NRC Technical Report
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Replacement Pages

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2.5 Meteorology, Climatology and Air Quality

This section describes meteorology, climatology, and air quality in the region in which the Project is located. Both regional (long-term) and site-specific data (available periods of measurement [at least one year]) are discussed to describe climatological conditions at the Permit Area. Where site-specific data are not available, data from the closest representative location are presented.

The Project is located in the Great Divide Basin, in south-central Wyoming. The Permit Area is located in the intermountain semi-desert ecoregion (Wyoming State Climate Office, 2005), which has cold winters and short, hot summers (Bailey, 1995). The average annual temperatures range from 40 to 52 degrees Fahrenheit (°F) in this ecoregion. The average annual precipitation ranges from five to 14 inches (Bailey, 1995). The nearest water bodies of any size are Pathfinder and Seminoe Reservoirs, shown on **Figure 2.5-1,** which are on the order of 50 miles downwind of the Lost Creek site and on the other side of the Continental Divide. It is unlikely these water bodies have any impact on meteorological measurements at Lost Creek. All other water bodies shown on **Figure 2.5-1** are seasonal, at best, and unlikely to have any impact on the measurements.

2.5.1 Meteorology and Climatology

Meteorological stations within 50 miles of the Project site are shown in **Figure 2.5-1**. The National Weather Service (NWS) meteorological station closest to the Permit Area with a long period of record is Muddy Gap, Wyoming (High Plains Regional Climate Center [HPRCC], 2007a). This station is 28 miles northeast of the Permit Area; and temperature, precipitation, snowfall and snow depth data have been collected since 1949. The Muddy Gap station is in the same Climate Division as the Project location, Climate Division 10 (CLIMAS, 2005), which means that these locations have similar climatic characteristics. Camp Creek is at a higher elevation in somewhat more rugged terrain (WRCC RAWS, 2010), and is not representative of conditions at the Project site.

The Lost Soldier (LS) meteorological station was installed at a location near Bairoil in April 2006, based on anticipated project development. The LS meteorological station is about 12 miles northeast from the Permit Area (**Figure 2.5-1**). After deciding to permit the Lost Creek Project before the Lost Soldier Project, the Lost Creek (LC) meteorological station was installed within the Lost Creek Permit Area in May 2007 to collect on-site data (**Figure 2.5-1**). Information collected from the LS and Muddy Gap stations was originally used to describe on-site conditions, due to the relatively short duration of the LC record at that time; additional data from the LC station has since been incorporated in this document. NRC also requested information as to the applicability of the LS data to the LC site [Request for

2.5.1.3 Humidity and Evaporation

The average relative humidity at the Permit Area is low in the summer, with the lowest average occurring in June (30.2 percent). The relative humidity is elevated during the winter, where the highest average occurred in February (75.6 percent). The monthly maximum and minimum humidity measured at the LS meteorological station is provided in **Table 2.5-2a** and the average monthly maximum and minimum humidity measured at the LC and LS meteorological stations is provided in **Table 2.5-2b**.

