

KARACHI, PAKISTAN

Latitude = 24.90 N

Longitude = 67.13 E

Period of Record = 1973 to 1996

WMO No. 417800

Elevation = 72 feet

Average Pressure = 29.68 inches Hg

Design Criteria Data

	Design Value	Mean Coincident (Average) Values			
		Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Dry Bulb Temperature (T)	(°F)				
Median of Extreme Highs	107	73	68	8.4	NW
0.4% Occurrence	102	74	80	9.2	W
1.0% Occurrence	99	74	89	8.5	W
2.0% Occurrence	97	75	96	8.4	W
Mean Daily Range	15	-	-	-	-
97.5% Occurrence	55	49	41	2.4	NE
99.0% Occurrence	52	46	35	2.4	NE
99.6% Occurrence	48	42	31	1.4	NE
Median of Extreme Lows	43	37	24	2.0	NE
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Wet Bulb Temperature (T_{wb})	(°F)				
Median of Extreme Highs	86	93	175	8.6	SW
0.4% Occurrence	84	92	162	8.8	SW
1.0% Occurrence	82	90	152	9.7	SW
2.0% Occurrence	82	90	152	9.7	SW
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Humidity Ratio (HR)	(gr/lb)				
Median of Extreme Highs	183	88	1.19	11.2	W
0.4% Occurrence	165	89	1.07	8.6	W
1.0% Occurrence	161	87	1.05	6.9	W
2.0% Occurrence	155	86	1.01	6.4	W
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		596	4987	4149	5200

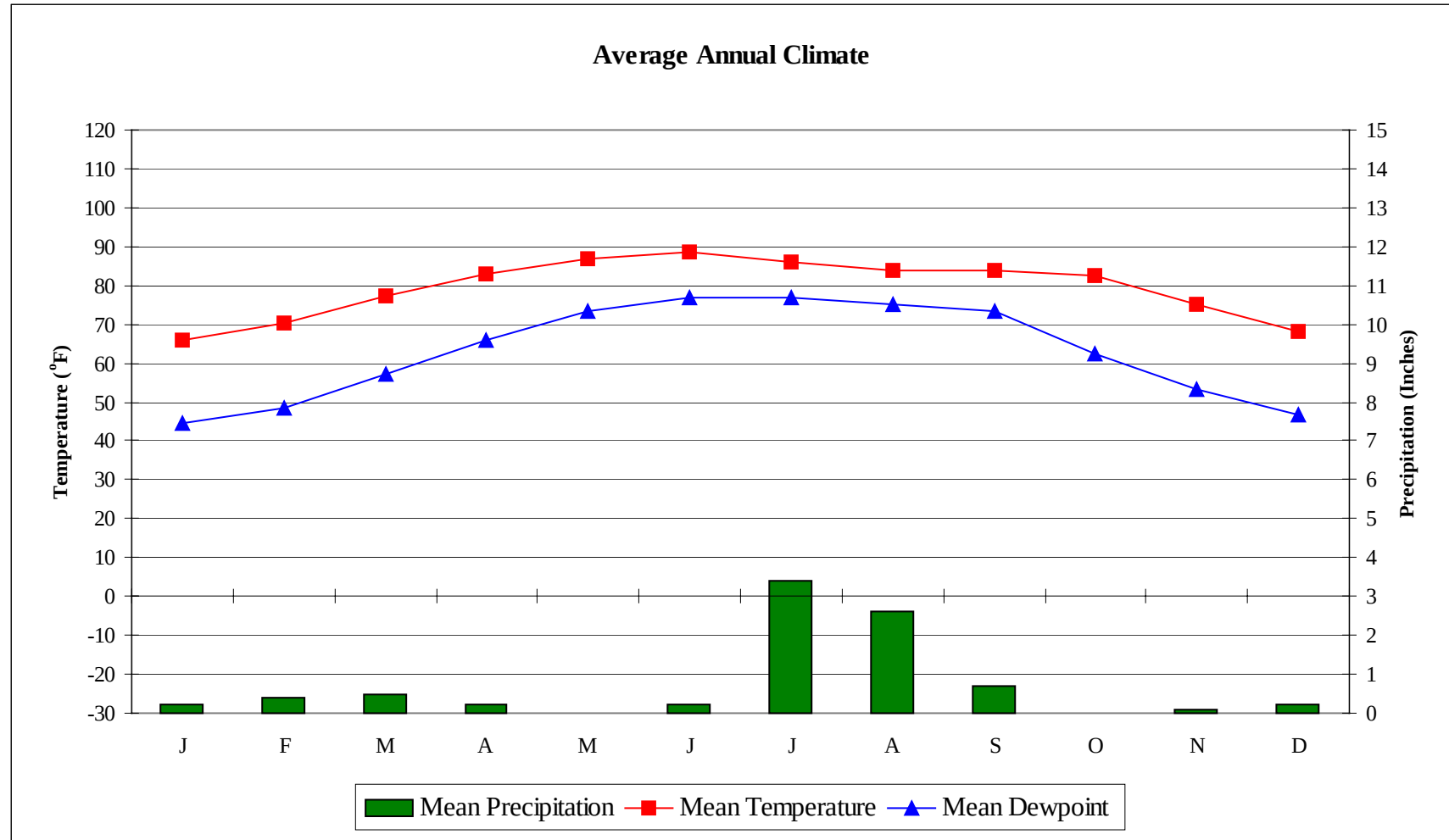
Other Site Data

Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
10	N/A	N/A	3.4 + 5.1
Ground Water Temperature (°F) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft ²)	Average Annual Freeze-Thaw Cycles (#)
81.8	N/A	N/A	0

