1.842	-0.065
10/13/2014 9:00	13.54	1.5	25.84	5.371	0.398
10/13/2014 10:00	13.39	1.5	27.27	3.373	0.258
10/13/2014 11:00	13.61	1.5	28.38	1.927	0.327
10/13/2014 12:00	13.6	1.501	28.94	1.304	0.332
10/13/2014 13:00	13.56	1.5	29.64	1.013	0.266
10/13/2014 14:00	13.57	1.5	30.17	0.889	0.37
10/13/2014 15:00	13.37	1.5	30.64	0.828	0.04
10/13/2014 16:00	13.5	1.5	30.31	0.818	0.248
10/13/2014 17:00	12.86	1.501	28.98	0.83	0.136
10/13/2014 18:00	12.43	1.501	26.15	0.437	0.239
10/13/2014 19:00	12.52	1.501	24.94	-0.008	0.312
10/13/2014 20:00	12.52	1.501	25.23	-0.01	0.333
10/13/2014 21:00	12.34	1.501	25.16	-0.01	0.354
10/13/2014 22:00	12.34	1.5	24.79	-0.01	0.36
10/13/2014 23:00	12.4	1.5	24.35	-0.01	0.439
10/14/2014 0:00	12.4	1.5	23.85	-0.01	0.366
10/14/2014 1:00	12.29	1.501	23.18	-0.01	0.309
10/14/2014 2:00	12.43	1.501	22.44	-0.01	0.299
10/14/2014 3:00	12.27	1.5	22.09	-0.01	0.416
10/14/2014 4:00	12.38	1.501	22.35	-0.01	0.204
10/14/2014 5:00	12.21	1.501	22.51	-0.01	-0.09
10/14/2014 6:00	12.33	1.501	22.52	-0.01	-0.114
10/14/2014 7:00	12.31	1.5	22.54	0.122	0.049
10/14/2014 8:00	12.42	1.501	22.94	0.624	0.094
10/14/2014 9:00	13.14	1.501	24.43	3.073	0.03
10/14/2014 10:00	13.1	1.501	26.51	3.531	0.149
10/14/2014 11:00	13.52	1.501	28.04	3.647	0.012
10/14/2014 12:00	13.52	1.501	29.36	2.212	0.11
10/14/2014 13:00	13.34	1.501	29.49	1.431	0.042
10/14/2014 14:00	13.5	1.501	29.87	1.061	-0.028
10/14/2014 15:00	13.58	1.501	26.88	0.878	0.174
10/14/2014 16:00	12.74	1.501	23.66	0.835	0.266
10/14/2014 17:00	12.57	1.501	23.19	0.44	0.12
10/14/2014 18:00	12.57	1.501	22.72	0.14	0.049

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/14/2014 19:00	12.4	1.501	22.54	-0.009	0.03
10/14/2014 20:00	12.38	1.501	22.49	-0.01	0.204
10/14/2014 21:00	12.36	1.5	22.31	-0.01	0.55
10/14/2014 22:00	12.5	1.5	22.41	-0.01	1.029
10/14/2014 23:00	12.3	1.501	22.41	-0.01	NAN
10/15/2014 0:00	12.44	1.5	22.36	-0.01	0.199
10/15/2014 1:00	12.43	1.501	22.41	-0.01	0.31
10/15/2014 2:00	12.34	1.501	22.27	-0.01	NAN
10/15/2014 3:00	12.41	1.5	21.49	-0.01	NAN
10/15/2014 4:00	12.16	1.5	20.77	-0.01	NAN
10/15/2014 5:00	12.13	1.501	20.16	-0.01	NAN
10/15/2014 6:00	12.12	1.5	19.48	-0.01	0.982
10/15/2014 7:00	12.28	1.5	18.83	0.014	1.017
10/15/2014 8:00	12.89	1.5	18.99	1.187	0.243
10/15/2014 9:00	13.35	1.501	20.77	5.427	0.198
10/15/2014 10:00	13.62	1.501	22.54	3.814	0.424
10/15/2014 11:00	13.46	1.501	23.49	2.044	0.163
10/15/2014 12:00	13.65	1.501	24.28	1.381	0.191
10/15/2014 13:00	13.53	1.501	24.54	1.037	0.13
10/15/2014 14:00	13.59	1.501	24.96	0.902	0.031
10/15/2014 15:00	13.48	1.501	25.28	0.828	0.242
10/15/2014 16:00	13.66	1.501	25.35	0.806	0.159
10/15/2014 17:00	12.51	1.501	24.58	0.751	0.271
10/15/2014 18:00	12.62	1.501	22.84	0.241	0.097
10/15/2014 19:00	12.53	1.5	19.68	-0.007	0.313
10/15/2014 20:00	12.53	1.5	17.32	-0.01	0.327
10/15/2014 21:00	12.33	1.501	16.08	-0.01	0.43
10/15/2014 22:00	12.48	1.501	15.36	-0.01	0.308
10/15/2014 23:00	12.38	1.5	14.65	-0.01	0.316
10/16/2014 0:00	12.24	1.5	14.12	-0.01	0.373
10/16/2014 1:00	12.45	1.5	13.67	-0.01	0.358
10/16/2014 2:00	12.31	1.5	13.21	-0.009	0.39
10/16/2014 3:00	12.17	1.5	12.84	-0.008	0.387
10/16/2014 4:00	12.31	1.501	12.5	-0.007	0.262
10/16/2014 5:00	12.16	1.5	12.15	-0.007	0.205