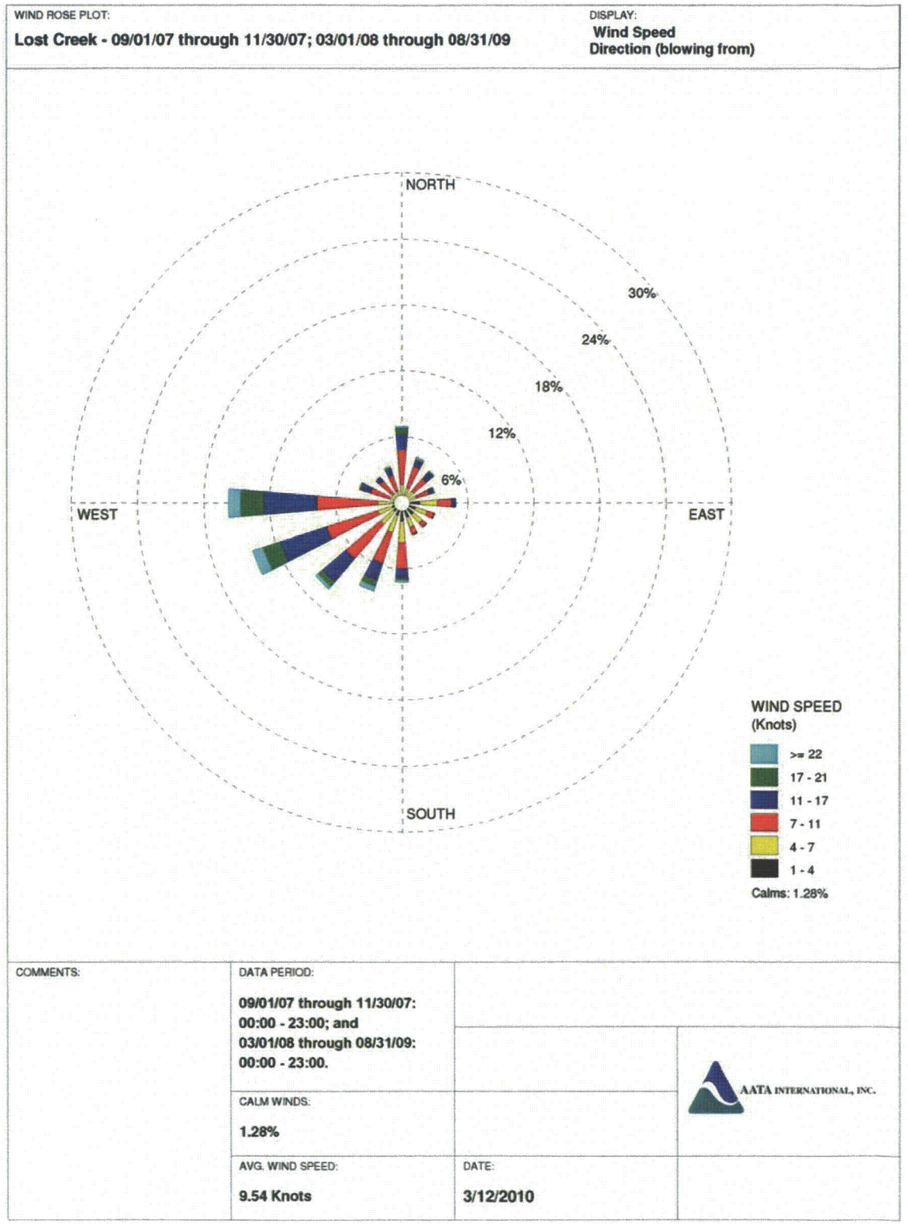
Information on total evaporation by month is included in **Section 3.7.1.5** and **Table 3.7-4** of the Lost Creek Environmental Report (ER).

2.5.1.4 Wind, Mixing, and Stability

The annual average wind speed at a height of ten meters measured May 2006 through April 2007 was 23 feet per second (ft/s) (7.0 meters per second [m/s]) at the LS meteorological station located near Bairoil, about 15 miles from the Permit Area. The wind speed is highest in February and November (29.9 and 29.2 ft/s or 9.1 and 8.9 m/s, respectively). The lowest wind speeds occur in July and August (16.4 and 16.7 ft/s or 5.0 and 5.1 m/s, respectively). The prevailing wind direction is from the west-northwest and west for most of the year (**Figure 2.5-3a**), with some variability occurring in the spring. The wind data from the LC station is compared to that from the LS station in **Figure 2.5-3b**. The predominant wind at the LC station is from the west-southwest and from the west-northwest at the LS station. The differences may be due to topographic variability or due to the relatively short period of record, particularly given the weather variability over short distances (e.g., summer thunderstorms).

