

**SANDFIRE RESOURCES, INC.
BLACK BUTTE COPPER
PROJECT AMBIENT AIR
MONITORING PROGRAM
Quarterly Data Report
Fourth Quarter 2019**

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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 project-specific *Quality Assurance Project Plan*, the *State of Montana Ambient Air Monitoring Program Quality Assurance Project Plan (April 2013)*, and the Environmental Protection Agency's *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume I, A Field Guide to Environmental Quality Assurance (April 1994)*, *Volume II, Ambient Air Quality Program (May 2013)*, and *Volume IV, Meteorological Measurements (March 2008)*.

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APPENDICES

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

1.0 INTRODUCTION

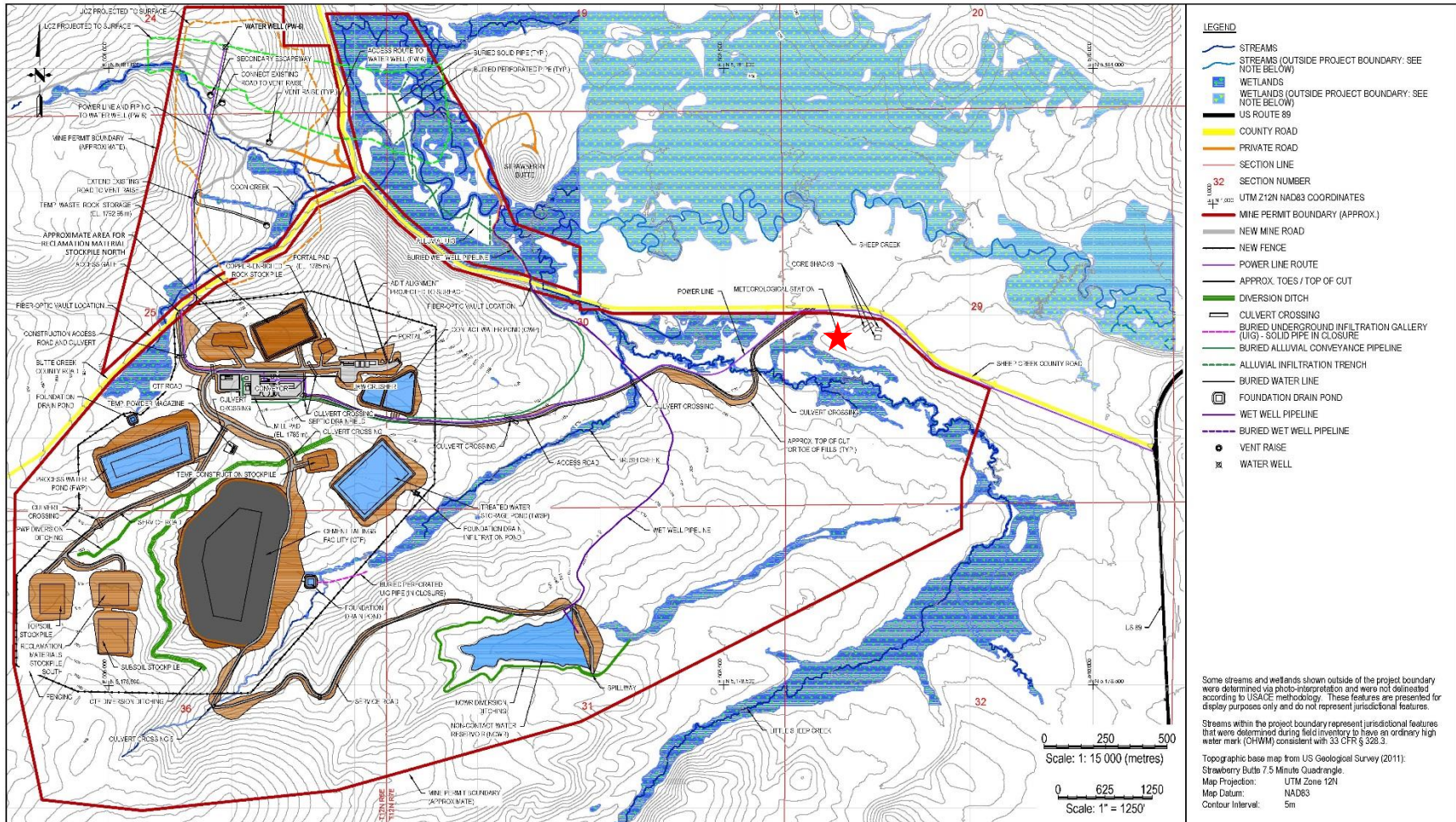
Sandfire Resources, Inc. established an ambient air monitoring site to measure wind speed, wind direction, standard deviation of wind direction, temperature at 9 meters and 2 meters, delta temperature, solar radiation, barometric pressure, and precipitation. The station was established to accurately 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 current location of the monitoring site, depicted by a red star. It is located to the west-southwest of the core shed buildings. On February 6, 2018 the tower was shut down and moved to a new location approximately 300 feet southwest of the original location, where monitoring resumed on March 7, 2018. Relocation activities were documented in the monitoring report for the first quarter of 2018.