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/16/2014 6:00	12.34	1.5	11.72	-0.006	0.06
10/16/2014 7:00	12.15	1.5	11.65	0.053	0.201
10/16/2014 8:00	13.13	1.5	15.42	1.829	0.354
10/16/2014 9:00	13.72	1.501	19.74	5.075	0.238
10/16/2014 10:00	13.8	1.501	21.39	3.085	0.258
10/16/2014 11:00	13.61	1.501	23.12	1.879	0.2
10/16/2014 12:00	13.63	1.501	23.99	1.324	0.156
10/16/2014 13:00	13.73	1.501	24.55	1.039	0.207
10/16/2014 14:00	13.85	1.501	24.92	0.896	0.115
10/16/2014 15:00	13.58	1.501	25.24	0.832	0.069
10/16/2014 16:00	13.81	1.5	25.4	0.801	0.028
10/16/2014 17:00	12.74	1.5	24.82	0.758	0.008
10/16/2014 18:00	12.47	1.5	22.85	0.225	0
10/16/2014 19:00	12.58	1.5	19.23	-0.008	0
10/16/2014 20:00	12.54	1.5	17.54	-0.01	0
10/16/2014 21:00	12.51	1.5	16.06	-0.01	0
10/16/2014 22:00	12.46	1.5	14.87	-0.01	0
10/16/2014 23:00	12.42	1.5	14.08	-0.01	0
10/17/2014 0:00	12.4	1.5	13.46	-0.01	0
10/17/2014 1:00	12.26	1.5	12.89	-0.009	0
10/17/2014 2:00	12.21	1.5	12.31	-0.008	0
10/17/2014 3:00	12.31	1.501	11.72	-0.007	0
10/17/2014 4:00	12.35	1.5	11.26	-0.007	0
10/17/2014 5:00	12.15	1.5	10.85	-0.006	0
10/17/2014 6:00	12.27	1.5	10.43	-0.005	0
10/17/2014 7:00	12.12	1.5	10.17	0.051	0
10/17/2014 8:00	13.11	1.5	13.62	1.844	0
10/17/2014 9:00	13.51	1.5	19.08	5.063	0
10/17/2014 10:00	13.67	1.501	22.14	3.202	0
10/17/2014 11:00	13.76	1.501	23.77	1.931	0
10/17/2014 12:00	13.62	1.501	24.85	1.356	0.002
10/17/2014 13:00	13.87	1.501	25.54	1.058	0
10/17/2014 14:00	13.85	1.501	26.09	0.918	0.001
10/17/2014 15:00	13.87	1.501	26.92	0.852	0
10/17/2014 16:00	13.7	1.501	27.36	0.826	0.001

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/17/2014 17:00	12.71	1.501	26.79	0.806	0
10/17/2014 18:00	12.63	1.501	24.26	0.246	0
10/17/2014 19:00	12.6	1.5	19.86	-0.008	0
10/17/2014 20:00	12.36	1.5	17.89	-0.01	0
10/17/2014 21:00	12.48	1.501	16.33	-0.01	0
10/17/2014 22:00	12.48	1.501	15.09	-0.01	0
10/17/2014 23:00	12.42	1.5	14.2	-0.01	0
10/18/2014 0:00	12.24	1.5	13.49	-0.01	0
10/18/2014 1:00	12.45	1.5	12.81	-0.009	0
10/18/2014 2:00	12.34	1.5	12.23	-0.008	0
10/18/2014 3:00	12.18	1.501	11.86	-0.007	0
10/18/2014 4:00	12.21	1.5	11.4	-0.007	0
10/18/2014 5:00	12.31	1.5	10.89	-0.006	0
10/18/2014 6:00	12.17	1.5	10.45	-0.005	0
10/18/2014 7:00	12.11	1.5	10.13	0.053	0
10/18/2014 8:00	13.2	1.5	13.6	1.816	0
10/18/2014 9:00	13.65	1.5	19.34	4.966	0
10/18/2014 10:00	13.63	1.501	22.09	3.106	0
10/18/2014 11:00	13.84	1.501	24.07	1.916	0.005
10/18/2014 12:00	13.84	1.501	25.54	1.363	0.005
10/18/2014 13:00	13.84	1.501	26.77	1.073	0.001
10/18/2014 14:00	13.8	1.501	27.58	0.932	0.004
10/18/2014 15:00	13.84	1.501	27.93	0.854	0.014
10/18/2014 16:00	13.6	1.501	28	0.823	0.016
10/18/2014 17:00	12.76	1.501	27.43	0.8	0.002
10/18/2014 18:00	12.41	1.501	25.13	0.239	0
10/18/2014 19:00	12.58	1.501	22.4	-0.008	0
10/18/2014 20:00	12.4	1.501	20.14	-0.01	0
10/18/2014 21:00	12.45	1.5	18	-0.01	0
10/18/2014 22:00	12.49	1.5	16.85	-0.01	0
10/18/2014 23:00	12.31	1.501	16.09	-0.01	0
10/19/2014 0:00	12.47	1.501	15.71	-0.01	0
10/19/2014 1:00	12.46	1.501	15.38	-0.01	0
10/19/2014 2:00	12.39	1.501	15.2	-0.01	0
10/19/2014 3:00	12.37	1.501	15.13	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/19/2014 4:00	12.19	1.501	15.4	-0.01	0
