

**TINTINA RESOURCES, INC.  
BLACK BUTTE COPPER PROJECT  
AMBIENT AIR  
MONITORING PROGRAM  
Quarterly Data Report  
Third Quarter 2013**

*Prepared for:*

**Tintina Resources, Inc.**  
17 East Main St  
White Sulphur Springs, MT 59645

*Prepared by:*

**Bison Engineering, Inc.**  
1111 Maggie Lane  
Billings, MT 59101  
(406) 896-1716  
<http://www.bison-eng.com>

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**CERTIFICATION OF DATA INTEGRITY**

Bison Engineering, Inc., certifies the data in this report is an accurate summary of the air quality conditions measured at the Black Butte Copper Project air monitoring site. Every effort was made to obtain accurate and representative data and to comply with the procedures set forth in the *Quality Assurance Project Plan*, the *State of Montana Ambient Air Monitoring Program Quality Assurance Project Plan*, the Environmental Protection Agency's *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume II, Ambient Air Specific Methods (April 1994)*, and EPA's *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II, Part 1, Ambient Air Quality Monitoring Program Quality System Development (March 1998)*.

Preparer: Jeffrey S. Bell

Signature: 

Title: Senior Field Technician

Date: 10/31/13

Reviewer: Rebecca L. Picchioni, P.E.

Signature: 

Title: Project Engineer

Date: 11/5/13

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## **APPENDICES**

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- Appendix A: Meteorological Data
- Appendix B: Performance Audit Reports

## 1.0 INTRODUCTION

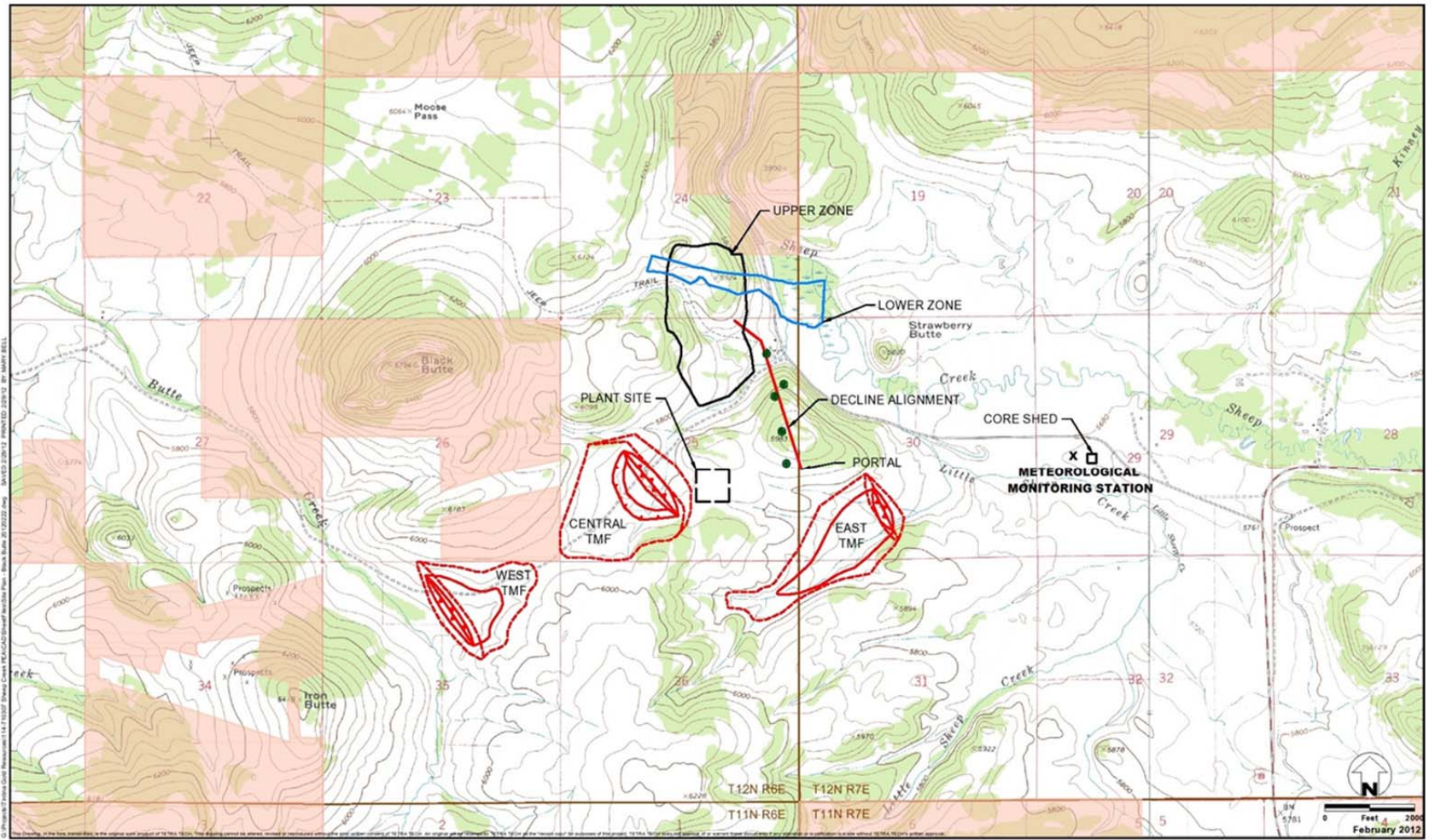
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Tintina Resources, Inc. established an ambient air monitoring site to measure wind speed, wind direction, standard deviation of wind direction, temperature at 9 meters and 2 meters, delta temperature, solar radiation, barometric pressure, and precipitation. The station was established to accurately characterize the local meteorology and collect baseline data in support of an operating permit application and various environmental studies.