*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

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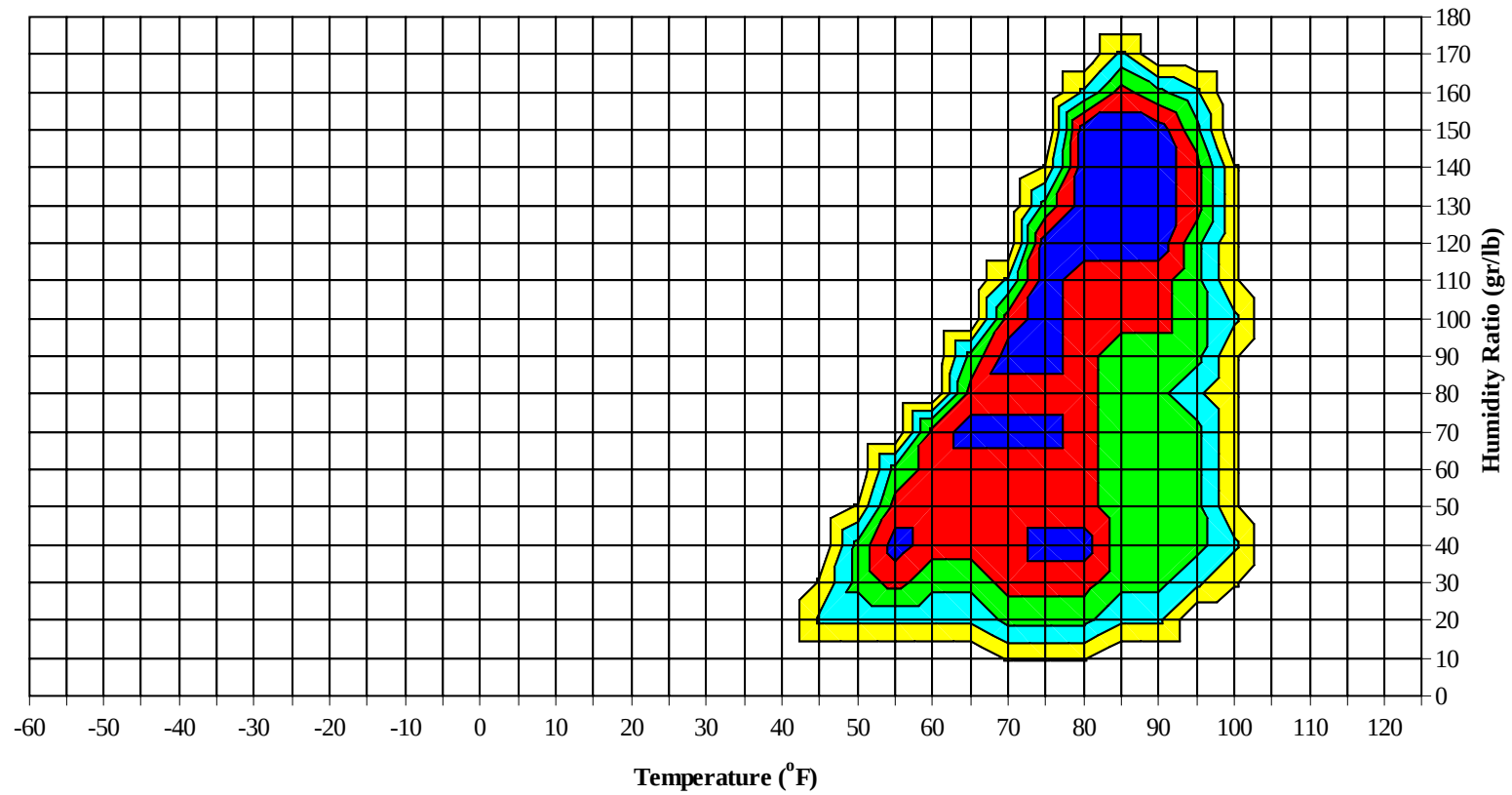
WMO No. 417800



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Long Term Psychrometric Summary

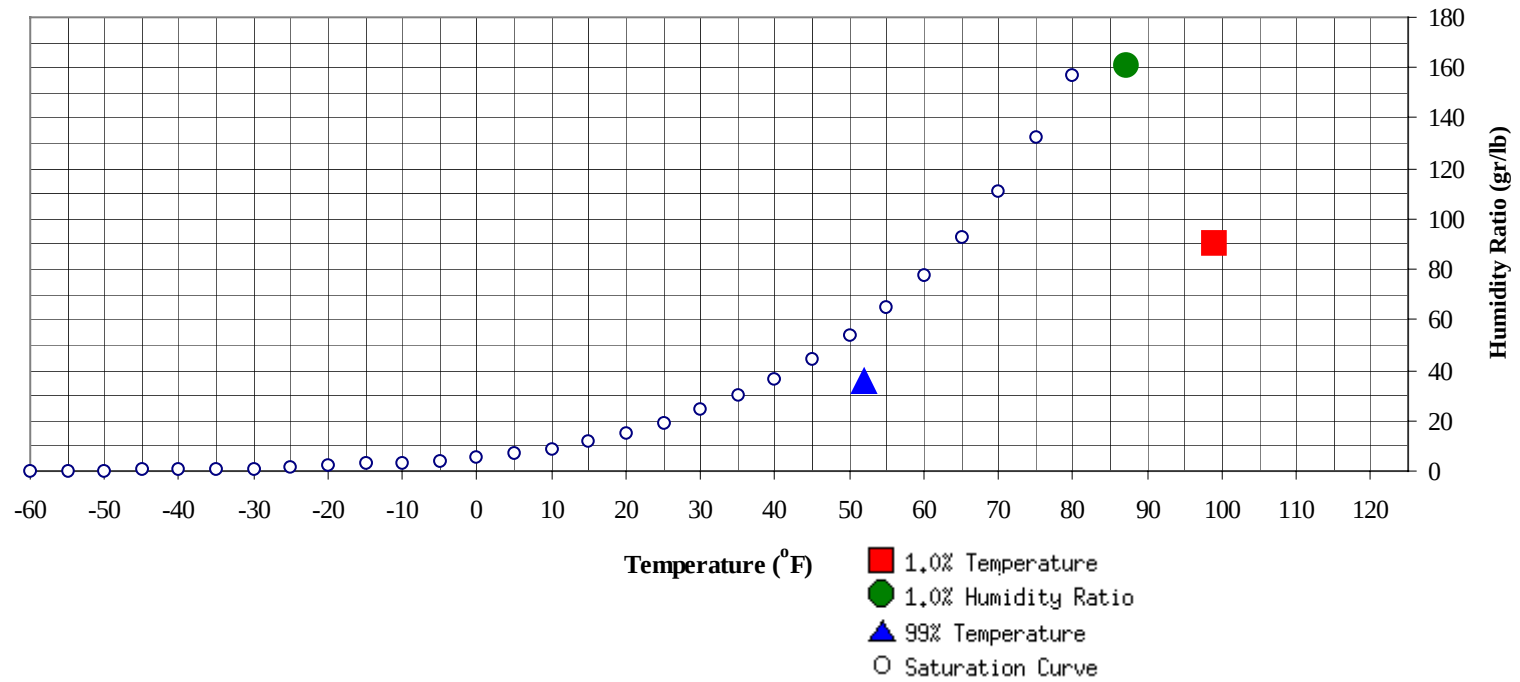


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

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Psychrometric Summary of Peak Design Values



