

## 2<sup>nd</sup> Quarter Wind Resource Interim Report Arkansas Anemometer Loan Program

Site: Bradford, AR  
Period: 03.23.2010-  
06.28.2010

### Details

|                |  |
|----------------|--|
| Site           | Bradford, Arkansas                                   |
| Participant    | Bill & Carey Robertson                               |
| Project no.    | 0001   |
| Latitude       | N 35° 25' 25"  |
| Longitude      | W 91° 27' 19"  |
| Elevation      | 500 m  |
| Soil Type      | Superficial Bedrock (Rock anchors installed)         |
| Mast height    | 34 m   |
| Report Quarter | 2 <sup>nd</sup> Quarter data (03.23.2010-06.28.2010) |

### Basic Data Information

|                          |                  |
|--------------------------|------------------|
| Frequency of data checks | Daily/weekly     |
| Data Acquisition         | Per day          |
| Start date               | 03/23/2010 00:00 |
| End date                 | 06/28/2010 00:00 |
| Duration                 | 97 days          |
| Length of time step      | 10 minutes       |
| Total Number of Data     | 13,968           |

### Monthly Wind Velocity Averages at 33 m

| Year                  | Month | Possible Records | Recovery Rate (%) | Mean (m/s) | Min (m/s) | Max (m/s) | Std. Dev. (m/s) | Weibull k | Weibull c (m/s) |
|-----------------------|-------|------------------|-------------------|------------|-----------|-----------|-----------------|-----------|-----------------|
| 2010                  | Mar   | 1,296            | 100               | 5.56       | 0.4       | 12.6      | 2.33            | 2.53      | 6.25            |
| 2010                  | Apr   | 4,320            | 100               | 5.22       | 0.4       | 13.3      | 2.52            | 2.19      | 5.91            |
| 2010                  | May   | 4,464            | 100               | 4.10       | 0.4       | 12.8      | 1.96            | 2.19      | 4.62            |
| 2010                  | Jun   | 3,888            | 100               | 3.64       | 0.4       | 11.1      | 1.41            | 2.73      | 4.07            |
| All data              |       | 13,968           | 100               | 4.45       | 0.4       | 13.3      | 2.18            | 2.14      | 5.02            |
| Mean of monthly means |       |                  |                   | 4.45       |           |           |                 |           |                 |

# 1. Status of Relevant Sensors

The state of all relevant sensors is periodically checked by visual inspection of data. Additionally, all signals are regularly checked by automatic failure detection to provide a general overview on the course of the operated measurement campaign. No correction of mast has been applied either.

## Status of Relevant Sensors

**Remark:** The automatic failure detection algorithm is based on predefined measures of failure or plausibility. The table above lists the results as percentage of the total available data. "Availability" gives the portion of remainders after removing faulty values. The following columns represent the portion of faulty values according to each failure definition. Four kinds of failure were checked: plausible "range<sup>1</sup>", "icing<sup>2</sup>" (only anemometers and wind vanes), "constant value<sup>3</sup>", "related<sup>4</sup>" (mutual consistence test if reference sensor available) and "vMax"<sup>5</sup>.

| Sensor/Signal | Availability | Failure Checks |       |                |         |       |
|---------------|--------------|----------------|-------|----------------|---------|-------|
|               |              | Range          | Icing | Constant Value | Related | VMax  |
| V33 Due West  | 98.01%       | 0%             | 0%    | 0%             | 0%      | 1.99% |
| V33 Due East  | 98.47%       | 0%             | 0%    | 0%             | 0%      | 1.53% |
| V20 Due West  | 97.37%       | 0%             | 0%    | 0%             | 0%      | 2.63% |
| WVane 34      | 100%         | 0%             | 0%    | 0%             | 0%      | 0%    |
| Temp          | 100%         | 0%             | 0%    | 0%             | 0%      | 0%    |

<sup>1</sup> Wind speed: 0 – 50 m/s, temperature: -20 – +50 °C

<sup>2</sup> Consecutive constant values during combined conditions of temperature (<2°C) and humidity (>80%rH)