The meteorological monitoring system was installed in April 2012. The site is operated by Bison Engineering, Inc., of Helena and Billings. Figure 1 shows the location of the monitoring site.

This report presents the data collected during the third quarter (July through September) of 2013. In addition, a description of the monitoring system operations is presented, together with summaries of quality assurance activities, including calibrations and performance audits. Tabular summaries of the data completeness achieved and the periods of missing data also are presented. Appendix A presents hourly meteorological data collected.

**Figure 1. Monitoring Site Location**



**Site Plan  
Black Butte Copper Project  
Meagher County, Montana  
FIGURE 1**



## **2.0 MONITORING SYSTEM OPERATIONS**

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The installation of the monitoring meteorological system equipment took place in April 2012, soon after the equipment was received from the manufacturers. The installation and calibration of the equipment required about two weeks to complete. All meteorological parameters were in full operation and producing valid data by April 30, 2012.

Data collection continued through the third quarter, although power supply problems and a mechanical failure in the tipping bucket rain gauge resulted in significant data losses. Those are discussed in Section 5.0, "Data Completeness."

The system was audited on September 17 and September 24. Those results are presented in Section 4.0, "Performance Audit Data."

### 3.0 CALIBRATION DATA

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No calibrations were performed during the third quarter. The audits discussed in Section 2.0 showed all instruments to be producing accurate data. However, a slight adjustment was made to the wind direction sensor's alignment on the crossarm when it was re-installed after the audit. Those results are included in Appendix B.

Meteorological system calibration is performed:

- No later than 180 days after the most recent calibration that indicated the meteorological system response to be acceptable;
- After an interruption of more than a few days in meteorological system operation;
- Following any repairs which might affect meteorological system calibration;
- Following a physical relocation of the meteorological system; or
- After any other indication of significant inaccuracy of the meteorological system, such as a failed audit.

## **4.0 PERFORMANCE AUDIT DATA**

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Steve Heck of Bison Engineering, Inc. conducted performance audits of the meteorological system at the site during September. On September 17, the barometric pressure, relative humidity, solar radiation and barometric pressure sensors, and the wind sensor crossarm alignment, were checked in conjunction with an unscheduled site visit. The remaining parameters (requiring lowering of the tower) were audited on September 24.

During the September 17 audit, the auditor found that the rain gauge bucket had fallen out of its holder. It was repaired and audited, and has worked correctly since then. However, a comparison of the site's precipitation data with that from other central Montana locations strongly indicated that the bucket fell out at the start of June. Therefore, all precipitation data from June 1 until September 17 was invalidated.

All instrument audits produced results within the recommended tolerance limits. The audit results are presented in Appendix B.



## 5.0 DATA COMPLETENESS

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The meteorological percentages of data recovery achieved during the third quarter of 2013 are given in Tables 1 and 2. In these tables, the number of possible data values during each month of the quarter is given, together with the number of valid readings and the number of hours spent on quality assurance activities (such as calibrations, performance audits, and maintenance on the sensors). The quality assurance hours are added to the number of hours of valid data to compute the net percentage data recovery.