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
99% Dry Bulb	52	35.4	18.0		161	87.2	82.2	80.5	46.2

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	99	90.5	74.4	38.0

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Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	January					February					March				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
115 / 119															
110 / 114															
105 / 109															
100 / 104															
95 / 99							0	0	0	68.0			1	0	1 68.8
90 / 94		0		0	65.0		6	1	7	64.5			12	2	14 68.3
85 / 89		1	0	1	63.8								49	15	64 68.0
80 / 84	0	37	9	47	61.6	0	17	5	22	62.4	0	58	25	84	67.1
75 / 79	1	84	52	137	59.2	0	61	29	90	61.8	1	75	61	139	66.9
70 / 74	4	73	60	137	57.3	1	72	56	129	60.9	3	34	77	145	66.9
65 / 69	12	25	44	81	56.8	18	40	67	124	60.8	33	12	57	168	65.1
60 / 64	47	17	48	113	54.3	31	14	36	81	58.7	99	4	8	65	60.7
55 / 59	86	7	29	123	50.6	71	12	23	106	56.0	53	1	3	46	56.6
50 / 54	72	3	6	81	46.4	43	15	0	16	51.3	43	1	3	46	56.6
45 / 49	23	0	0	23	41.8	74	2	6	83	51.4	15	1	0	16	51.3
40 / 44	2		0	2	35.9	25	0	1	26	46.3	1		0	1	47.2
35 / 39	0		0	0	35.3	4	0		4	40.3					
30 / 34	0		0	0	33.0	0			0	34.0					

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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Dry-Bulb Temperature Hours For An Average Year (Sheet 2 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	April					May					June				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
115 / 119													0		0 78.0
110 / 114							0		0	71.0		0	0	0	75.0
105 / 109		2	0	2	67.6		3	1	4	72.7		4	0	4	76.9
100 / 104		7	2	9	70.8	0	18	4	22	74.5	1	10	4	14	79.6
95 / 99	0	34	8	42	71.5	1	59	11	71	78.0	0	56	9	65	81.0
90 / 94	1	99	32	132	73.1	2	133	57	192	78.5	8	144	76	228	80.4
85 / 89	1	57	40	99	73.0	17	30	61	108	77.8	89	24	110	223	79.8
80 / 84	40	27	88	156	73.2	183	4	111	298	77.3	142	2	42	186	79.0
75 / 79	125	10	62	197	71.4	41	0	3	44	73.7	0	0	0	0	76.2
70 / 74	59	2	7	68	67.3	3	0	0	3	68.8					
65 / 69	11	1	0	12	60.9	1		0	1	64.6					
60 / 64	2		0	2	56.3										
55 / 59	0			0	54.7										
50 / 54															
45 / 49															
40 / 44															
35 / 39															
30 / 34															

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	July					August					September				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
115 / 119															
110 / 114															
105 / 109															
100 / 104	0	1	0	1	83.2	0			0	82.0	0	2	1	3	77.5
95 / 99	0	20	4	24	81.1	0	1	0	1	82.7	1	9	3	12	78.2
90 / 94	1	111	37	149	80.0	0	59	9	68	79.0	0	78	13	91	77.6
85 / 89	49	86	97	231	79.4	4	106	60	169	78.2	2	98	56	155	77.0
80 / 84	187	28	104	318	78.7	209	79	172	459	77.4	148	50	151	350	76.2
75 / 79	11	2	6	18	76.3	35	3	8	46	75.9	84	2	16	102	74.3
70 / 74	1		1	2	71.3	1	0	0	1	69.5	4	1	0	5	70.6
65 / 69						0			0		1		0	1	62.1
60 / 64											0			0	61.0
55 / 59															
50 / 54															
45 / 49															
40 / 44															
35 / 39															
30 / 34															

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Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	October					November					December				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
115 / 119															
110 / 114															
105 / 109		0		0	68.5										
100 / 104		13	2	15	69.6		0	0	0	67.3					
95 / 99	0	49	12	61	69.3	0	10	1	11	66.1					
90 / 94	0	97	39	136	70.8	0	54	12	66	66.4			1	1	62.9
85 / 89	1	52	43	96	73.0	0	61	22	83	66.1		12	3	15	64.0
80 / 84	39	24	84	147	73.0	1	67	58	126	65.5	0	79	26	104	62.3
75 / 79	93	9	49	151	70.4	11	24	56	91	65.5	0	81	54	135	60.4
70 / 74	69	3	17	89	64.5	47	14	51	112	63.3	7	40	55	102	59.1
65 / 69	28	1	3	32	60.2	61	4	22	88	59.9	13	16	40	69	57.5
60 / 64	17			17	56.8	82	4	15	101	56.3	73	12	48	133	55.1
55 / 59	0			0	56.0	32	1	2	35	50.4	96	6	17	119	50.9
50 / 54						6	0	0	6	45.1	44	2	4	50	45.9
45 / 49											14	0	1	15	41.1
40 / 44											2			2	36.8
35 / 39															
30 / 34															

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Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1996