This report presents the data collected during the fourth quarter (October through December) of 2019. 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.

On June 23, 2015, an evaporation pan and manual precipitation gauge were installed adjacent to the existing meteorological system. The evaporation data will be used for hydrological / water balance studies. The manual rain gauge was installed to provide a backup data source for the existing automatic rain gauge, which has experienced occasional mechanical problems. Also, the automatic rain gauge is sometimes unreliable for measuring frozen precipitation. The evaporation pan was not operated during the fourth quarter of 2019.

Figure 1. Monitoring Site Location



Prepared by Tetra Tech Inc. (Revised October 2018 to include alluvial UG as included in the December 2018 Integrated Discharge Permit Application Narrative Report by Hydrometrics that was revised in February 2018, Completeness Determination by MT DEQ on May 25, 2018.)



FIGURE 1.3
Facilities Site Plan
Black Butte Copper Project
Mine Operating Permit Application
Meagher County, Montana

2.0 MONITORING SYSTEM OPERATIONS

The original meteorological monitoring system began collecting data on April 30, 2012. Data were collected continuously at that location until February 6, 2018 at 1400 MST when the existing meteorological tower was relocated approximately 300 feet to the southwest of the original location. All instruments except the automatic rain gauge were operational starting March 7 at 1800 MST; the rain gauge became operational on March 8 at 1500 MST.

Jeff Bell of Bison conducted performance audits of the meteorological system on December 5, 2019. All as-found audit results were satisfactory, and no calibration adjustments were needed.

3.0 PERFORMANCE AUDIT DATA

Jeff Bell of Bison conducted performance audits of the meteorological system on December 5, 2019. No calibration adjustments were necessary.

The Bison report of the audits are presented in Appendix B.

4.0 CALIBRATION DATA

Jeff Bell of Bison conducted performance audits of the meteorological system on December 5, 2019, as discussed in Section 3.0. All of the as-found audit results were satisfactory, and no calibration adjustments were needed.

5.0 DATA COMPLETENESS

The meteorological percentages of data recovery achieved during the fourth quarter of 2019 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 fourth quarter the net percentage data recovery was 99.8 percent for wind direction and standard deviation, 99.6 percent for wind speed, and 100.0 percent for all other parameters. The loss of data was due to the sensors being frozen in place during bad weather.

Table 1. Monthly Data Completeness

October 2019					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
Black Butte Copper Project Met Tower					
Wind Speed	744	742	99.7	0	99.7
Wind Direction	744	740	99.5	0	99.5
Standard Deviation	744	740	99.5	0	99.5
Temperature 9 Meters	744	744	100.0	0	100.0
Temperature 2 Meters	744	744	100.0	0	100.0
Temperature Delta T	744	744	100.0	0	100.0
Solar Radiation	744	744	100.0	0	100.0
Barometric Pressure	744	744	100.0	0	100.0
Relative Humidity	744	744	100.0	0	100.0
Precipitation	744	744	100.0	0	100.0
Total	7,440	7,430	99.9	0	99.9

Table 1. Monthly Data Completeness (Continued)

November 2019					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
Black Butte Copper Project Met Tower					
Wind Speed	720	713	99.0	0	99.0
Wind Direction	720	720	100.0	0	100.0
Standard Deviation	720	720	100.0	0	100.0
Temperature 9 Meters	720	720	100.0	0	100.0
Temperature 2 Meters	720	720	100.0	0	100.0
Temperature Delta T	720	720	100.0	0	100.0
Solar Radiation	720	720	100.0	0	100.0
Barometric Pressure	720	720	100.0	0	100.0
Relative Humidity	720	720	100.0	0	100.0
Precipitation	720	720	100.0	0	100.0
Total	7,200	7,193	99.9	0	99.9