During the third quarter, the net percentage data recovery was 12.2% for precipitation and 55.5% for all other meteorological parameters at Black Butte. The causes of data loss included:

- The precipitation gauge's tipping bucket fell out of its holder at the start of June, resulting in the invalidation of all precipitation data from June 1 at 0100 MST through September 17 at 1200 MST.
- It appears that a severe lightning storm caused the station's battery charging system to fail and damaged the station's phone line, resulting in the loss of all data from July 22 at 0100 MST through August 29 at 1400 MST.
- For unknown reasons, the station's battery charging system again failed in late September, resulting in the loss of all data from September 28 at 1700 MST through the end of the quarter.

Additionally, remote communications with the site failed in early September, triggering an unscheduled site visit on September 17 to determine the cause. It was discovered that the modem had failed (most likely due to a lightning storm), but that the system was otherwise working properly. The modem failure itself did not result in data loss, and a new modem was installed on October 8.

**Table 1. Monthly Data Completeness**

<b>July 2013</b>					
<b>Parameter</b>	<b>Readings Possible</b>	<b>Valid Readings</b>	<b>Percentage Recovery</b>	<b>Quality Assurance Hours</b>	<b>Net Percentage Recovery</b>
<b>Black Butte Copper Project Met Tower</b>					
Wind Speed	744	504	67.7	0	67.7
Wind Direction	744	504	67.7	0	67.7
Standard Deviation	744	504	67.7	0	67.7
Temperature 9 Meters	744	504	67.7	0	67.7
Temperature 2 Meters	744	504	67.7	0	67.7
Temperature Delta T	744	504	67.7	0	67.7
Solar Radiation	744	504	67.7	0	67.7
Barometric Pressure	744	504	67.7	0	67.7
Relative Humidity	744	504	67.7	0	67.7
Precipitation	744	0	0.0	0	0.0
<b>Total</b>	<b>7,440</b>	<b>4,536</b>	<b>61.0</b>	<b>0</b>	<b>61.0</b>

**Table 1. Monthly Data Completeness (Continued)**

<b>August 2013</b>					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
<b>Black Butte Copper Project Met Tower</b>					
Wind Speed	744	58	7.8	0	7.8
Wind Direction	744	58	7.8	0	7.8
Standard Deviation	744	58	7.8	0	7.8
Temperature 9 Meters	744	58	7.8	0	7.8
Temperature 2 Meters	744	58	7.8	0	7.8
Temperature Delta T	744	58	7.8	0	7.8
Solar Radiation	744	58	7.8	0	7.8
Barometric Pressure	744	58	7.8	0	7.8
Relative Humidity	744	58	7.8	0	7.8
Precipitation	744	58	0.0	0	0.0
<b>Total</b>	<b>7,440</b>	<b>522</b>	<b>7.0</b>	<b>0</b>	<b>7.0</b>

**Table 1. Monthly Data Completeness (Continued)**

<b>September 2013</b>					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
<b>Black Butte Copper Project Met Tower</b>					
Wind Speed	720	660	91.7	4	92.2
Wind Direction	720	660	91.7	4	92.2
Standard Deviation	720	660	91.7	4	92.2
Temperature 9 Meters	720	661	91.7	4	92.2
Temperature 2 Meters	720	661	91.7	4	92.2
Temperature Delta T	720	661	91.7	4	92.2
Solar Radiation	720	661	91.7	4	92.2
Barometric Pressure	720	661	91.7	4	92.2
Relative Humidity	720	661	91.7	4	92.2
Precipitation	720	265	36.8	4	37.4
<b>Total</b>	<b>7,200</b>	<b>6,205</b>	<b>86.2</b>	<b>40</b>	<b>86.7</b>

**Table 2. Quarterly Data Completeness**

<b>Third Quarter 2013</b>					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
<b>Black Butte Copper Project Met Tower</b>					
Wind Speed	2,208	1,222	55.3	4	55.5
Wind Direction	2,208	1,222	55.3	4	55.5
Standard Deviation	2,208	1,222	55.3	4	55.5
Temperature 9 Meters	2,208	1,222	55.3	4	55.5
Temperature 2 Meters	2,208	1,222	55.3	4	55.5
Temperature Delta T	2,208	1,222	55.3	4	55.5
Solar Radiation	2,208	1,222	55.3	4	55.5
Barometric Pressure	2,208	1,222	55.3	4	55.5
Relative Humidity	2,208	1,222	55.3	4	55.5
Precipitation	2,208	265	12.0	4	12.2
<b>Total</b>	<b>22,080</b>	<b>11,263</b>	<b>51.0</b>	<b>40</b>	<b>51.2</b>

## 6.0 MONITORING DATA

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The hourly data values collected at the monitoring sites are given in the data tables in Appendix A. Each of these tables presents one month's data for all parameters in the monitoring system. In addition, the average, maximum, and minimum values for each parameter for each day are listed (for wind direction, the prevailing wind direction for the day is given). For those hours with missing data, a code is given that explains the reason the data were missing. These codes are given in Table 3.