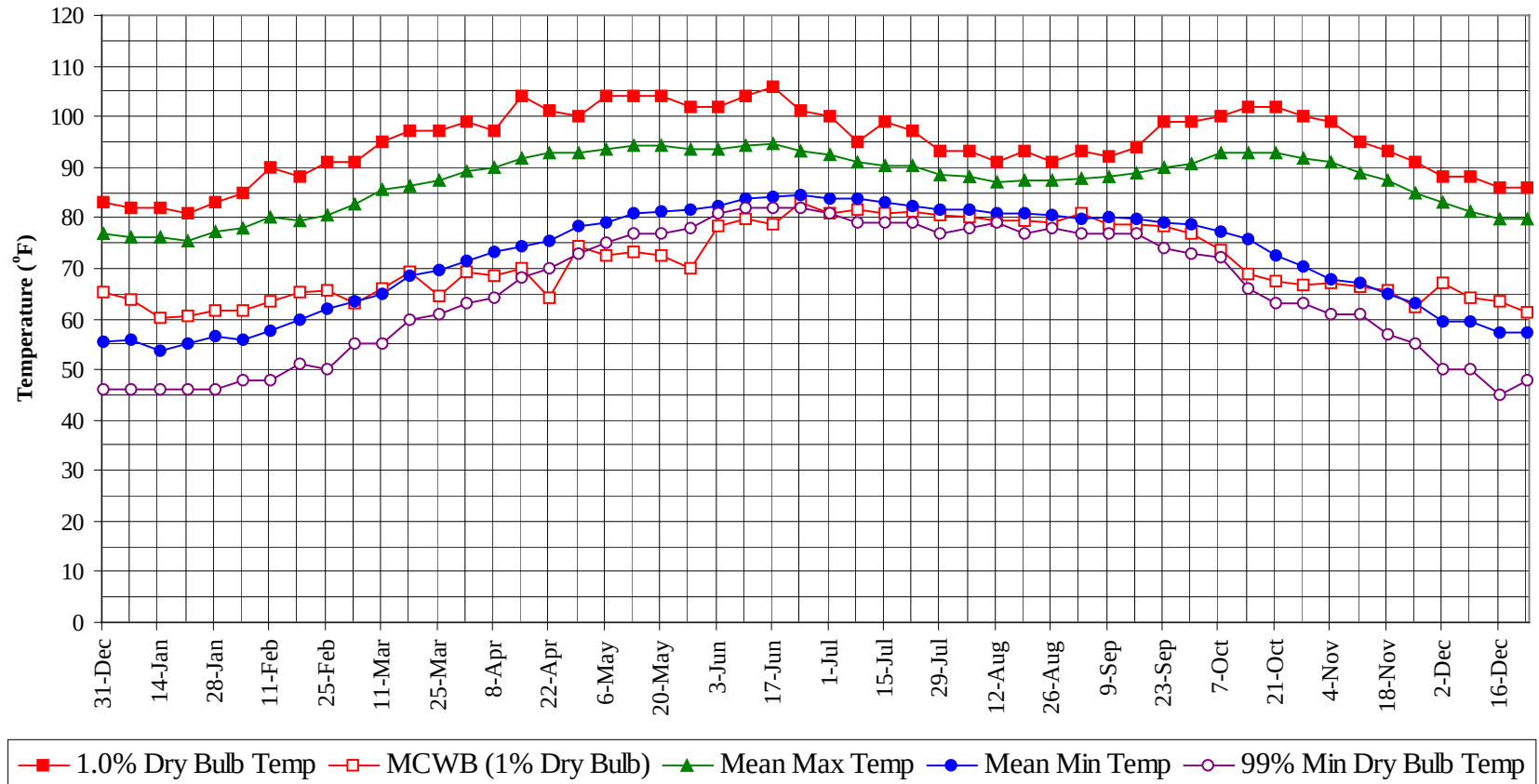
Annual Totals						
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	
	01 To 08	09 To 16	17 To 00			
115 / 119	0			0	78.0	
110 / 114	1			0	1	73.0
105 / 109	10			2	12	73.1
100 / 104	2	54	12	68	74.1	
95 / 99	3	253	51	307	75.4	
90 / 94	12	838	292	1141	76.1	
85 / 89	164	597	519	1281	75.8	
80 / 84	964	530	926	2420	74.3	
75 / 79	438	320	442	1201	67.2	
70 / 74	313	182	318	813	62.4	
65 / 69	211	65	155	431	58.9	
60 / 64	333	46	137	516	55.6	
55 / 59	296	17	54	367	50.9	
50 / 54	141	5	11	157	46.2	
45 / 49	39	1	1	41	41.4	
40 / 44	4		0	4	36.3	
35 / 39	0		0	0	35.3	
30 / 34	0			0	33.0	