Table 1. Monthly Data Completeness (Continued)

December 2019					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
Black Butte Copper Project Met Tower					
Wind Speed	744	741	99.6	3	100.0
Wind Direction	744	741	99.6	3	100.0
Standard Deviation	744	741	99.6	3	100.0
Temperature 9 Meters	744	741	99.6	3	100.0
Temperature 2 Meters	744	741	99.6	3	100.0
Temperature Delta T	744	741	99.6	3	100.0
Solar Radiation	744	741	99.6	3	100.0
Barometric Pressure	744	741	99.6	3	100.0
Relative Humidity	744	741	99.6	3	100.0
Precipitation	744	741	99.6	3	100.0
Total	7,440	7,410	99.6	30	100.0

Table 2. Quarterly Data Completeness

Fourth Quarter 2019					
Parameter	Readings Possible	Valid Readings	Percentage Recovery	Quality Assurance Hours	Net Percentage Recovery
Black Butte Copper Project Met Tower					
Wind Speed	2,208	2,196	99.5	3	99.6
Wind Direction	2,208	2,201	99.7	3	99.8
Standard Deviation	2,208	2,201	99.7	3	99.8
Temperature 9 Meters	2,208	2,205	99.9	3	100.0
Temperature 2 Meters	2,208	2,205	99.9	3	100.0
Temperature Delta T	2,208	2,205	99.9	3	100.0
Solar Radiation	2,208	2,205	99.9	3	100.0
Barometric Pressure	2,208	2,205	99.9	3	100.0
Relative Humidity	2,208	2,205	99.9	3	100.0
Precipitation	2,208	2,205	99.9	3	100.0
Total	22,080	22,033	99.8	30	99.9

6.0 MONITORING DATA

The hourly data values collected at the monitoring site are given in the data tables in Appendix A. Each of these tables presents one month's data for one parameter 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.

Table 3. Missing Data Codes

Mnemonic Code	Description	Equivalent EPA Null Value Reason Code
Sc	Scheduled but not collected	9972
Ti	Sample time out of limits	9973
Fi	Filter damage	9976
Op	Voided by operator	9978
Mi	Miscellaneous void	9979
ND	Machine malfunction	9980
Wx	Bad weather	9981
Co	Collection error	9983
Lb	Lab error	9984
QA	Poor quality assurance results	9985
ZS	Manual zero/span check	9986
Wa	Monitoring waived	9987
Pw	Power failure	9988
Wi	Wildlife damage	9989
AZ	Automatic zero/span check	9991
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

October 2019																		
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	0.7	0.9	0.7	0.9	1.9	2.4	3.6	1.9	1.9	0.8	1.1	0.4	0.5	0.5	0.7	0.5	19.6
	1.1 - 2.0	0.5	0.7	1.9	1.4	2.2	2.7	4.2	3.2	0.5	0.9	0.3	0.8	0.8	0.8	0.4	0.5	21.9
	2.1 - 3.0	0.0	0.0	0.0	0.4	1.1	1.9	0.8	0.8	0.7	0.1	0.4	1.1	1.9	2.3	1.5	0.4	13.4
	3.1 - 4.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	1.1	0.3	0.4	0.0	0.4	3.9	2.7	1.8	1.8	12.7
	4.1 - 5.0	0.4	0.1	0.0	0.1	0.0	0.0	0.0	0.9	0.5	0.3	0.3	1.4	3.0	2.0	1.4	1.4	11.8
	5.1 - 6.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.5	0.5	0.5	0.7	1.8	1.2	0.7	0.5	7.2
	6.1 - 7.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.1	0.7	1.9	0.9	0.5	0.5	5.7
	7.1 - 8.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.1	0.9	0.5	0.3	0.5	3.2
	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	1.5	0.3	0.5	0.1	2.4
	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	0.3	0.7	0.3	0.1	0.3	1.6
	10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	0.0	0.0	0.5
	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	3.1	1.8	2.6	3.1	5.1	7.0	8.6	8.2	4.5	3.6	3.2	5.8	17.2	11.6	7.8	6.6		100.0
Average Speed	4.0	1.2	1.2	1.6	1.5	1.6	1.2	2.1	2.3	3.3	3.8	4.0	5.0	4.1	4.1	4.3		3.2