Monthly and quarterly wind rose distributions from the monitoring site are presented in Tables 4 through 7. These tables give the percentage frequency of occurrence of winds from 16 cardinal directions and from 22 wind speed ranges. These same data are presented graphically in Figures 2 through 5. In the wind rose figures, the length of each "petal" of the rose is proportional to the percentage of time the wind blew from that direction. On the bottom of each figure is a histogram showing the average wind speed from each of the cardinal wind directions.

The wind rose for August appears noticeably different from other months, because it was based on only 58 hours of data and represents very short-term conditions.

**Table 3. Missing Data Codes**

<b>Mnemonic Code</b>	<b>Description</b>	<b>Equivalent EPA Null Value Reason Code</b>
Sc	Scheduled but not collected	9972
Ti	Sample time out of limits	9973
Fi	Filter damage	9976
Op	Voided by operator	9978
ND	Machine malfunction	9980
Wx	Bad weather	9981
Co	Collection error	9983
Lb	Lab error	9984
QA	Poor quality assurance results	9985
Pwr	Power failure	9988
Wi	Wildlife damage	9989
AZ	Automatic zero/span check	9991
ZS	Manual zero/span check	9986
Au	Performance audit	9992
Ma	Routine maintenance/repairs	9993
Ca	Multipoint calibration	9995
PZ	Precision/zero/span	9998

**Table 4. Monthly Wind Rose Summary, Black Butte Copper Project Met Tower**

July 2013																		
Direction>>>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	
Wind Speed (meters per second)	0.1 - 1.0	1.8	1.0	1.0	0.8	2.6	1.0	1.2	0.4	0.6	1.0	0.0	0.4	0.6	0.4	0.8	0.8	14.3
	1.1 - 2.0	1.2	0.8	2.4	3.2	5.2	5.2	3.2	2.0	0.0	0.4	0.2	0.2	0.8	0.6	1.6	1.6	28.4
	2.1 - 3.0	0.2	0.0	0.8	2.0	3.0	2.4	1.4	1.0	0.4	0.4	0.8	1.4	0.8	2.2	1.6	1.2	19.4
	3.1 - 4.0	0.4	0.2	0.2	0.6	1.8	0.4	1.0	0.8	0.2	0.2	0.4	1.2	2.0	4.2	1.6	0.2	15.3
	4.1 - 5.0	0.0	0.0	0.2	0.4	0.2	0.2	1.4	0.6	0.0	0.2	0.8	0.8	1.6	3.2	0.6	0.0	10.1
	5.1 - 6.0	0.4	0.0	0.2	0.0	0.0	0.0	0.6	0.2	0.2	0.6	0.6	0.4	1.0	1.8	0.8	0.4	7.1
	6.1 - 7.0	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.6	0.0	0.2	0.2	0.0	0.4	0.8	0.0	0.0	2.8
	7.1 - 8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	1.0
	8.1 - 9.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.4
	9.1 - 10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11.1 - 12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	12.1 - 13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13.1 - 14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14.1 - 15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.1 - 16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	16.1 - 17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.1 - 18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	18.1 - 19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19.1 - 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calm																		0.0
Total	4.0	2.0	4.8	6.9	12.7	9.3	10.7	5.8	1.4	3.6	3.0	4.4	7.1	13.3	6.9	4.2	100.0	
Average Speed	1.7	1.4	1.8	2.0	1.9	1.9	3.6	3.1	2.3	3.8	4.0	3.2	3.7	4.0	2.9	2.2	2.8	