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

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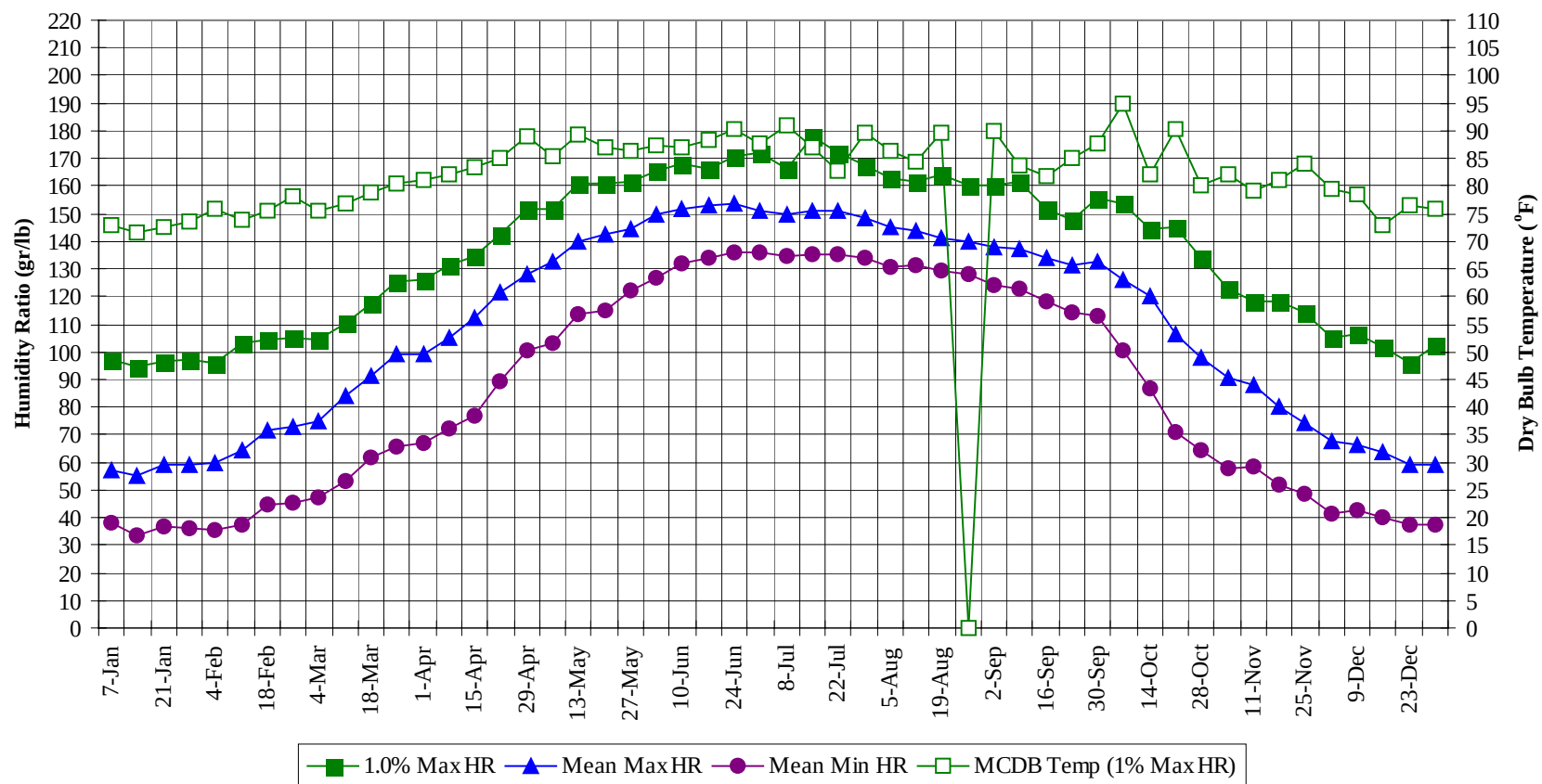
Annual Summary of Temperatures



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Long Term Humidity and Dry Bulb Temperature Summary