10/19/2014 5:00	12.16	1.501	15.9	-0.01	0
10/19/2014 6:00	12.35	1.5	16.51	-0.01	0
10/19/2014 7:00	12.18	1.501	15.44	0.071	0
10/19/2014 8:00	13.06	1.5	17.01	1.485	0.002
10/19/2014 9:00	13.52	1.501	18.84	5.008	0.013
10/19/2014 10:00	13.46	1.501	20.57	3.315	0.008
10/19/2014 11:00	13.74	1.501	22.69	1.896	0.021
10/19/2014 12:00	13.71	1.501	24.17	1.318	0.011
10/19/2014 13:00	13.67	1.501	25.77	1.054	0.006
10/19/2014 14:00	13.74	1.501	26.49	0.914	0.01
10/19/2014 15:00	13.72	1.501	27.21	0.837	0.009
10/19/2014 16:00	13.7	1.501	27.27	0.806	0.005
10/19/2014 17:00	13.01	1.501	26.91	0.807	0.002
10/19/2014 18:00	12.63	1.501	24.67	0.365	0
10/19/2014 19:00	12.58	1.501	22.07	-0.008	0
10/19/2014 20:00	12.52	1.501	20.72	-0.01	0
10/19/2014 21:00	12.36	1.501	19.47	-0.01	0
10/19/2014 22:00	12.46	1.5	18.58	-0.01	0
10/19/2014 23:00	12.5	1.501	17.7	-0.01	0
10/20/2014 0:00	12.49	1.501	17.37	-0.01	0
10/20/2014 1:00	12.43	1.501	17.13	-0.01	0
10/20/2014 2:00	12.44	1.501	16.68	-0.01	0
10/20/2014 3:00	12.2	1.501	16.73	-0.01	0
10/20/2014 4:00	12.38	1.501	16.58	-0.01	0
10/20/2014 5:00	12.28	1.501	16.43	-0.01	0
10/20/2014 6:00	12.21	1.5	16.17	-0.01	0
10/20/2014 7:00	12.15	1.5	16.26	0.095	0
10/20/2014 8:00	12.98	1.501	18.72	1.747	0
10/20/2014 9:00	13.6	1.501	22	5.038	0
10/20/2014 10:00	13.21	1.501	24.35	3.105	0.012
10/20/2014 11:00	13.68	1.501	25.91	2.059	0.012
10/20/2014 12:00	13.52	1.501	26.82	1.397	0.003
10/20/2014 13:00	13.44	1.501	27.5	1.057	0.002
10/20/2014 14:00	13.7	1.501	28.35	0.91	0.001

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/20/2014 15:00	13.68	1.501	28.11	0.845	0
10/20/2014 16:00	13.57	1.501	29.15	0.828	0
10/20/2014 17:00	12.69	1.501	28.43	0.81	0
10/20/2014 18:00	12.42	1.501	24.56	0.268	0
10/20/2014 19:00	12.51	1.5	22.29	-0.009	0
10/20/2014 20:00	12.37	1.501	21.65	-0.01	0
10/20/2014 21:00	12.53	1.5	21.28	-0.01	0
10/20/2014 22:00	12.49	1.501	19.97	-0.01	0
10/20/2014 23:00	12.33	1.5	19.29	-0.01	0
10/21/2014 0:00	12.38	1.501	19.12	-0.01	0
10/21/2014 1:00	12.43	1.5	18.77	-0.01	0
10/21/2014 2:00	12.42	1.5	18.39	-0.01	0
10/21/2014 3:00	12.33	1.5	18.2	-0.01	0
10/21/2014 4:00	12.39	1.501	17.97	-0.01	0
10/21/2014 5:00	12.23	1.501	17.26	-0.01	0
10/21/2014 6:00	12.35	1.501	16.56	-0.01	0
10/21/2014 7:00	12.17	1.501	16.18	0.033	0
10/21/2014 8:00	12.84	1.5	17.91	1.338	0
10/21/2014 9:00	13.37	1.501	20.26	3.418	0
10/21/2014 10:00	13.2	1.501	23.78	4.266	0
10/21/2014 11:00	13.65	1.501	25.57	2.609	0.004
10/21/2014 12:00	13.56	1.501	26.94	1.715	0
10/21/2014 13:00	13.54	1.501	27.83	1.215	0
10/21/2014 14:00	13.63	1.501	27.53	0.964	0
10/21/2014 15:00	13.67	1.501	27.68	0.857	0
10/21/2014 16:00	13.59	1.501	27.63	0.806	0
10/21/2014 17:00	12.79	1.501	27.59	0.8	0
10/21/2014 18:00	12.6	1.501	25.19	0.267	0
10/21/2014 19:00	12.39	1.501	21.64	-0.009	0
10/21/2014 20:00	12.54	1.5	20.03	-0.01	0
10/21/2014 21:00	12.32	1.501	19.32	-0.01	0
10/21/2014 22:00	12.33	1.5	18.63	-0.01	0
10/21/2014 23:00	12.45	1.501	18.13	-0.01	0
10/22/2014 0:00	12.32	1.5	17.5	-0.01	0
10/22/2014 1:00	12.28	1.5	17.03	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/22/2014 2:00	12.43	1.501	16.34	-0.01	0
10/22/2014 3:00	12.39	1.501	15.52	-0.01	0
10/22/2014 4:00	12.22	1.501	14.99	-0.01	0