**Table 5. Monthly Wind Rose Summary, Black Butte Copper Project Met Tower**

August 2013																		
Direction>>>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	
Wind Speed (meters per second)	0.1 - 1.0	0.0	0.0	3.4	0.0	0.0	1.7	0.0	1.7	0.0	0.0	0.0	1.7	0.0	1.7	0.0	10.3	
	1.1 - 2.0	0.0	0.0	0.0	5.2	3.4	12.1	0.0	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	22.4	
	2.1 - 3.0	0.0	0.0	0.0	1.7	6.9	3.4	0.0	1.7	0.0	0.0	1.7	0.0	1.7	1.7	0.0	20.7	
	3.1 - 4.0	0.0	0.0	0.0	0.0	6.9	1.7	1.7	0.0	3.4	1.7	1.7	0.0	1.7	0.0	1.7	22.4	
	4.1 - 5.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.0	0.0	1.7	1.7	1.7	1.7	1.7	3.4	0.0	13.8
	5.1 - 6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7	0.0	0.0	3.4
	6.1 - 7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	3.4	0.0	0.0	0.0	5.2
	7.1 - 8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	1.7
	8.1 - 9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	9.1 - 10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	11.1 - 12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	12.1 - 13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13.1 - 14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14.1 - 15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.1 - 16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	16.1 - 17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.1 - 18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	18.1 - 19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19.1 - 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calm																		0.0
Total	0.0	0.0	3.4	8.6	17.2	19.0	1.7	5.2	3.4	3.4	6.9	3.4	12.1	5.2	6.9	3.4	100.0	
Average Speed	---	---	0.6	2.1	2.7	1.7	3.3	1.7	3.5	4.0	4.3	5.0	4.5	4.1	3.3	3.0	2.9	

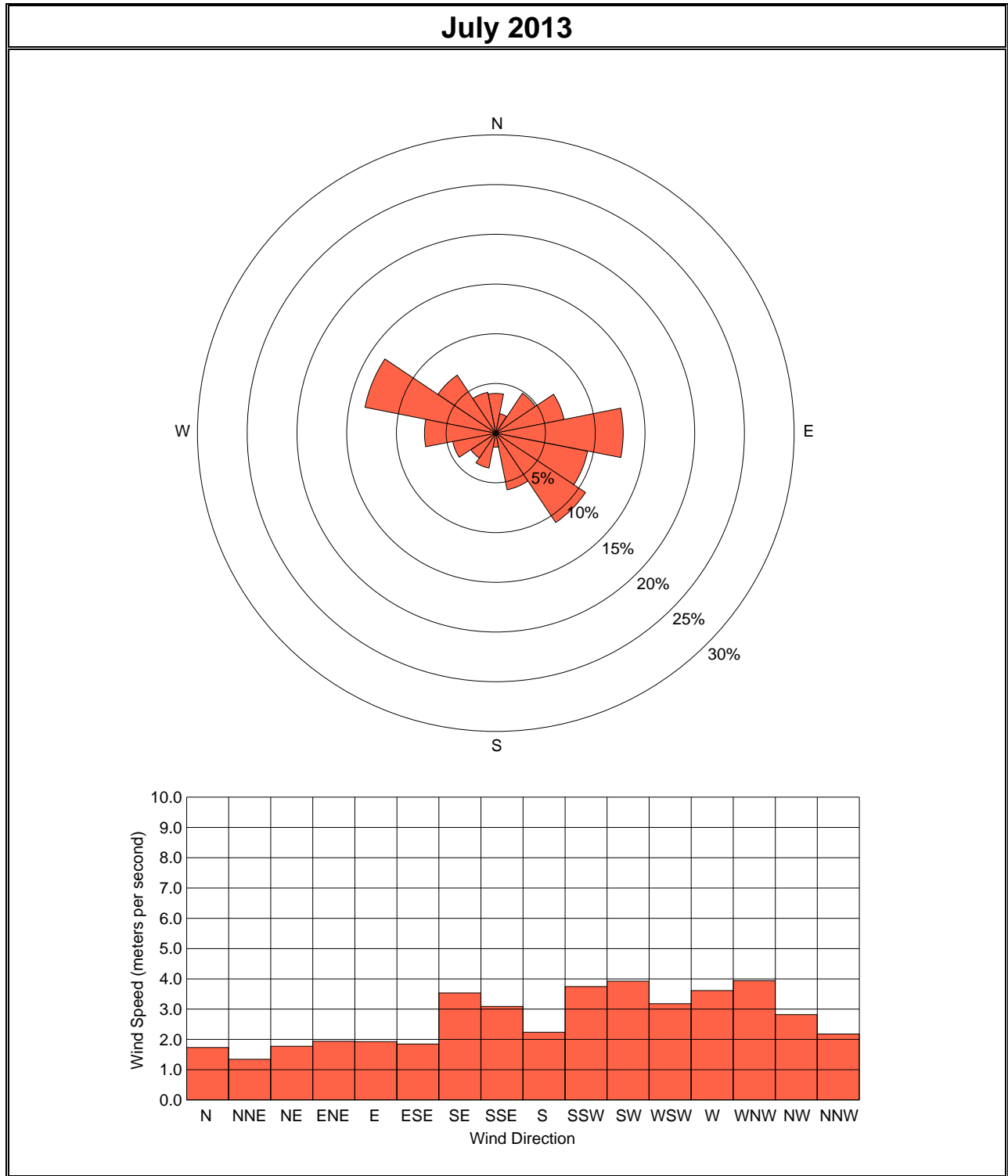
**Table 6. Monthly Wind Rose Summary, Black Butte Copper Project Met Tower**