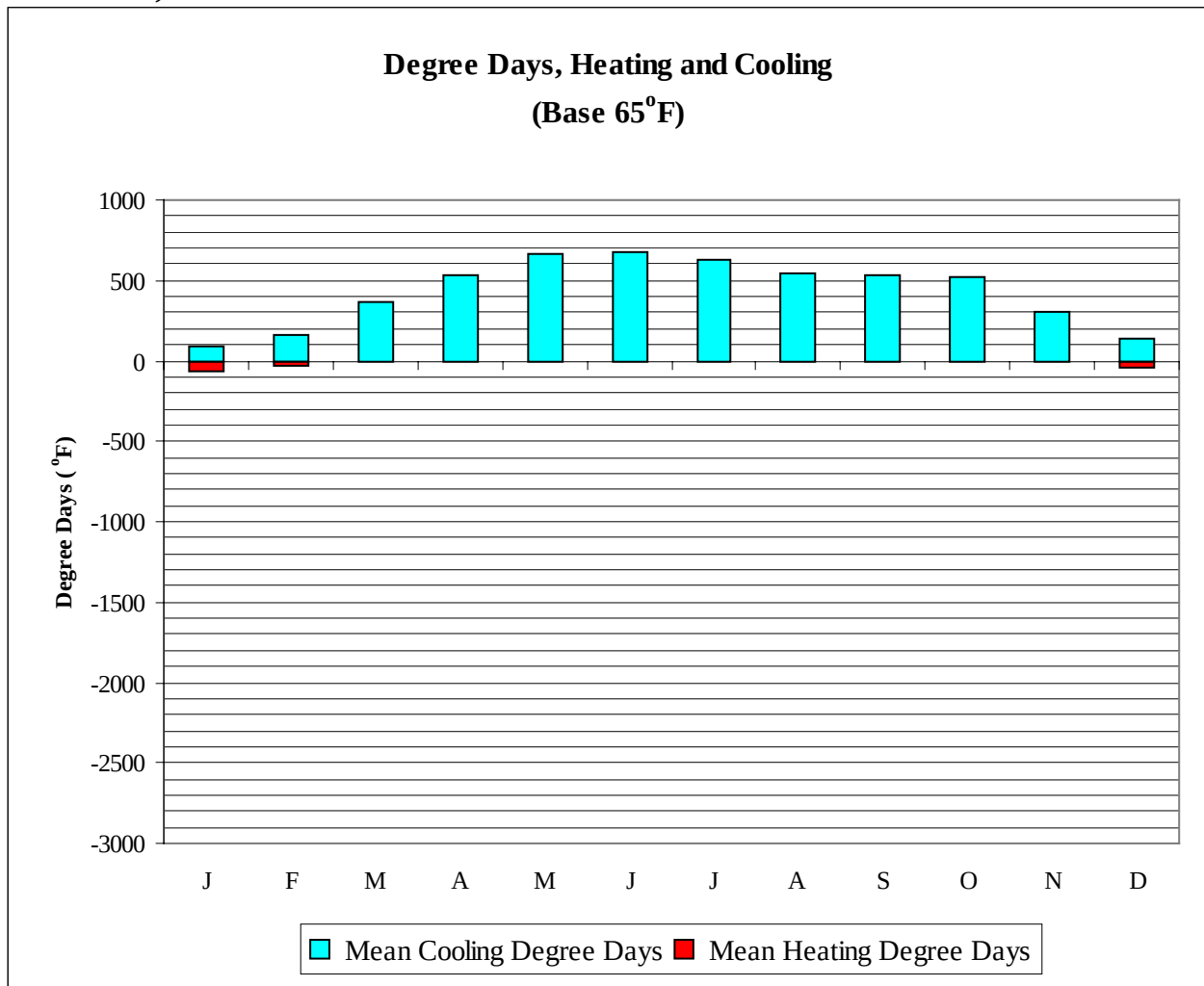


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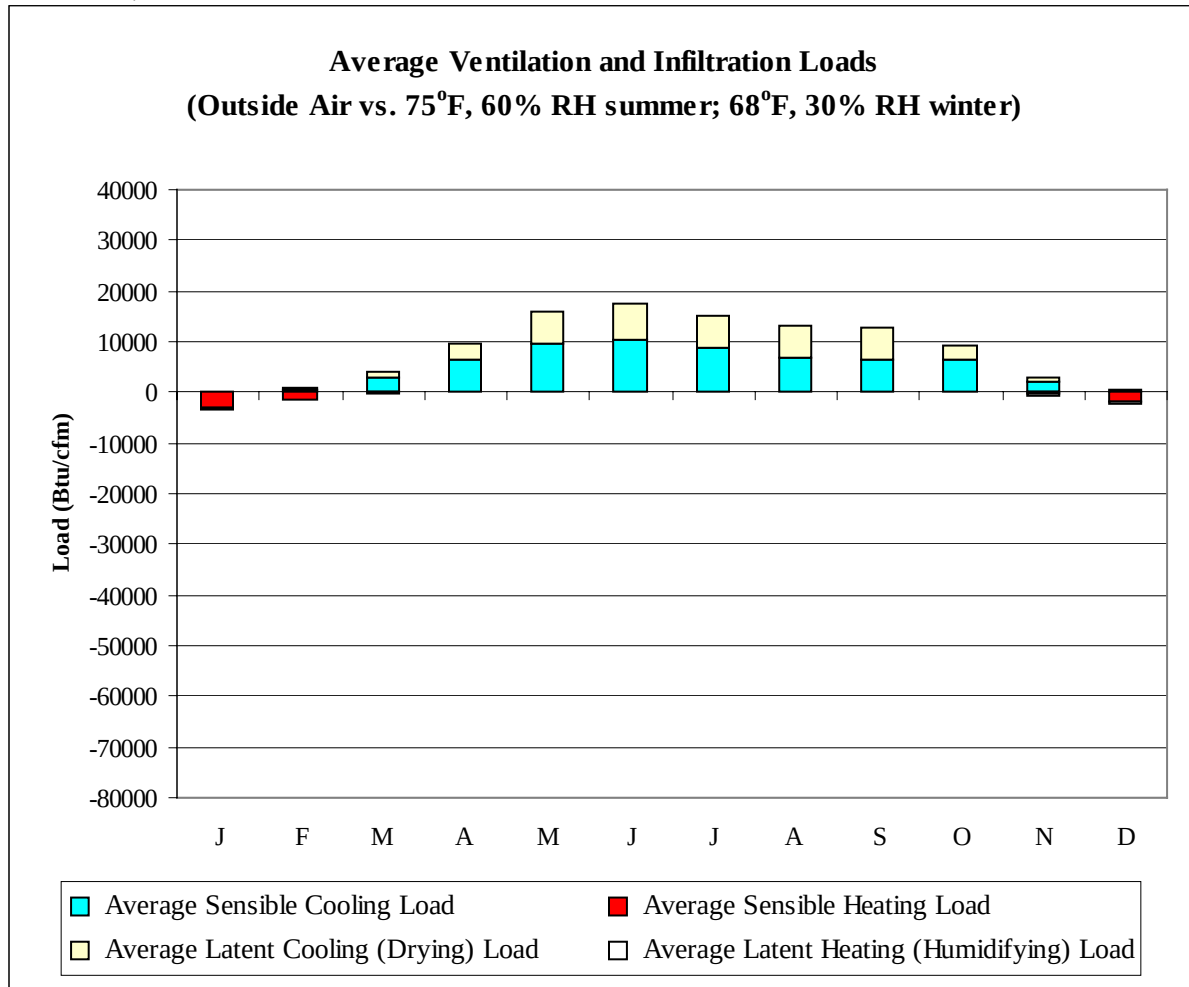
WMO No. 417800