Atmospheric stability was categorized into six classes according to Pasquill (Pasquill, 1961). Calculations were made using wind speed and solar radiation data collected at the site. The data show that relatively stable conditions (stability class D, E, or F), which contribute to good dispersion conditions, occur 87 percent of the time, making atmospheric inversion conditions unlikely. The stability class distribution at the LS station for January 2007 through December 2007 is shown in **Table 2.5-3.** The stability classes for the two stations are essentially the same (**Figure 2.5-4**). Data collected for Lander/Riverton Wyoming indicated that the average annual mixing height is 348 meters in the morning and 2,300 meters in the afternoon. These can also be considered the inversion heights (Holzworth, 1972).

Figure 2.5-3b Wind Speed and Direction at the LS and LC Meteorological Stations



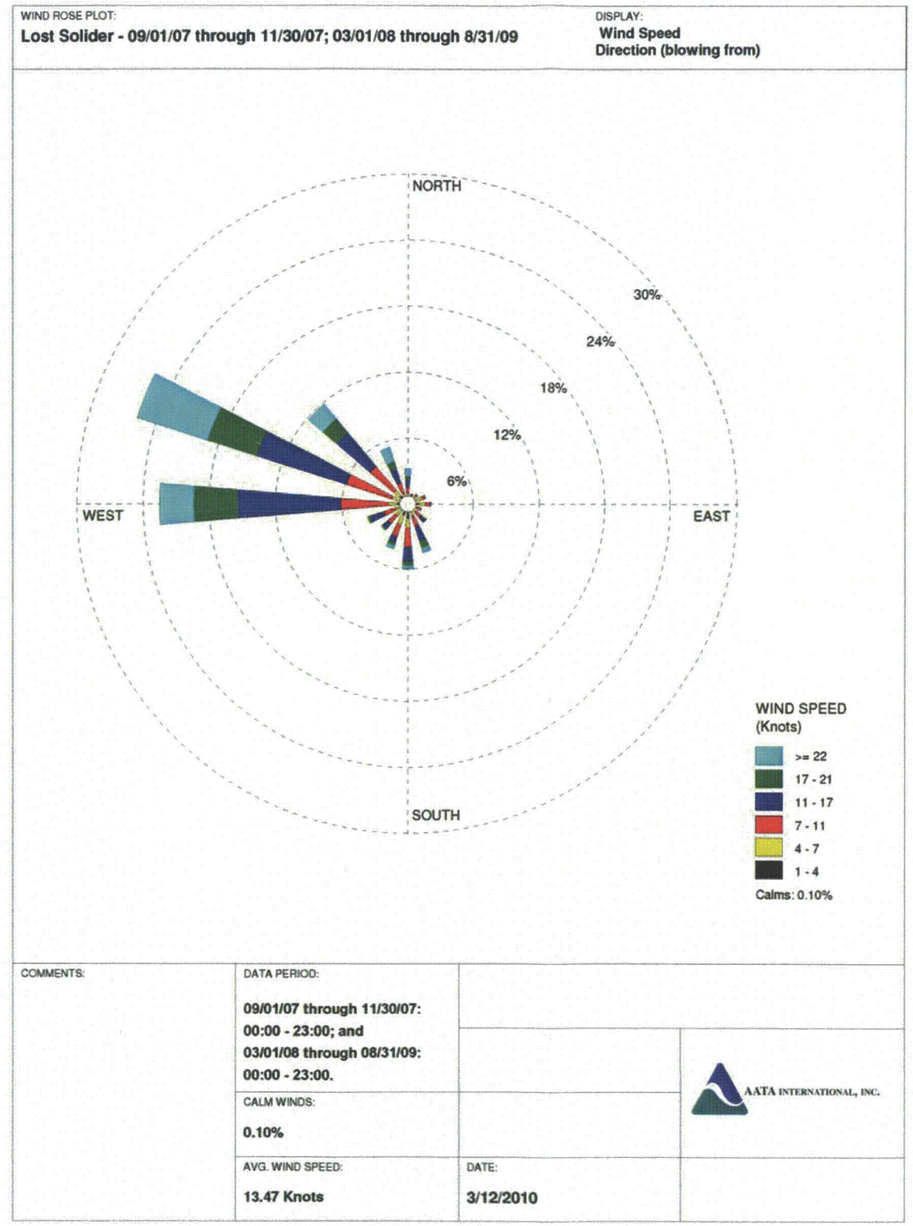


Table 2.5-1b Comparison of Temperature Data (degrees Fahrenheit)
LC, LS, Muddy Gap, Jeffrey City, and Rawlins Meteorological Stations

Station:	Lost Creek		Lost Soldier		Muddy Gap		Jeffery City		Rawlins	
	Avg. High	Avg. Low	Avg. High	Avg. Low	Avg. High	Avg. Low	Avg. High	Avg. Low	Avg. High	Avg. Low
Comparison of Full Dataset										
Period of record:	7/07 - 11/07; 3/08 - 11/09		5/06 - 10/06; 12/06 - 8/09		10/19/1949 - 12/31/2007		4/10/1964 - 6/30/2009		3/6/1951 - 5/31/2008	