10/22/2014 5:00	12.3	1.5	14.31	-0.008	0
10/22/2014 6:00	12.23	1.5	13.75	-0.007	0
10/22/2014 7:00	12.35	1.5	13.64	0.045	0
10/22/2014 8:00	13.02	1.5	15.69	1.694	0
10/22/2014 9:00	13.64	1.501	19.27	4.899	0
10/22/2014 10:00	13.57	1.501	21.19	2.888	0.003
10/22/2014 11:00	13.74	1.501	23.12	2.076	0.004
10/22/2014 12:00	13.77	1.501	24.08	1.441	0.019
10/22/2014 13:00	13.75	1.501	24.68	1.105	0.02
10/22/2014 14:00	13.5	1.501	25.45	0.932	0.008
10/22/2014 15:00	13.59	1.501	26	0.854	0.005
10/22/2014 16:00	13.71	1.501	26.08	0.807	0.007
10/22/2014 17:00	12.69	1.501	25.51	0.776	0.001
10/22/2014 18:00	12.48	1.501	23.23	0.21	0
10/22/2014 19:00	12.44	1.501	20.58	-0.009	0
10/22/2014 20:00	12.51	1.5	18.93	-0.01	0
10/22/2014 21:00	12.34	1.501	17.36	-0.01	0
10/22/2014 22:00	12.26	1.501	16.4	-0.01	0
10/22/2014 23:00	12.46	1.501	15.37	-0.01	0
10/23/2014 0:00	12.43	1.501	15.15	-0.01	0
10/23/2014 1:00	12.23	1.501	15.13	-0.01	0
10/23/2014 2:00	12.29	1.501	14.68	-0.008	0
10/23/2014 3:00	12.31	1.5	13.38	-0.007	0
10/23/2014 4:00	12.16	1.5	12.63	-0.006	0
10/23/2014 5:00	12.27	1.5	11.99	-0.006	0
10/23/2014 6:00	12.29	1.5	11.81	-0.005	0
10/23/2014 7:00	12.25	1.5	12.63	0.036	0
10/23/2014 8:00	13.18	1.5	14.06	1.601	0
10/23/2014 9:00	13.57	1.5	17	5.003	0.006
10/23/2014 10:00	13.58	1.501	19.33	3.064	0.021
10/23/2014 11:00	13.83	1.501	21.36	1.882	0.018
10/23/2014 12:00	13.74	1.501	22.7	1.338	0.023

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/23/2014 13:00	13.82	1.501	23.46	1.05	0.032
10/23/2014 14:00	13.81	1.501	24.25	0.907	0.025
10/23/2014 15:00	13.71	1.501	24.69	0.837	0.006
10/23/2014 16:00	13.62	1.501	25.05	0.801	0.004
10/23/2014 17:00	12.79	1.501	24.59	0.776	0.002
10/23/2014 18:00	12.48	1.501	22.28	0.2	0
10/23/2014 19:00	12.62	1.501	18.82	-0.009	0
10/23/2014 20:00	12.58	1.5	18.17	-0.01	0
10/23/2014 21:00	12.39	1.5	16.98	-0.01	0
10/23/2014 22:00	12.31	1.501	15.46	-0.01	0
10/23/2014 23:00	12.43	1.5	14.44	-0.01	0
10/24/2014 0:00	12.28	1.5	13.65	-0.009	0
10/24/2014 1:00	12.44	1.5	12.85	-0.008	0
10/24/2014 2:00	12.17	1.5	12.28	-0.007	0
10/24/2014 3:00	12.25	1.5	11.21	-0.006	0
10/24/2014 4:00	12.34	1.5	10.42	-0.005	0
10/24/2014 5:00	12.19	1.5	9.82	-0.004	0
10/24/2014 6:00	12.3	1.5	9.28	-0.004	0
10/24/2014 7:00	12.33	1.5	8.75	0.038	0
10/24/2014 8:00	13.36	1.5	12.23	1.953	0
10/24/2014 9:00	13.26	1.5	17.38	3.953	0
10/24/2014 10:00	13.84	1.501	20.03	3.483	0.009
10/24/2014 11:00	13.61	1.501	21.36	2.145	0.006
10/24/2014 12:00	13.84	1.501	22.65	1.465	0.003
10/24/2014 13:00	13.76	1.501	23.58	1.112	0.001
10/24/2014 14:00	13.85	1.501	24.21	0.929	0.008
10/24/2014 15:00	13.84	1.501	25.03	0.848	0.001
10/24/2014 16:00	13.9	1.501	25.51	0.81	0
10/24/2014 17:00	12.7	1.501	24.82	0.791	0
10/24/2014 18:00	12.61	1.501	22.04	0.197	0
10/24/2014 19:00	12.6	1.501	18.49	-0.009	0
10/24/2014 20:00	12.32	1.5	16.69	-0.01	0
10/24/2014 21:00	12.51	1.501	15.26	-0.01	0
10/24/2014 22:00	12.42	1.501	14.14	-0.01	0
10/24/2014 23:00	12.51	1.5	13.22	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/25/2014 0:00	12.39	1.501	12.42	-0.009	0
10/25/2014 1:00	12.45	1.5	11.64	-0.007	0
10/25/2014 2:00	12.41	1.5	10.78	-0.007	0
10/25/2014 3:00	12.38	1.5	10.08	-0.006	0
10/25/2014 4:00	12.2	1.5	9.5	-0.004	0