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

November 2019																	
Direction>>>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.1 - 1.0	1.3	0.6	0.3	1.8	0.7	2.0	3.9	3.8	1.3	0.1	0.3	0.4	0.6	1.3	0.8	1.0	20.1
1.1 - 2.0	1.4	1.7	1.7	2.4	3.5	5.8	5.8	2.9	0.8	0.1	0.4	1.0	1.3	1.3	1.3	1.5	32.8
2.1 - 3.0	0.4	0.0	0.7	1.1	1.0	0.3	1.0	0.7	0.4	0.0	0.1	0.8	3.4	2.1	1.5	0.6	14.2
3.1 - 4.0	0.1	0.0	0.0	0.1	0.1	0.1	0.3	0.4	0.1	0.1	0.0	0.7	2.5	4.1	3.4	0.8	13.0
4.1 - 5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.1	0.1	0.1	0.8	2.4	2.2	1.0	0.4	7.9
5.1 - 6.0	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.1	2.2	1.3	0.3	0.1	4.9
6.1 - 7.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.0	0.0	0.0	0.1	1.4	0.7	0.1	0.0	3.1
7.1 - 8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.7	0.6	0.0	0.0	1.5
8.1 - 9.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.7
9.1 - 10.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.7
10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3
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	0.1	0.0	0.1	0.0	0.0	0.3
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	0.1	0.0	0.0	0.1
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	0.1	0.0	0.0	0.0	0.1
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	0.3	0.0	0.0	0.0	0.3
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	3.5	2.2	2.7	5.5	5.3	9.0	11.9	8.8	2.8	0.6	1.0	4.3	15.3	14.2	8.4	4.5	100.0
Average Speed	1.8	1.2	1.8	1.5	1.7	2.0	1.7	1.8	1.5	2.4	2.1	3.4	4.4	3.9	3.0	2.3	2.7

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

December 2019																	
Direction>>>	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
0.1 - 1.0	0.8	0.4	1.2	0.8	2.6	2.0	5.3	3.8	1.8	0.8	0.1	0.3	0.4	0.4	0.9	0.8	22.4
1.1 - 2.0	0.7	1.2	1.2	2.6	3.9	4.9	6.9	2.2	0.3	0.1	0.3	0.4	0.8	0.7	0.9	0.5	27.5
2.1 - 3.0	0.0	0.0	0.4	0.5	2.2	2.4	2.0	0.3	0.5	0.1	0.5	0.7	2.7	0.7	0.1	0.5	13.8
3.1 - 4.0	0.0	0.0	0.0	0.8	2.7	1.2	1.6	0.9	0.1	0.4	0.3	0.8	2.7	1.3	0.3	0.1	13.4
4.1 - 5.0	0.0	0.0	0.0	0.1	0.7	0.3	0.3	1.1	0.5	0.5	0.7	0.8	4.0	0.9	0.4	0.0	10.4
5.1 - 6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.4	0.3	0.9	0.4	2.8	0.7	0.3	0.0	6.1
6.1 - 7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.7	0.4	0.1	1.5	0.4	0.1	0.0	3.6
7.1 - 8.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.3	0.4	0.1	0.0	0.0	1.2
8.1 - 9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.3	0.3	0.0	0.0	0.9
9.1 - 10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.4
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	0.3	0.0	0.0	0.0	0.3
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	1.5	1.6	2.8	4.9	12.0	10.8	16.3	8.4	4.0	3.6	3.4	3.9	15.9	5.7	3.1	2.0	100.0
Average Speed	1.0	1.4	1.3	1.9	2.2	1.9	1.7	1.8	2.7	4.5	4.5	3.9	4.4	4.1	2.5	1.6	2.7