January	31.8	5.6	22.4	7.0	31.3	13.8	30.6	8.5	30.8	12.6
February	34.1	9.8	29.5	14.1	34.9	15.9	34.1	10.6	33.8	14.7
March	35.9	11.9	38.0	20.1	43.4	21.4	43.5	18.5	41.3	20.4
April	47.3	22.7	47.0	26.0	55.2	29.2	54.5	26.3	52.6	27.6
May	61.1	34.4	61.0	37.9	66.0	37.9	64.6	34.8	63.9	36.3
June	70.4	41.1	72.4	46.7	76.2	46.4	75.2	42.6	75.4	44.6
July	84.3	50.6	81.6	55.5	85.1	53.5	85.2	49.6	83.8	51.5
August	80.7	48.3	78.4	52.6	83.1	52.2	82.9	48.3	81.1	50.0
September	69.7	38.7	64.7	41.7	72.8	42.5	71.7	38.2	70.5	40.8
October	52.4	26.4	52.6	31.7	59.9	32.9	59.2	28.8	57.0	31.2
November	44.8	18.1	43.4	23.7	42.1	22.1	41.0	17.2	40.7	20.4
December	27.9	4.0	26.0	10.2	32.7	15.2	30.9	9.3	32.0	14.0
Comparison of Same Time Period										
Period of record:	7/07 - 11/07; 3/08 - 11/09									
January	31.8	5.6	30.1	12.3	-	-	35.2	10.2	33.7	13.0
February	34.1	9.8	32.7	15.6	-	-	40.0	15.3	35.4	17.9
March	35.9	11.9	34.6	17.4	-	-	40.3	15.0	40.5	19.0
April	47.3	22.7	45.1	25.1	-	-	49.8	24.3	49.7	25.3
May	61.1	34.4	58.8	36.9	-	-	62.9	35.6	62.9	36.4
June	70.4	41.1	68.0	44.1	-	-	71.8	42.5	72.9	42.5
July	84.3	50.6	81.5	54.9	-	-	85.8	51.0	86.0	51.4
August	80.7	48.3	78.3	52.7	-	-	82.5	48.2	82.5	49.0
September	69.7	38.7	67.7	43.4	-	-	72.8	38.9	72.1	40.4
October	52.4	26.4	50.3	29.9	-	-	54.8	27.8	54.6	28.8
November	44.8	18.1	43.1	23.2	-	-	48.9	19.4	46.7	22.8
December	27.9	4	26.7	8.4	-	-	30.6	7.5	31.2	12.5

"-" indicates data are unavailable for the time period (Muddy Gap station was discontinued in 2008).