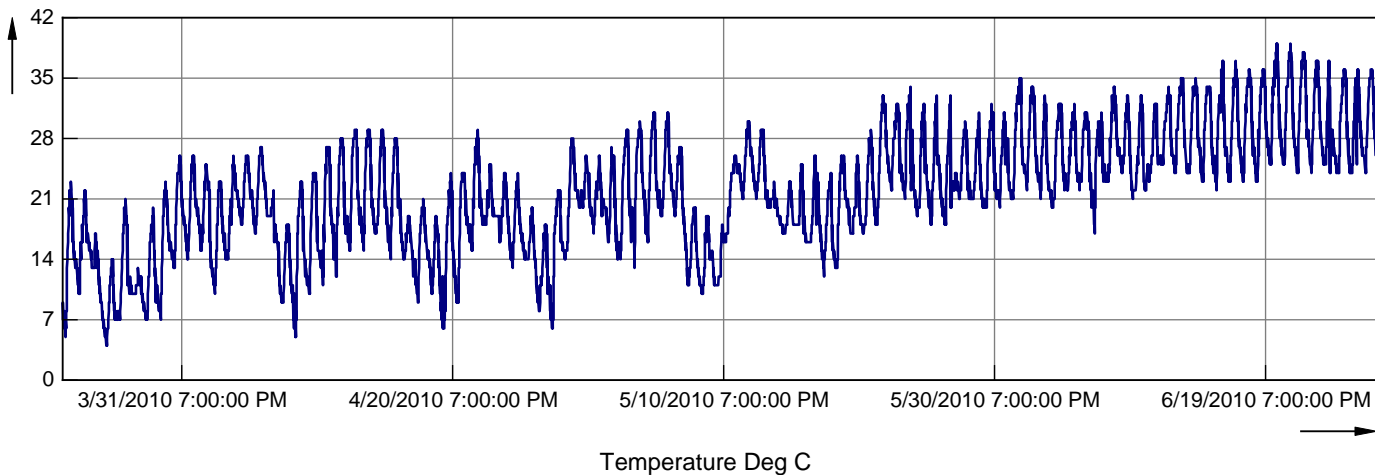
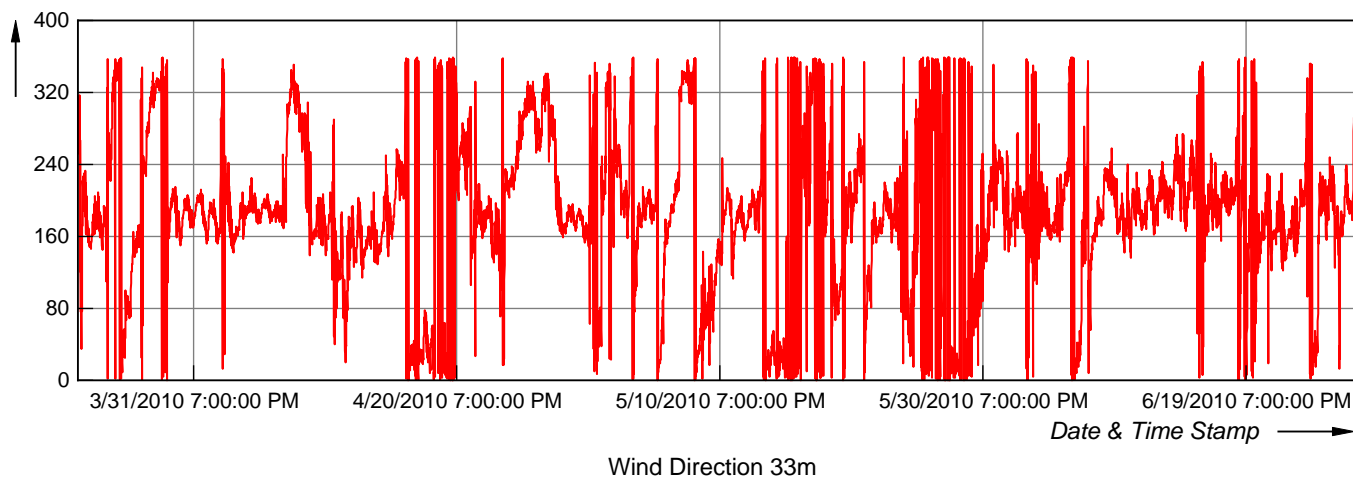
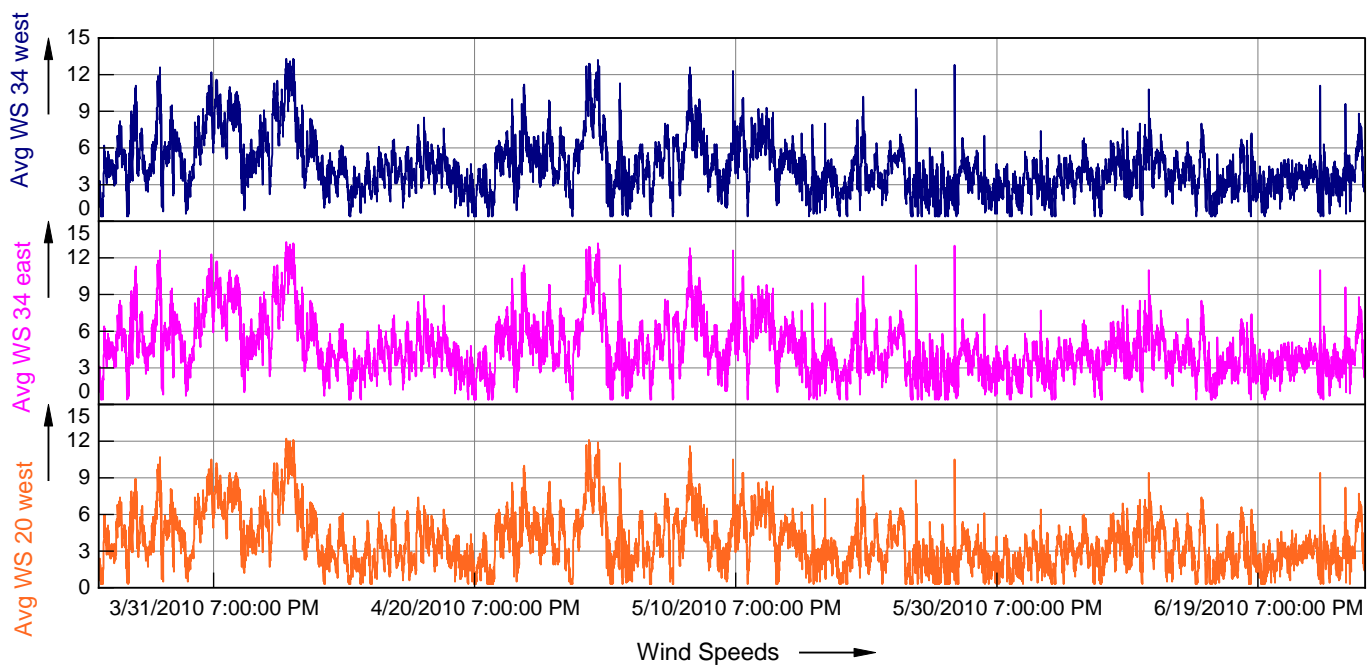
<sup>3</sup> Constant values for minimum 3 consecutive 10-min intervals (only average)