10/25/2014 5:00	12.23	1.5	9.2	-0.004	0
10/25/2014 6:00	12.31	1.5	9.05	-0.004	0
10/25/2014 7:00	12.15	1.5	8.81	0.037	0
10/25/2014 8:00	13.36	1.5	11.38	1.526	0
10/25/2014 9:00	13.84	1.5	16.13	4.841	0
10/25/2014 10:00	13.82	1.501	20.57	3.25	0
10/25/2014 11:00	13.78	1.501	22.4	2.004	0
10/25/2014 12:00	13.79	1.501	23.57	1.401	0.008
10/25/2014 13:00	13.65	1.501	24.38	1.078	0.024
10/25/2014 14:00	13.86	1.501	25.2	0.92	0.009
10/25/2014 15:00	13.63	1.501	25.78	0.845	0.006
10/25/2014 16:00	13.73	1.501	25.81	0.811	0.009
10/25/2014 17:00	12.63	1.501	25.17	0.802	0
10/25/2014 18:00	12.64	1.501	21.54	0.203	0
10/25/2014 19:00	12.56	1.5	17.73	-0.009	0
10/25/2014 20:00	12.54	1.501	15.89	-0.01	0
10/25/2014 21:00	12.35	1.501	14.6	-0.01	0
10/25/2014 22:00	12.52	1.5	13.66	-0.01	0
10/25/2014 23:00	12.27	1.501	12.8	-0.01	0
10/26/2014 0:00	12.45	1.5	12.07	-0.008	0
10/26/2014 1:00	12.35	1.5	11.19	-0.007	0
10/26/2014 2:00	12.38	1.5	10.52	-0.007	0
10/26/2014 3:00	12.25	1.5	9.83	-0.006	0
10/26/2014 4:00	12.14	1.5	9.31	-0.004	0
10/26/2014 5:00	12.19	1.5	8.81	-0.004	0
10/26/2014 6:00	12.16	1.5	8.32	-0.003	0
10/26/2014 7:00	12.28	1.5	7.98	0.034	0
10/26/2014 8:00	13.13	1.5	10.53	1.544	0
10/26/2014 9:00	13.58	1.5	16.36	4.88	0
10/26/2014 10:00	13.93	1.5	19.83	3.255	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/26/2014 11:00	13.82	1.501	23.54	2.032	0
10/26/2014 12:00	13.73	1.501	25.46	1.436	0
10/26/2014 13:00	13.91	1.501	26.51	1.104	0
10/26/2014 14:00	13.79	1.501	27.36	0.956	0
10/26/2014 15:00	13.73	1.501	28.03	0.88	0
10/26/2014 16:00	13.77	1.501	28.41	0.845	0
10/26/2014 17:00	12.85	1.501	27.96	0.836	0
10/26/2014 18:00	12.56	1.501	24.42	0.212	0
10/26/2014 19:00	12.57	1.501	20.53	-0.009	0
10/26/2014 20:00	12.6	1.501	20.36	-0.01	0
10/26/2014 21:00	12.33	1.501	18.42	-0.01	0
10/26/2014 22:00	12.5	1.5	16.81	-0.01	0
10/26/2014 23:00	12.28	1.501	15.75	-0.01	0
10/27/2014 0:00	12.47	1.501	15	-0.01	0
10/27/2014 1:00	12.44	1.501	14.36	-0.01	0
10/27/2014 2:00	12.33	1.5	13.83	-0.01	0
10/27/2014 3:00	12.38	1.5	13.32	-0.009	0
10/27/2014 4:00	12.33	1.5	12.96	-0.008	0
10/27/2014 5:00	12.2	1.5	12.47	-0.007	0
10/27/2014 6:00	12.33	1.501	12.23	-0.007	0
10/27/2014 7:00	12.35	1.5	12.01	0.038	0
10/27/2014 8:00	13.28	1.5	13.4	1.329	0
10/27/2014 9:00	13.49	1.501	18.92	5.119	0
10/27/2014 10:00	13.77	1.501	23.62	3.656	0
10/27/2014 11:00	13.73	1.501	26.32	2.12	0
10/27/2014 12:00	13.81	1.501	27.88	1.427	0.001
10/27/2014 13:00	13.54	1.501	29.06	1.089	0.004
10/27/2014 14:00	13.6	1.501	29.6	0.92	0.007
10/27/2014 15:00	13.72	1.501	29.7	0.85	0.005
10/27/2014 16:00	13.8	1.501	29.61	0.825	0.001
10/27/2014 17:00	12.93	1.501	29.69	0.819	0
10/27/2014 18:00	12.65	1.501	26.44	0.223	0
10/27/2014 19:00	12.58	1.501	23.23	-0.01	0
10/27/2014 20:00	12.58	1.501	20.68	-0.01	0
10/27/2014 21:00	12.54	1.5	19.03	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/27/2014 22:00	12.28	1.5	18	-0.01	0
10/27/2014 23:00	12.49	1.501	16.93	-0.01	0
10/28/2014 0:00	12.48	1.501	16.17	-0.01	0
10/28/2014 1:00	12.45	1.501	15.5	-0.01	0
10/28/2014 2:00	12.2	1.501	14.82	-0.01	0
10/28/2014 3:00	12.18	1.5	14.2	-0.01	0
10/28/2014 4:00	12.4	1.501	13.64	-0.009	0
10/28/2014 5:00	12.26	1.501	13.11	-0.007	0
10/28/2014 6:00	12.26	1.5	12.86	-0.007	0