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

Fourth Quarter 2019																		
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	0.9	0.6	0.7	1.2	1.7	2.1	4.3	3.1	1.6	0.6	0.5	0.4	0.5	0.7	0.8	0.8	20.7
	1.1 - 2.0	0.9	1.2	1.6	2.1	3.2	4.4	5.6	2.8	0.5	0.4	0.3	0.7	1.0	0.9	0.9	0.9	27.3
	2.1 - 3.0	0.1	0.0	0.4	0.7	1.4	1.5	1.3	0.6	0.5	0.1	0.4	0.9	2.6	1.7	1.0	0.5	13.8
	3.1 - 4.0	0.1	0.0	0.0	0.4	1.0	0.5	0.6	0.8	0.2	0.3	0.1	0.6	3.1	2.7	1.8	0.9	13.0
	4.1 - 5.0	0.1	0.0	0.0	0.1	0.2	0.1	0.2	0.7	0.4	0.3	0.4	1.0	3.1	1.7	0.9	0.6	10.0
	5.1 - 6.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3	0.3	0.5	0.4	2.3	1.0	0.4	0.2	6.1
	6.1 - 7.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.3	0.2	0.3	1.6	0.7	0.3	0.2	4.1
	7.1 - 8.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.1	0.7	0.4	0.1	0.2	2.0
	8.1 - 9.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.6	0.2	0.2	0.0	1.4
	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	0.1	0.3	0.3	0.0	0.1	0.9
	10.1 - 11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.4
	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	0.1
	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	0.1	0.0	0.0	0.0	0.1
	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	2.7	1.9	2.7	4.5	7.5	8.9	12.3	8.5	3.8	2.6	2.6	4.7	16.1	10.4	6.4	4.4		100.0
Average Speed	2.5	1.3	1.4	1.7	1.9	1.8	1.6	1.9	2.2	3.8	3.9	3.8	4.6	4.0	3.4	3.2		2.9