September 2013																		
Direction>>>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	
Wind Speed (meters per second)	0.1 - 1.0	1.1	0.6	1.4	1.5	1.1	1.4	2.0	1.2	0.2	0.3	0.2	0.3	0.5	0.3	1.2	0.9	13.9
	1.1 - 2.0	0.5	1.2	1.5	3.0	5.0	5.6	5.0	2.3	1.2	0.2	0.5	0.9	1.2	0.8	1.7	0.6	31.1
	2.1 - 3.0	0.3	0.2	0.5	0.5	2.3	2.9	1.4	1.5	0.3	0.3	0.5	0.9	1.7	1.4	2.0	0.9	17.3
	3.1 - 4.0	1.4	0.6	0.2	1.2	1.7	0.9	0.9	0.3	0.8	0.8	0.2	0.2	1.5	1.2	0.6	0.3	12.6
	4.1 - 5.0	0.2	0.2	0.2	0.8	1.2	0.3	0.3	0.8	0.8	0.8	0.8	0.8	1.1	1.8	0.6	0.2	10.5
	5.1 - 6.0	0.5	0.2	0.0	0.0	0.0	0.2	0.9	0.3	0.9	0.3	0.5	0.9	0.6	0.8	0.3	0.2	6.4
	6.1 - 7.0	0.2	0.0	0.0	0.0	0.2	0.2	0.8	0.0	0.0	0.2	0.9	1.1	0.6	0.2	0.2	0.2	4.4
	7.1 - 8.0	0.0	0.3	0.0	0.0	0.0	0.2	0.9	0.2	0.0	0.0	0.0	0.0	0.6	0.2	0.0	0.0	2.3
	8.1 - 9.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0.6	0.0	0.0	0.0	1.1
	9.1 - 10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.5
	10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
	11.1 - 12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	12.1 - 13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13.1 - 14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14.1 - 15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.1 - 16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	16.1 - 17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.1 - 18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	18.1 - 19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19.1 - 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calm																		0.0
Total	4.1	3.2	3.6	7.0	11.4	11.5	12.4	6.7	4.1	2.9	3.3	5.0	8.6	6.5	6.5	3.2	100.0	
Average Speed	3.0	2.7	1.6	2.1	2.3	2.1	3.0	2.6	3.4	4.0	4.3	3.9	4.3	3.7	2.3	2.3	2.9	