Long Term Dry Bulb Temperature and Humidity Summary

Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	82.0	64.0	76.3	55.9	46.0	97.3	72.8	57.2	38.3
14-Jan	82.0	60.2	76.2	53.6	46.0	94.5	71.5	55.1	33.7
21-Jan	81.0	60.7	75.5	55.1	46.0	96.6	72.6	58.9	36.9
28-Jan	83.0	61.7	77.2	56.4	46.0	97.3	73.5	58.8	36.3
4-Feb	85.0	61.5	78.0	55.7	48.0	95.9	75.8	59.5	35.2
11-Feb	90.0	63.5	80.0	57.7	48.0	102.9	74.0	64.7	37.4
18-Feb	88.0	65.4	79.5	59.7	51.0	104.3	75.4	71.6	44.8
25-Feb	91.0	65.5	80.7	62.1	50.0	105.0	78.3	73.2	45.2
4-Mar	91.0	63.3	82.8	63.3	55.0	104.3	75.6	74.6	47.1
11-Mar	95.0	65.8	85.5	65.0	55.0	110.6	76.9	83.8	53.5
18-Mar	97.0	69.2	86.3	68.4	60.0	117.6	78.8	91.6	61.7
25-Mar	97.0	64.6	87.5	69.4	61.0	125.3	80.3	99.4	65.8
1-Apr	99.0	69.2	89.1	71.2	63.0	126.0	81.0	99.5	66.9
8-Apr	97.0	68.7	89.9	73.1	64.0	131.6	82.0	104.9	72.1
15-Apr	104.0	69.8	91.9	74.2	68.0	134.4	83.3	112.6	77.0
22-Apr	101.0	64.0	92.9	75.6	70.0	142.8	85.1	121.8	89.4
29-Apr	100.0	74.4	92.8	78.3	73.0	151.9	89.0	128.2	100.4
6-May	104.0	72.3	93.6	78.9	75.0	151.9	85.5	132.4	102.9
13-May	104.0	73.2	94.4	80.8	77.0	161.0	89.2	140.2	113.3
20-May	104.0	72.4	94.1	81.3	77.0	161.0	87.0	142.8	114.6
27-May	102.0	70.0	93.6	81.5	78.0	161.7	86.3	144.8	122.2
3-Jun	102.0	78.1	93.4	82.4	81.0	165.2	87.3	149.5	126.9
10-Jun	104.0	79.7	94.1	83.6	82.0	168.0	87.0	151.8	132.3
17-Jun	106.0	78.6	94.5	84.3	82.0	165.9	88.3	152.7	133.8
24-Jun	101.0	83.0	93.3	84.3	82.0	170.8	90.3	153.7	136.2
1-Jul	100.0	81.0	92.3	83.7	81.0	172.2	87.8	151.2	135.7
8-Jul	95.0	81.5	91.2	83.7	79.0	165.9	91.0	149.7	134.9
15-Jul	99.0	80.9	90.3	83.0	79.0	177.8	87.0	151.2	135.1
22-Jul	97.0	81.3	90.1	82.4	79.0	172.2	82.8	151.3	135.0
29-Jul	93.0	80.6	88.5	81.5	77.0	167.3	89.5	148.2	134.0
5-Aug	93.0	80.2	87.9	81.5	78.0	163.1	86.5	145.0	130.9
12-Aug	91.0	79.6	87.2	80.9	79.0	161.7	84.3	143.5	131.4
19-Aug	93.0	79.5	87.3	80.8	77.0	164.5	89.7	141.0	129.2
26-Aug	91.0	79.1	87.4	80.6	78.0	160.0	.	140.0	128.2
2-Sep	93.0	80.9	87.7	79.9	77.0	160.3	90.0	137.7	124.1
9-Sep	92.0	78.5	87.9	80.0	77.0	161.7	83.7	137.6	123.0
16-Sep	94.0	78.5	88.9	79.7	77.0	151.9	81.8	133.7	118.3
23-Sep	99.0	78.3	89.9	79.1	74.0	147.7	85.1	131.6	114.2
30-Sep	99.0	76.9	90.7	78.6	73.0	155.4	87.7	132.7	112.8
7-Oct	100.0	73.5	92.7	77.3	72.0	154.0	95.0	126.2	100.3
14-Oct	102.0	68.8	92.8	75.9	66.0	144.2	82.0	120.3	86.7
21-Oct	102.0	67.4	92.9	72.4	63.0	144.9	90.3	106.5	70.9
28-Oct	100.0	66.7	91.8	70.5	63.0	133.7	80.2	97.7	64.6
4-Nov	99.0	67.2	91.2	67.6	61.0	122.5	82.0	91.0	58.0
11-Nov	95.0	66.4	88.8	66.9	61.0	118.3	79.0	87.9	58.5
18-Nov	93.0	65.7	87.2	65.0	57.0	118.3	81.0	80.1	52.1
25-Nov	91.0	62.2	84.8	63.0	55.0	114.1	84.0	74.3	48.7
2-Dec	88.0	67.0	83.2	59.3	50.0	105.0	79.4	67.6	41.4
9-Dec	88.0	64.4	81.3	59.3	50.0	106.4	78.5	66.5	42.6
16-Dec	86.0	63.4	79.8	57.1	45.0	101.5	73.0	64.0	40.1
23-Dec	86.0	61.3	79.8	57.3	48.0	95.9	76.5	59.1	37.2
31-Dec	83.0	65.3	76.7	55.5	46.0	102.2	75.9	59.1	37.1



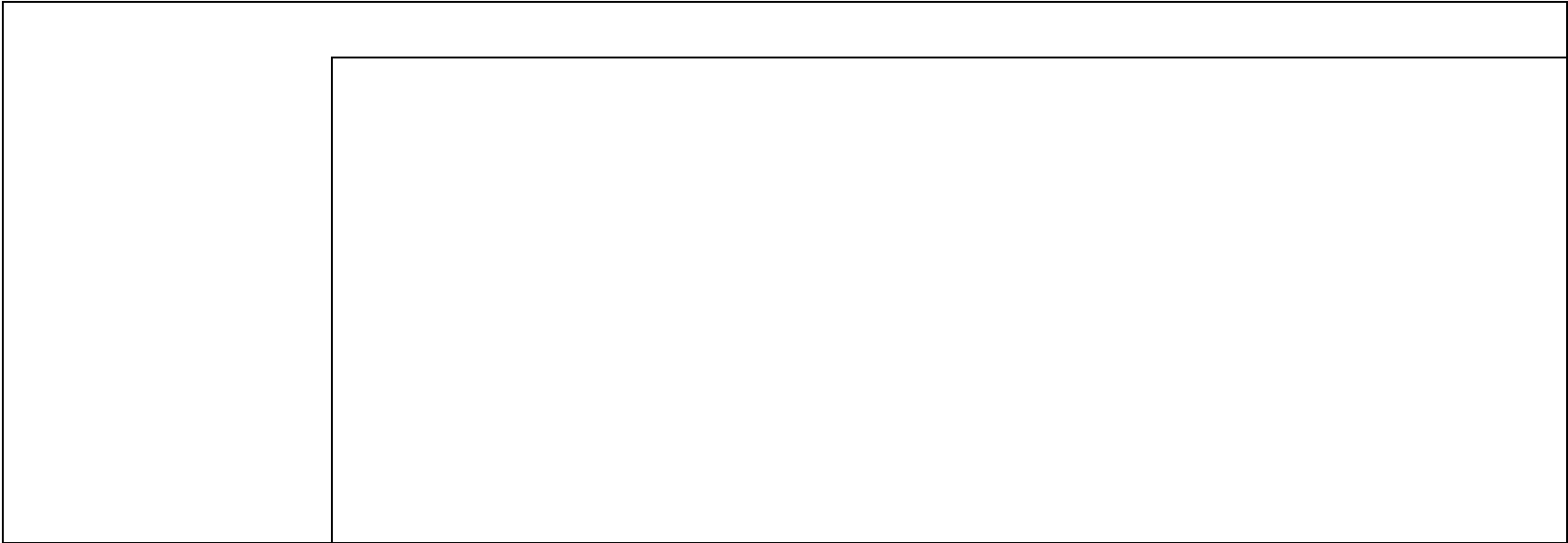
	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	93	67
FEB	166	25
MAR	362	4
APR	532	0
MAY	661	0
JUN	682	0
JUL	634	0
AUG	548	0
SEP	532	0
OCT	515	0
NOV	304	8
DEC	139	46
ANN	5169	150