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

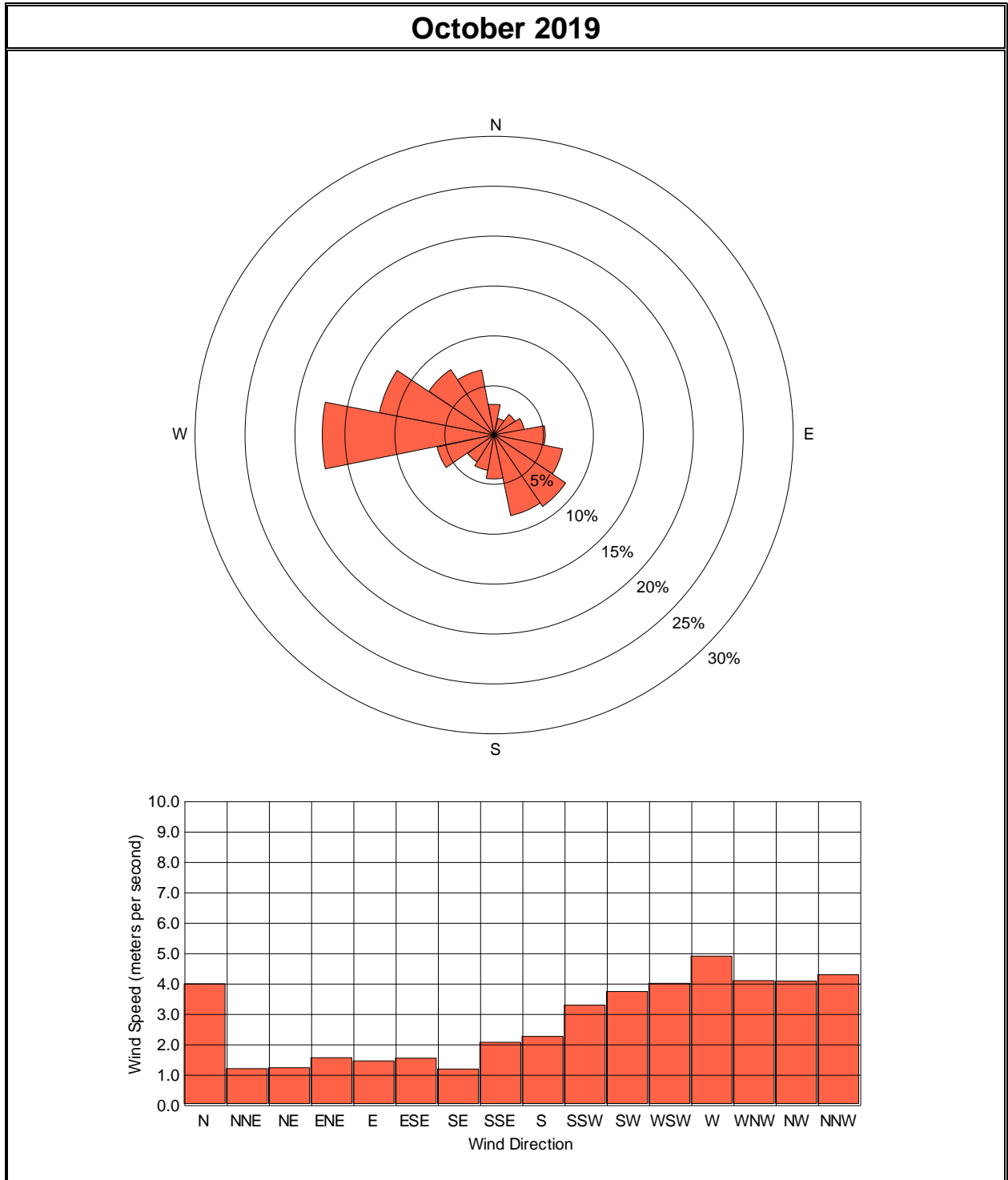


Figure 3. Monthly Wind Rose, Black Butte Copper Project Met Tower

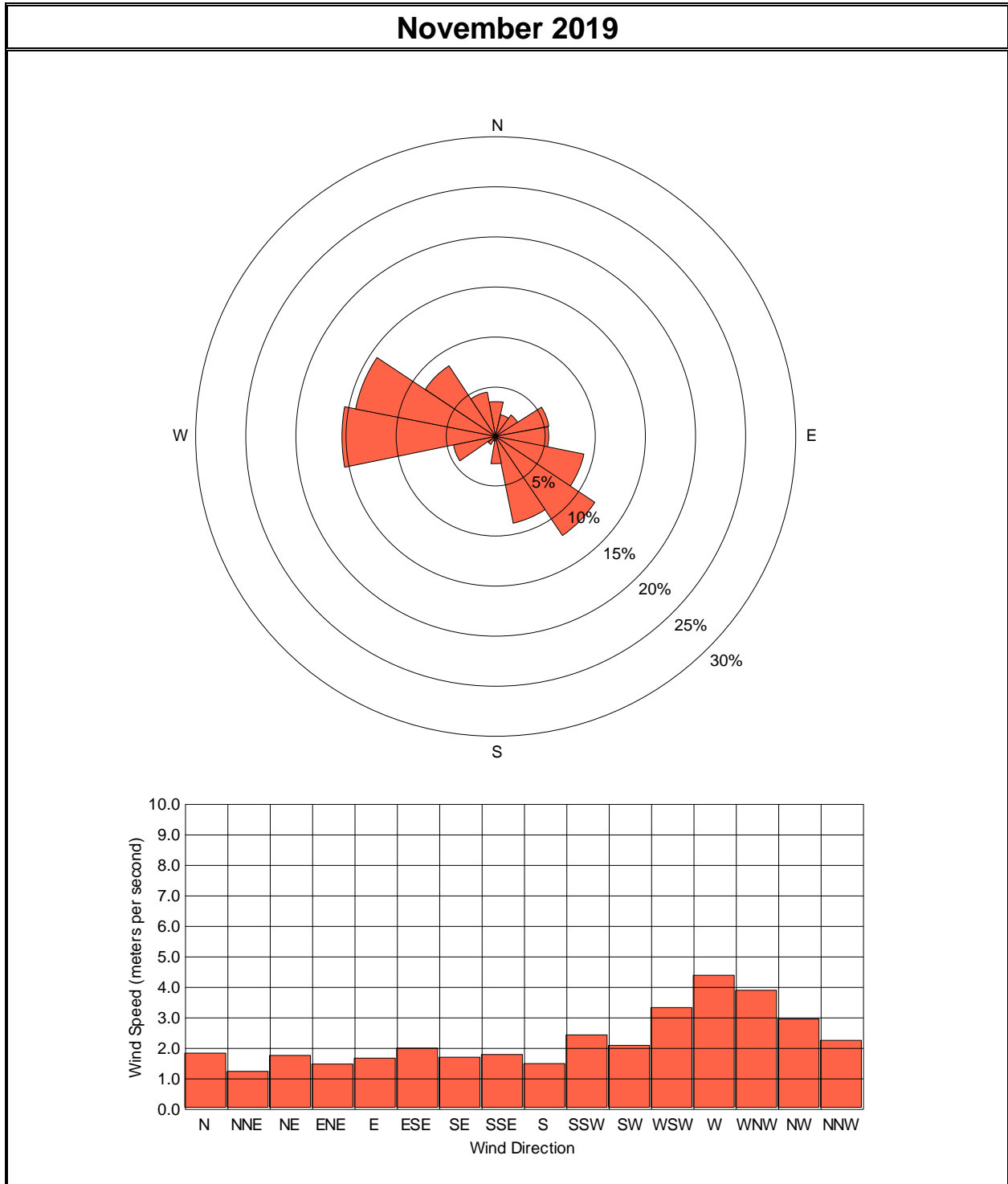