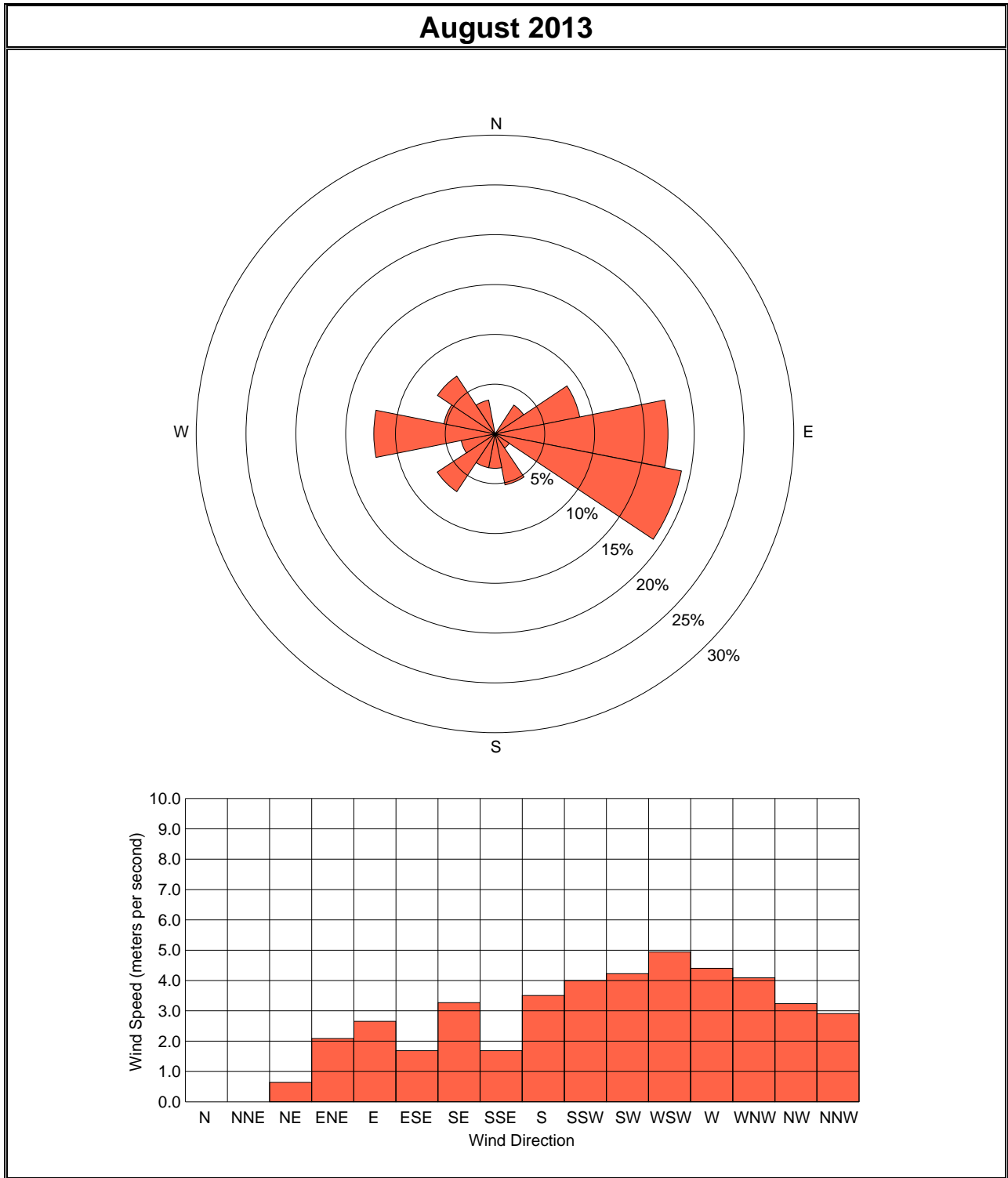
**Table 7. Quarterly Wind Rose Summary, Black Butte Copper Project Met Tower**

Third Quarter 2013																		
Direction>>>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total	
Wind Speed (meters per second)	0.1 - 1.0	1.3	0.7	1.3	1.1	1.6	1.2	1.6	0.9	0.3	0.6	0.1	0.3	0.6	0.3	1.1	0.8	13.9
	1.1 - 2.0	0.7	1.0	1.8	3.2	5.0	5.7	4.0	2.1	0.7	0.2	0.3	0.6	1.0	0.7	1.6	1.0	29.5
	2.1 - 3.0	0.2	0.1	0.6	1.1	2.8	2.7	1.3	1.3	0.3	0.3	0.7	1.1	1.3	1.7	1.7	1.1	18.3
	3.1 - 4.0	0.9	0.4	0.2	0.9	2.0	0.7	1.0	0.5	0.7	0.6	0.3	0.6	1.7	2.4	1.1	0.3	14.2
	4.1 - 5.0	0.1	0.1	0.2	0.7	0.7	0.2	0.7	0.7	0.4	0.6	0.8	0.8	1.3	2.4	0.7	0.1	10.5
	5.1 - 6.0	0.4	0.1	0.1	0.0	0.0	0.1	0.7	0.2	0.6	0.4	0.5	0.7	0.7	1.2	0.5	0.2	6.5
	6.1 - 7.0	0.1	0.0	0.0	0.0	0.1	0.2	0.6	0.2	0.0	0.2	0.7	0.6	0.7	0.4	0.1	0.1	3.8
	7.1 - 8.0	0.0	0.2	0.0	0.0	0.0	0.1	0.7	0.2	0.0	0.1	0.0	0.0	0.4	0.2	0.0	0.0	1.7
	8.1 - 9.0	0.1	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	1.1
	9.1 - 10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.3
	10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	11.1 - 12.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	12.1 - 13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	13.1 - 14.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14.1 - 15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.1 - 16.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	16.1 - 17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	17.1 - 18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	18.1 - 19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	19.1 - 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
> 20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Calm																		0.0
Total	3.8	2.5	4.1	7.0	12.2	11.0	11.2	6.2	2.9	3.2	3.4	4.7	8.2	9.2	6.7	3.6	100.0	
Average Speed	2.5	2.2	1.7	2.1	2.2	2.0	3.2	2.7	3.2	3.9	4.2	3.7	4.1	3.9	2.6	2.3	2.9	

