

OSLO, NORWAY	
Latitude = 59.90 N	WMO No. 014880
Longitude = 10.62 E	Elevation = 56 feet
Period of Record = 1973 to 1996	Average Pressure = 29.77 inches Hg

Design Criteria Data

	Design Value	Mean Coincident (Average) Values			
		Wet Bulb Temperature (oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Dry Bulb Temperature (T)	(oF)				
Median of Extreme Highs	84	65	61	6.8	S
0.4% Occurrence	81	63	59	6.7	S
1.0% Occurrence	77	62	57	7.3	S
2.0% Occurrence	74	60	55	7.0	S
Mean Daily Range	13	-	-	-	-
97.5% Occurrence	11	11	8	2.0	N
99.0% Occurrence	5	5	6	1.4	N
99.6% Occurrence	0	0	5	1.3	N
Median of Extreme Lows	-2	-2	4	1.3	N
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Wet Bulb Temperature (Twb)	(oF)				
Median of Extreme Highs	68	79	83	5.8	S
0.4% Occurrence	66	76	77	5.9	S
1.0% Occurrence	64	73	73	5.8	S
2.0% Occurrence	62	70	68	5.8	S
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (oF)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Humidity Ratio (HR)	(gr/lb)				
Median of Extreme Highs	88	68	0.59	4.2	S
0.4% Occurrence	85	69	0.57	4.3	S
1.0% Occurrence	78	68	0.53	4.1	S
2.0% Occurrence	74	67	0.50	4.1	S
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93oF	T ≥ 80oF	Twb ≥ 73oF	Twb ≥ 67oF
		0	45	0	22