10/28/2014 7:00	12.17	1.5	12.77	0.03	0
10/28/2014 8:00	13.2	1.5	15.7	1.54	0
10/28/2014 9:00	13.61	1.501	21.04	5.1	0
10/28/2014 10:00	13.52	1.501	23.47	3.462	0
10/28/2014 11:00	13.72	1.501	25.35	2.024	0.002
10/28/2014 12:00	13.58	1.501	26.39	1.404	0.001
10/28/2014 13:00	13.69	1.501	27.09	1.087	0.003
10/28/2014 14:00	13.78	1.501	27.61	0.928	0.002
10/28/2014 15:00	13.69	1.501	28.41	0.849	0
10/28/2014 16:00	13.78	1.501	28.83	0.825	0
10/28/2014 17:00	13.76	1.501	28.4	0.821	0
10/28/2014 18:00	12.6	1.501	24.49	0.197	0
10/28/2014 19:00	12.44	1.5	21.06	-0.01	0
10/28/2014 20:00	12.58	1.5	19.6	-0.01	0
10/28/2014 21:00	12.39	1.501	18.4	-0.01	0
10/28/2014 22:00	12.44	1.5	17.5	-0.01	0
10/28/2014 23:00	12.45	1.5	16.91	-0.01	0
10/29/2014 0:00	12.49	1.5	16.44	-0.01	0
10/29/2014 1:00	12.37	1.501	15.94	-0.01	0
10/29/2014 2:00	12.39	1.501	15.52	-0.01	0
10/29/2014 3:00	12.35	1.501	15.49	-0.01	0
10/29/2014 4:00	12.27	1.501	15.34	-0.01	0
10/29/2014 5:00	12.26	1.501	15.17	-0.01	0
10/29/2014 6:00	12.29	1.5	14.99	-0.01	0
10/29/2014 7:00	12.36	1.501	14.83	0.047	0
10/29/2014 8:00	13.05	1.5	16.75	1.417	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/29/2014 9:00	13.66	1.501	21.66	4.863	0
10/29/2014 10:00	13.5	1.501	24	3.823	0
10/29/2014 11:00	13.66	1.501	26.27	2.117	0
10/29/2014 12:00	13.72	1.501	27.22	1.432	0.017
10/29/2014 13:00	13.68	1.501	27.66	1.07	0.008
10/29/2014 14:00	13.69	1.501	27.99	0.908	0.027
10/29/2014 15:00	13.77	1.501	27.46	0.836	0.002
10/29/2014 16:00	13.52	1.501	27.67	0.802	0
10/29/2014 17:00	13.58	1.501	27.89	0.812	0.001
10/29/2014 18:00	12.58	1.501	24.91	0.182	0
10/29/2014 19:00	12.6	1.501	21.86	-0.01	0
10/29/2014 20:00	12.44	1.5	20.97	-0.01	0
10/29/2014 21:00	12.39	1.5	20.54	-0.01	0
10/29/2014 22:00	12.54	1.5	20.03	-0.01	0
10/29/2014 23:00	12.31	1.5	19.68	-0.01	0
10/30/2014 0:00	12.41	1.501	18.29	-0.01	0
10/30/2014 1:00	12.3	1.5	17.36	-0.01	0
10/30/2014 2:00	12.26	1.5	16.64	-0.01	0
10/30/2014 3:00	12.28	1.501	16.18	-0.01	0
10/30/2014 4:00	12.33	1.501	15.7	-0.01	0
10/30/2014 5:00	12.31	1.501	15.48	-0.01	0
10/30/2014 6:00	12.16	1.501	15.14	-0.01	0
10/30/2014 7:00	12.28	1.5	15.01	0.009	0
10/30/2014 8:00	12.48	1.5	16.15	0.499	0
10/30/2014 9:00	12.88	1.5	18.81	1.605	0
10/30/2014 10:00	13.07	1.501	20.73	2.96	0
10/30/2014 11:00	13.39	1.501	22.18	4.38	0
10/30/2014 12:00	13.7	1.501	23.71	2.934	0
10/30/2014 13:00	13.52	1.501	24.76	1.728	0
10/30/2014 14:00	13.71	1.501	25.93	1.21	0
10/30/2014 15:00	12.79	1.501	25.63	0.992	0
10/30/2014 16:00	12.62	1.501	22.91	0.661	0
10/30/2014 17:00	12.63	1.5	21.38	0.193	0
10/30/2014 18:00	12.32	1.501	19.81	0.005	0
10/30/2014 19:00	12.36	1.501	18.9	-0.01	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
10/30/2014 20:00	12.35	1.501	18.79	-0.01	0
10/30/2014 21:00	12.49	1.501	18.66	-0.01	0
10/30/2014 22:00	12.46	1.5	18.44	-0.01	0
10/30/2014 23:00	12.29	1.5	16.98	-0.01	0
10/31/2014 0:00	12.44	1.5	16.82	-0.01	0
10/31/2014 1:00	12.44	1.5	16.62	-0.01	0
10/31/2014 2:00	12.23	1.5	15.96	-0.01	0
10/31/2014 3:00	12.37	1.501	14.64	-0.008	0
10/31/2014 4:00	12.31	1.501	13.79	-0.007	0
10/31/2014 5:00	12.16	1.5	13.04	-0.007	0
10/31/2014 6:00	12.1	1.5	12.28	-0.006	0
10/31/2014 7:00	12.15	1.5	11.3	0.02	0
10/31/2014 8:00	12.83	1.501	11.99	1.221	0