	Average Sensible Cooling Load	Average Sensible Heating Load	Average Latent Cooling Load	Average Latent Heating Load
	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)
JAN	222	-3056	102	-196
FEB	634	-1268	225	-130
MAR	2820	-243	1145	-56
APR	6471	-10	3320	-16
MAY	9434	0	6326	-2
JUN	10215	0	7254	0
JUL	8727	0	6548	0
AUG	6770	0	6303	0
SEP	6637	0	6036	0
OCT	6366	-38	3019	-14
NOV	2239	-435	686	-68
DEC	528	-2016	143	-132
ANN	61063	-7066	41107	-614

Average Annual Solar Radiation – Nearest Available Site
(Source: National Renewable Energy Laboratory, Golden CO, 1995)

No Solar Radiation
Data Available

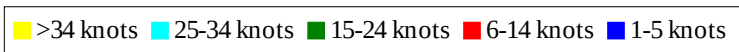
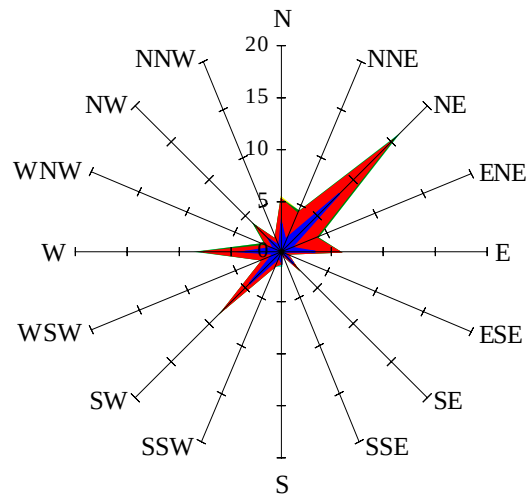


Average Annual Solar Heat and Illumination – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

Wind Summary - December, January, and February

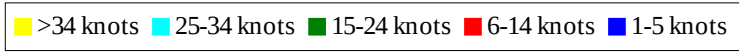
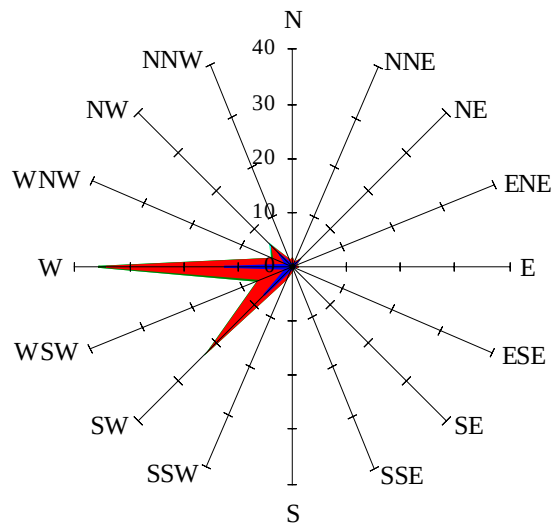
Labels of Percent Frequency on North Axis



Percent Calm = 36.48

Wind Summary - March, April, and May

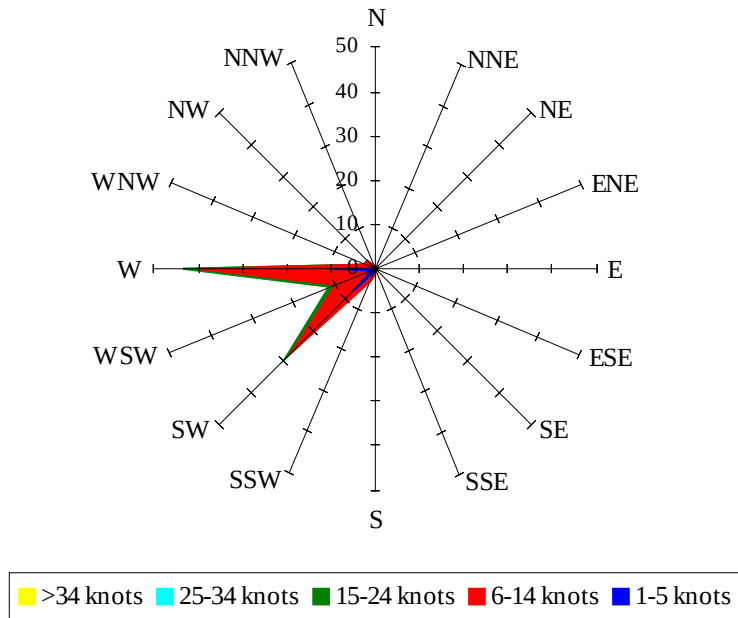
Labels of Percent Frequency on North Axis



Percent Calm = 16.29

Wind Summary - June, July, and August

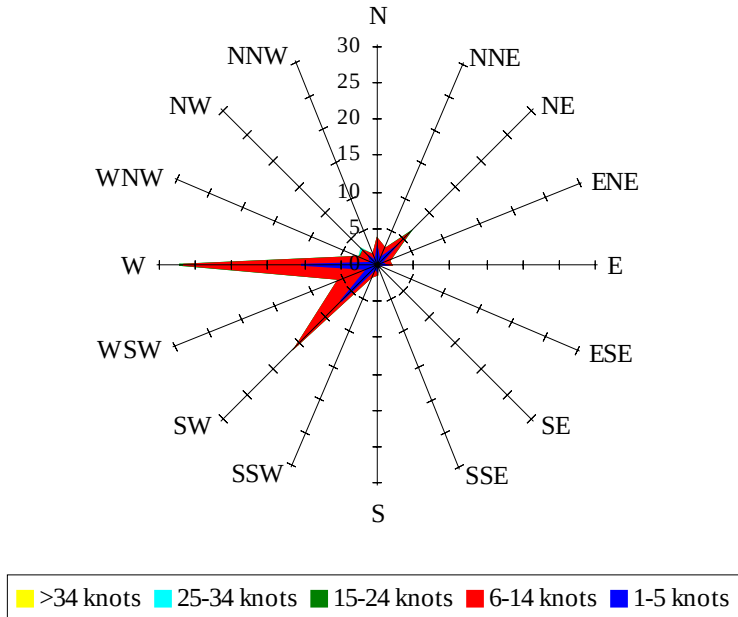
Labels of Percent Frequency on North Axis



Percent Calm = 4.21

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 25.12