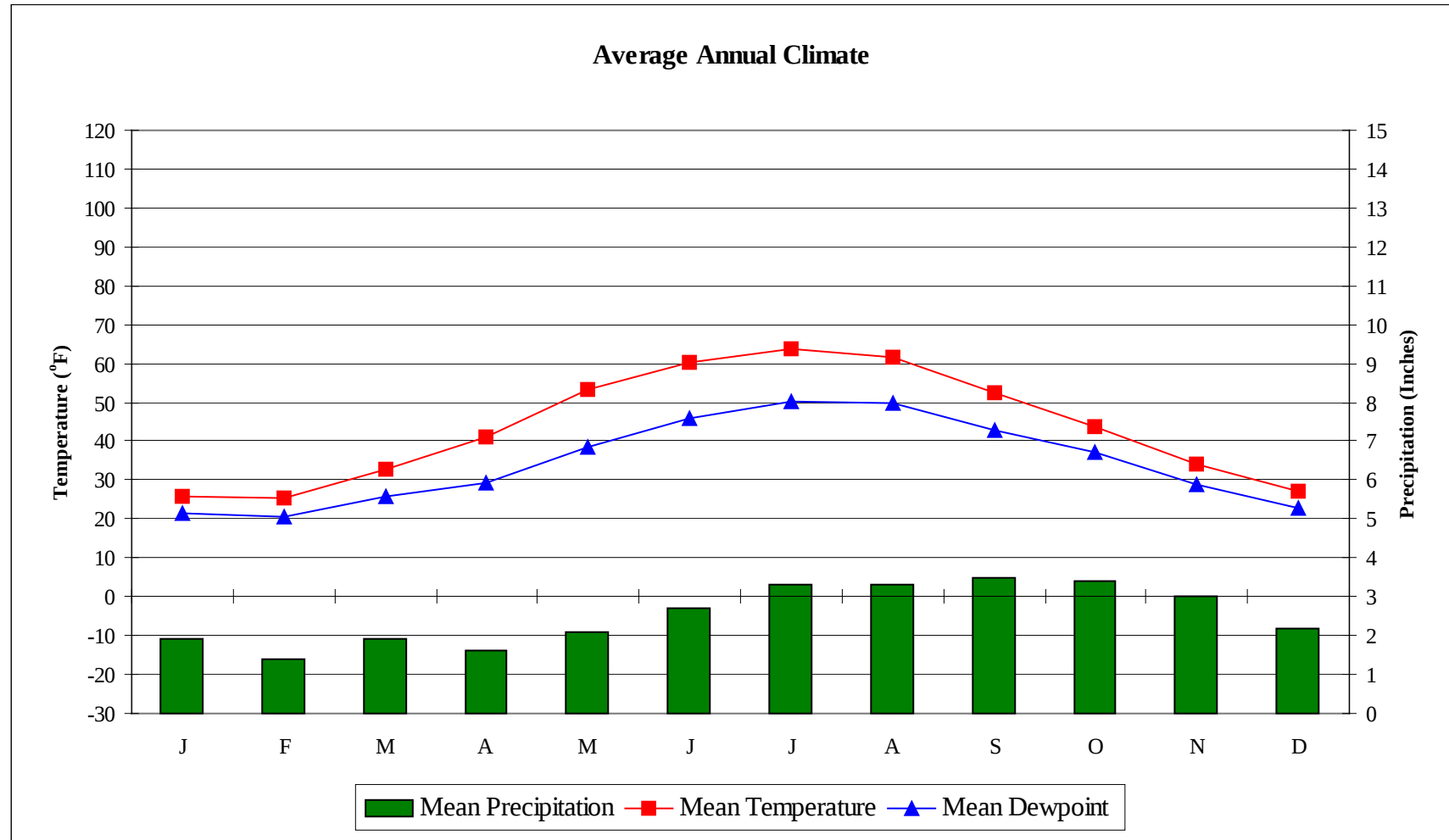
Other Site Data

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 75oF-RH 60% Latent + Sensible
5	N/A	N/A	0.0 + 0.0
Ground Water Temperature (oF) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft2)	Average Annual Freeze-Thaw Cycles (#)
46.0	N/A	N/A	66

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

OSLO, NORWAY

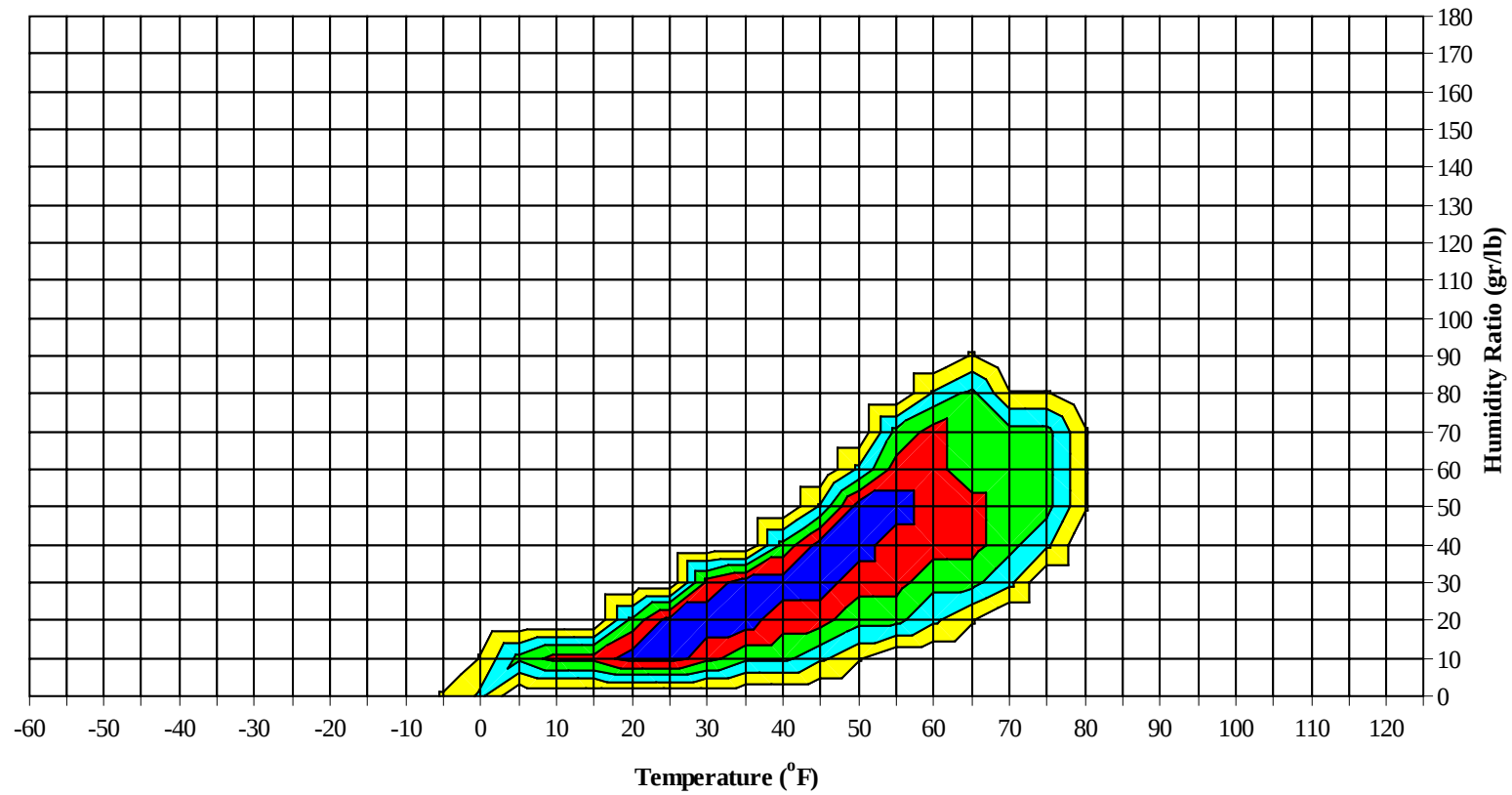
WMO No. 014880



OSLO, NORWAY

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Long Term Psychrometric Summary