10/31/2014 9:00	13.54	1.5	14.34	4.799	0
10/31/2014 10:00	13.76	1.501	16.84	3.783	0
10/31/2014 11:00	13.74	1.501	19.67	2.177	0
10/31/2014 12:00	13.74	1.501	21.39	1.523	0.007
10/31/2014 13:00	13.74	1.501	22.17	1.15	0.01
10/31/2014 14:00	13.67	1.501	23.18	0.951	0.007
10/31/2014 15:00	13.64	1.501	23.54	0.869	0.006
10/31/2014 16:00	13.69	1.501	23.46	0.822	0.01
10/31/2014 17:00	13.52	1.501	23.04	0.81	0.001
10/31/2014 18:00	12.52	1.5	19.31	0.175	0
10/31/2014 19:00	12.49	1.5	15.49	-0.01	0
10/31/2014 20:00	12.54	1.5	13.99	-0.01	0
10/31/2014 21:00	12.5	1.501	13.16	-0.01	0
10/31/2014 22:00	12.45	1.5	11.91	-0.008	0
10/31/2014 23:00	12.46	1.5	10.75	-0.007	0
11/1/2014 0:00	12.37	1.5	9.96	-0.007	0
11/1/2014 1:00	12.26	1.5	9.95	-0.007	0
11/1/2014 2:00	12.24	1.5	9.89	-0.006	0
11/1/2014 3:00	12.41	1.5	9.91	-0.004	0
11/1/2014 4:00	12.35	1.5	12.02	-0.006	0
11/1/2014 5:00	12.33	1.5	11.64	-0.006	0.004
11/1/2014 6:00	12.3	1.5	10.63	-0.004	0.006

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
11/1/2014 7:00	12.28	1.5	8.79	0.023	0.014
11/1/2014 8:00	13.38	1.5	7.839	1.522	0.006
11/1/2014 9:00	13.62	1.5	8.12	4.419	0.033
11/1/2014 10:00	13.88	1.5	8.82	2.555	0.055
11/1/2014 11:00	13.64	1.5	10.11	1.641	0.048
11/1/2014 12:00	13.76	1.5	11.31	1.252	0.068
11/1/2014 13:00	13.7	1.5	12.26	1.037	0.052
11/1/2014 14:00	13.91	1.5	13.33	0.906	0.064
11/1/2014 15:00	13.7	1.5	13.99	0.823	0.055
11/1/2014 16:00	13.92	1.5	14.36	0.772	0.025
11/1/2014 17:00	13.81	1.5	13.95	0.749	0.019
11/1/2014 18:00	12.54	1.501	12.56	0.18	0.002
11/1/2014 19:00	12.57	1.501	9.26	-0.006	0
11/1/2014 20:00	12.49	1.5	7.217	-0.005	0
11/1/2014 21:00	12.4	1.5	6.36	-0.004	0
11/1/2014 22:00	12.46	1.5	6.592	-0.003	0
11/1/2014 23:00	12.42	1.5	7.986	-0.003	0
11/2/2014 0:00	12.29	1.5	7.884	-0.003	0
11/2/2014 1:00	12.42	1.5	6.98	-0.003	0
11/2/2014 2:00	12.22	1.5	5.965	-0.003	0
11/2/2014 3:00	12.29	1.5	5.35	-0.003	0
11/2/2014 4:00	12.21	1.5	4.634	-0.003	0
11/2/2014 5:00	12.31	1.5	3.998	-0.003	0
11/2/2014 6:00	12.08	1.5	3.575	-0.003	0
11/2/2014 7:00	12.27	1.5	3.136	0.021	0
11/2/2014 8:00	13.49	1.5	3.501	1.312	0
11/2/2014 9:00	14.35	1.5	6.8	5	0.001
11/2/2014 10:00	14.25	1.502	9.48	3.307	0
11/2/2014 11:00	14.37	1.502	11.54	1.865	0
11/2/2014 12:00	13.82	1.502	13.66	1.264	0.005
11/2/2014 13:00	13.94	1.501	15.07	0.984	0.008
11/2/2014 14:00	14.07	1.501	16.38	0.863	0.011
11/2/2014 15:00	13.93	1.501	17.48	0.813	0.005
11/2/2014 16:00	13.86	1.501	17.99	0.782	0.002
11/2/2014 17:00	13.88	1.501	17.71	0.781	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
11/2/2014 18:00	12.44	1.5	14.91	0.144	0
11/2/2014 19:00	12.6	1.501	10.72	-0.007	0
11/2/2014 20:00	12.55	1.5	8.24	-0.006	0
11/2/2014 21:00	12.49	1.5	6.892	-0.004	0
11/2/2014 22:00	12.52	1.5	5.955	-0.003	0
11/2/2014 23:00	12.3	1.5	5.324	-0.003	0
11/3/2014 0:00	12.37	1.5	4.442	-0.003	0
11/3/2014 1:00	12.3	1.5	3.352	-0.003	0
11/3/2014 2:00	12.41	1.5	2.722	-0.003	0
11/3/2014 3:00	12.36	1.5	2.182	-0.003	0
11/3/2014 4:00	12.35	1.499	1.8	-0.003	0
11/3/2014 5:00	12.12	1.5	1.52	-0.003	0
11/3/2014 6:00	12.08	1.5	1.521	-0.003	0
11/3/2014 7:00	12.14	1.499	1.7	0.021	0
11/3/2014 8:00	13.54	1.5	4.294	1.248	0
11/3/2014 9:00	14.07	1.5	10.95	5.001	0.001