Figure 4. Monthly Wind Rose, Black Butte Copper Project Met Tower

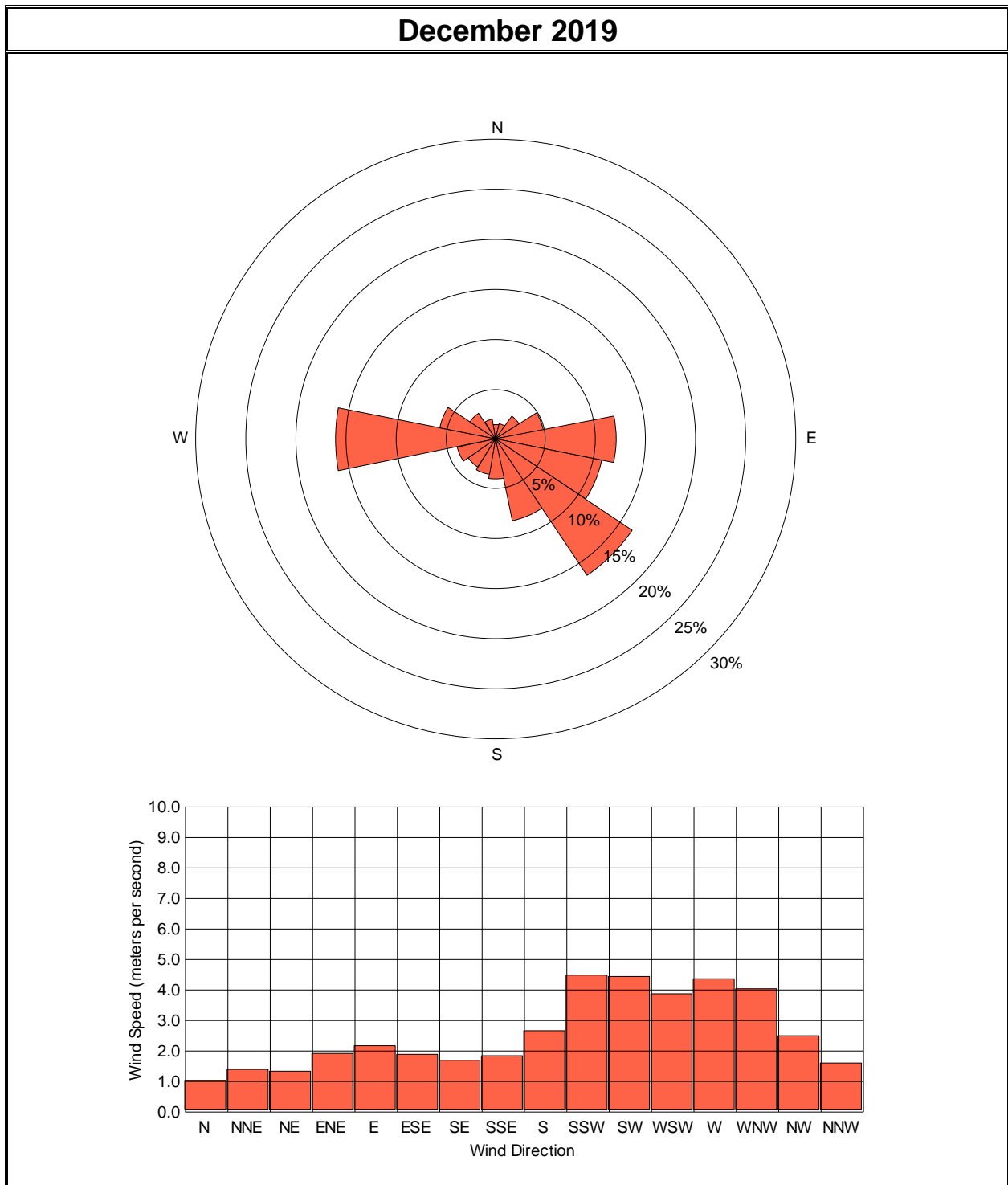


Figure 5. Quarterly Wind Rose, Black Butte Copper Project Met Tower