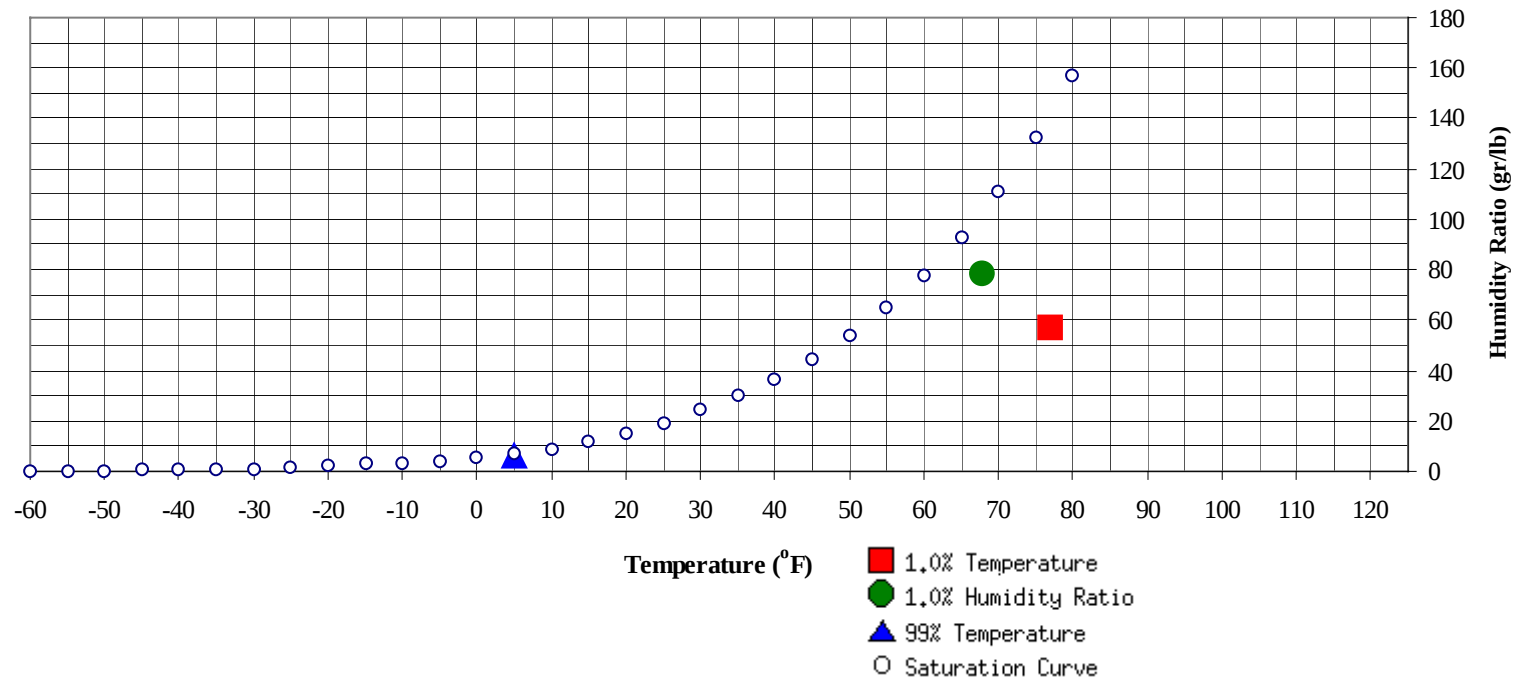


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

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Psychrometric Summary of Peak Design Values



99% Dry Bulb	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
	5	6.1	2.1		78.4	67.9	63.2	60.5	28.5