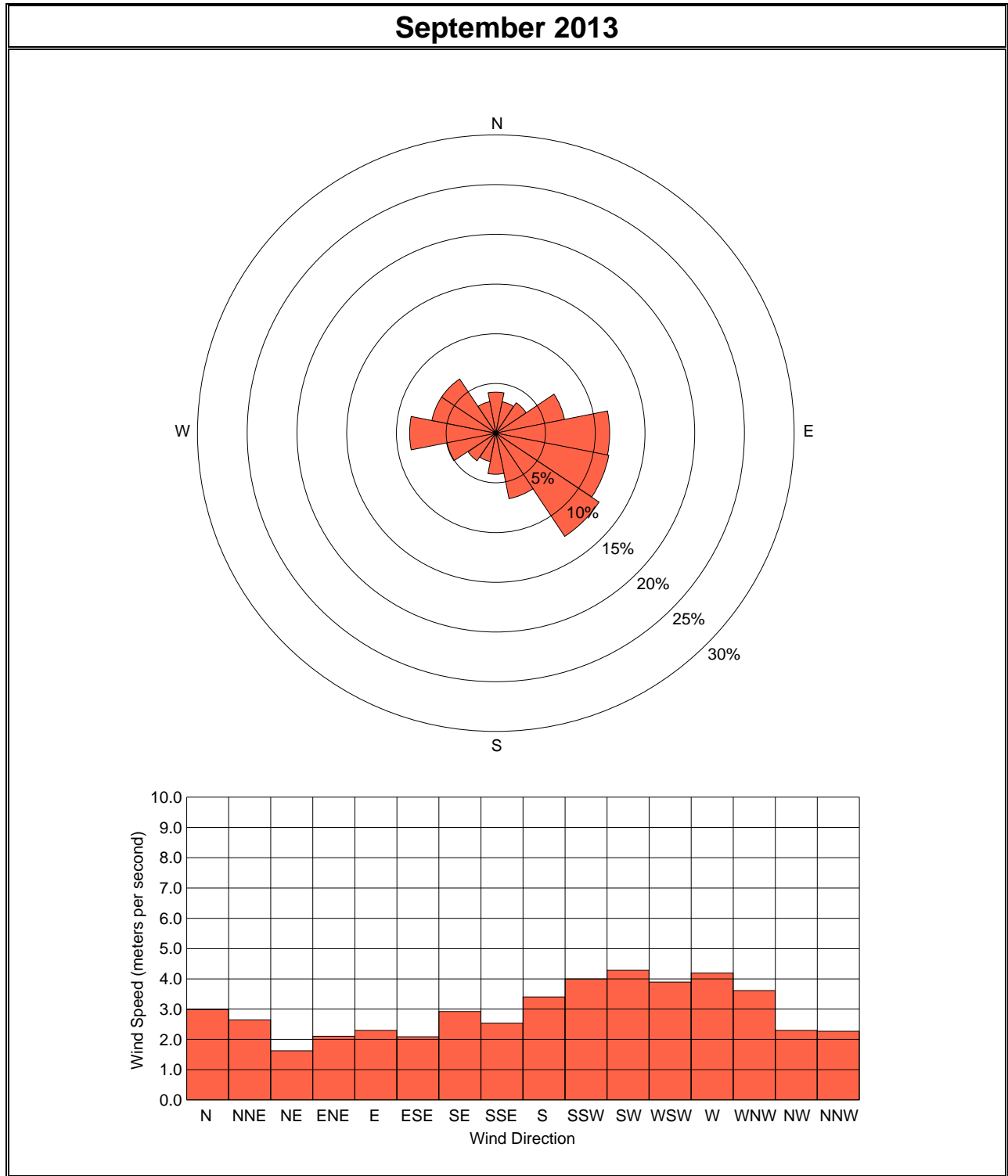
**Figure 2. Monthly Wind Rose, Black Butte Copper Project Met Tower**



**Figure 3. Monthly Wind Rose, Black Butte Copper Project Met Tower**



**Figure 4. Monthly Wind Rose, Black Butte Copper Project Met Tower**



**Figure 5. Quarterly Wind Rose, Black Butte Copper Project Met Tower**