11/3/2014 10:00	14.45	1.501	14.1	3.542	0.002
11/3/2014 11:00	14.41	1.501	16.5	2.005	0.009
11/3/2014 12:00	14.05	1.501	18.67	1.304	0.024
11/3/2014 13:00	13.9	1.501	19.67	1.005	0.018
11/3/2014 14:00	13.85	1.501	20.53	0.874	0.017
11/3/2014 15:00	14.11	1.5	21.16	0.819	0.007
11/3/2014 16:00	14.08	1.501	21.2	0.798	0.013
11/3/2014 17:00	13.63	1.501	20.91	0.805	0.002
11/3/2014 18:00	12.5	1.501	18.57	0.145	0
11/3/2014 19:00	12.61	1.5	15.55	-0.01	0
11/3/2014 20:00	12.55	1.5	14.32	-0.01	0
11/3/2014 21:00	12.45	1.5	13.51	-0.009	0
11/3/2014 22:00	12.45	1.5	13.18	-0.009	0
11/3/2014 23:00	12.43	1.5	12.58	-0.008	0
11/4/2014 0:00	12.3	1.501	12.28	-0.007	0
11/4/2014 1:00	12.34	1.5	11.8	-0.007	0
11/4/2014 2:00	12.46	1.5	11.74	-0.006	0
11/4/2014 3:00	12.22	1.5	10.91	-0.005	0
11/4/2014 4:00	12.21	1.5	11.34	-0.005	0

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
11/4/2014 5:00	12.15	1.5	10.73	-0.004	0
11/4/2014 6:00	12.11	1.5	11.26	-0.004	0
11/4/2014 7:00	12.28	1.5	10.02	0.018	0
11/4/2014 8:00	13.24	1.5	11.84	1.111	0
11/4/2014 9:00	13.52	1.5	16.2	5.098	0
11/4/2014 10:00	13.8	1.501	19.3	3.71	0
11/4/2014 11:00	13.79	1.501	21.85	2.018	0.002
11/4/2014 12:00	13.86	1.501	23.37	1.336	0.02
11/4/2014 13:00	13.82	1.501	24.19	1.027	0.019
11/4/2014 14:00	13.84	1.501	24.23	0.874	0.005
11/4/2014 15:00	13.87	1.501	24.6	0.815	0.007
11/4/2014 16:00	13.9	1.501	24.9	0.798	0.004
11/4/2014 17:00	12.66	1.501	23.82	0.81	0
11/4/2014 18:00	12.56	1.501	21.26	0.224	0
11/4/2014 19:00	12.62	1.501	18.91	-0.01	0
11/4/2014 20:00	12.42	1.501	17.82	-0.01	0
11/4/2014 21:00	12.52	1.5	17.92	-0.01	0
11/4/2014 22:00	12.47	1.5	17.65	-0.01	0
11/4/2014 23:00	12.41	1.5	17.11	-0.01	0
11/5/2014 0:00	12.46	1.5	16.48	-0.01	0
11/5/2014 1:00	12.47	1.5	16.4	-0.01	0
11/5/2014 2:00	12.41	1.5	16.91	-0.01	0
11/5/2014 3:00	12.45	1.5	16.97	-0.01	0
11/5/2014 4:00	12.38	1.5	16.3	-0.01	0
11/5/2014 5:00	12.34	1.5	16.02	-0.01	0
11/5/2014 6:00	12.24	1.5	16.21	-0.01	0
11/5/2014 7:00	12.26	1.501	17.15	-0.005	0
11/5/2014 8:00	12.56	1.5	18.27	0.659	0
11/5/2014 9:00	12.9	1.5	19.67	2.068	0
11/5/2014 10:00	13.31	1.501	22.48	4.258	0
11/5/2014 11:00	13.39	1.501	24.13	3.998	0
11/5/2014 12:00	13.7	1.501	25.1	2.139	0.007
11/5/2014 13:00	13.7	1.501	25.94	1.349	0
11/5/2014 14:00	13.71	1.501	26.22	0.99	0.002
11/5/2014 15:00	13.5	1.501	26.74	0.862	0.003

Date/Time	Battery Voltage (volts)	Flow Rate (lpm)	Temp (°C)	Solar Output (watts)	Wind Output (watts)
11/5/2014 16:00	13.65	1.501	26.95	0.804	0
11/5/2014 17:00	12.66	1.501	26.1	0.809	0
11/5/2014 18:00	12.57	1.501	23.11	0.173	0
11/5/2014 19:00	12.6	1.501	21.54	-0.01	0
11/5/2014 20:00	12.56	1.5	21.08	-0.01	0
11/5/2014 21:00	12.54	1.5	20.24	-0.01	0
11/5/2014 22:00	12.54	1.5	19.27	-0.01	0
11/5/2014 23:00	12.5	1.5	18.62	-0.01	0
11/6/2014 0:00	12.3	1.5	17.99	-0.01	0
11/6/2014 1:00	12.27	1.5	17.15	-0.01	0
11/6/2014 2:00	12.28	1.5	16.5	-0.01	0
11/6/2014 3:00	12.37	1.5	16.42	-0.01	0
11/6/2014 4:00	12.41	1.5	16.13	-0.01	0
11/6/2014 5:00	12.36	1.5	15.41	-0.01	0
11/6/2014 6:00	12.12	1.5	14.83	-0.009	0
11/6/2014 7:00	12.25	1.501	14.3	0.044	0
11/6/2014 8:00	12.64	1.5	14.92	0.756	0
11/6/2014 9:00	13.16	1.5	17.91	3.035	0
11/6/2014 10:00	13.15	1.501	23.16	4.406	0
11/6/2014 11:00	13.68	1.501	24.52	2.804	0