<sup>4</sup> Ratio of tested signal and reference signal: 1/3 – 3 [dimensionless]

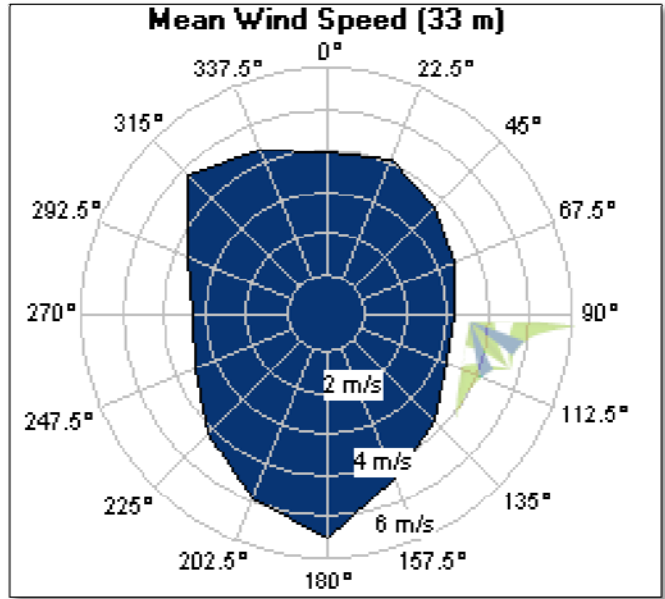
<sup>5</sup>  $v_{max} > 2.5 * v_{avg}$  (10-min-interval)

## 2 Bradford Site Intermediate Evaluation\_ 2nd Quarter

### 2.1 Timeseries Plots, all relevant sensors



**2.2. Wind Rose: Graphical Presentation of joined wind speed and direction (Top Anemometer 33W )** ( North = 0 Deg ; South = 180 Deg ; West = 270 Deg ; East = 90 Deg)



**2.3 Graphical Presentation of wind speed frequency distribution (Top Anemometer \_33 W)**