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	77	56.8	61.6	27.4

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

Period of Record = 1973 to 1996

Temperature Range (oF)	January					February					March				
	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)
	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		
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74															
65 / 69															
60 / 64												0 0		0	49.6
55 / 59											0	2	1	3	45.3
50 / 54	0	1	1	2	43.2	0	2	1	3	43.1	0	6	3	9	42.3
45 / 49		3	5	4	12 40.5	3	6	4	13	40.9		2	19	12	33 39.6
40 / 44		10	13	12	35 38.3		6	11	9	26 38.0		10	32	24	66 37.1
35 / 39		29	34	31	94 34.7		20	33	28	81 34.8		42	77	74	194 34.0
30 / 34		53	60	57	170 30.8		37	46	46	129 30.3		94	73	83	250 30.5
25 / 29		44	48	44	136 25.4		41	48	48	137 25.2		49	25	31	106 25.1
20 / 24		30	28	30	88 21.1		33	31	30	94 20.9		20	7	9	36 20.7
15 / 19		31	26	29	86 16.9		32	25	28	85 16.7		16	5	7	28 16.6
10 / 14		21	18	18	57 11.6		20	10	16	46 11.7		7	1	2	10 11.6
5 / 9		13	9	13	35 6.6		15	6	8	29 6.6	4	0	1	5	6.5
0 / 4		7	4	6	17 1.2		9	3	4	16 1.4	2	0	0	2	1.3
-5 / -1		4	2	1	7 -3.2	4	1	2	7	-3.2	1			1	-2.7
-10 / -6	1	1	1	3	-7.8	3	1	1	5	-7.4	0			0	-6.5
-15 / -11	0	0		0	-11.9	1	0	0	1	-11.7					
-20 / -16	0			0	-15.0	0			0	-15.0					

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 (oF)	April					May					June				
	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)
	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		
90 / 94											0			0	67.5
85 / 89											1	0		1	66.7
80 / 84							1 1		2	60.5		7 4		11	62.8
75 / 79	0			0	60.0		6	5	11	58.6	0	21	16	37	60.7
70 / 74		1 1		2	56.3	0	18	12	30	56.0	2	32	24	58	58.1
65 / 69		2	1	3	52.7	1	20	13	34	53.8	7	36	27	70	55.9
60 / 64		6	4	10	49.3	6	45	34	85	51.5	33	66	58	157	53.9
55 / 59	1	16	12	29	45.9	27	59	55	141	48.7	78	55	69	201	51.6
50 / 54	3	36	25	64	42.7	57	59	64	180	46.1	86	20	35	141	48.5
45 / 49	18	62	53	133	40.1	85	29	45	159	42.7	29	3	6	38	44.1
40 / 44	39	54	51	144	37.8	42	7	14	63	38.6	4	0	0	4	40.1
35 / 39	81	49	64	194	34.2	25	3	6	34	35.3	1		0	1	36.9
30 / 34	69	14	27	110	29.9	4	0	0	4	30.4					
25 / 29	27	1	3	31	25.3	0			0	24.0					
20 / 24	2		0	2	20.5										
15 / 19	0			0	17.9										
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															

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

Period of Record = 1973 to 1996

Temperature Range (oF)	July					August					September				
	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)
	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		
90 / 94		0		0	69.0		1	0	1	67.1					
85 / 89		1	0	1	66.6		2	1	3	66.4					
80 / 84		11	7	18	64.0	0		6	3	9	64.5				
75 / 79	0	31	19	50	62.1	0		19	11	30	62.1	1	0	1	61.1
70 / 74	4	56	40	100	59.6	2		38	26	66	59.5		2	1	3
65 / 69	13	58	47	118	57.9		8	51	35	94	57.7	0	11	4	15
60 / 64	75	64	79	218	56.3		50	81	80	211	56.1	5	49	26	80
55 / 59	107	26	49	182	53.2		96	44	67	208	53.3	40	87	77	205
50 / 54	44	2	7	53	49.0		68	6	22	96	49.0	68	60	75	204
45 / 49	5		0	5	44.7		21	0	3	24	44.7	61	25	40	126
40 / 44	0			0	38.3		3		0	3	40.7	37	4	11	52
35 / 39							0			0	37.5	22	1	5	28
30 / 34						0				0	33.0	6	0		6
25 / 29												0		0	
20 / 24															28.3
15 / 19															
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															

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OSLO, NORWAY

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

Period of Record = 1973 to 1996

Temperature Range (oF)	October					November					December				
	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)	Hour Group (LST)			Total Obs	M C W B (oF)
	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		
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74															
65 / 69		0	0	0	53.7										
60 / 64		3	1	4	51.2										
55 / 59	5	25	11	41	50.4		0 0		0	49.5		0	0		45.0
50 / 54	30	61	52	143	47.6	3	9	6	18	46.9	0	0	1	1	42.5
45 / 49	61	72	72	206	43.5	18	25	22	65	42.9	4	6	5	15	40.8
40 / 44	48	39	42	129	39.5	25	33	30	88	39.2	15	17	13	45	38.8
35 / 39	52	34	43	129	35.3	45	59	50	154	35.1	26	34	31	91	34.7
30 / 34	33	11	21	65	30.8	69	65	68	201	30.5	56	59	60	175	30.6
25 / 29	14	2	6	22	26.0	47	34	41	122	25.6	56	59	56	171	25.6
20 / 24	3 0	1		4	21.3	19	11	12	42	21.1	31	28	30	89	21.2
15 / 19	1	0		1	18.2	10	4	9	23	16.8	29	23	25	77	16.9
10 / 14						3	1	2	6	12.3	14	12	12	38	11.8
5 / 9						0	0	0		8.1	9	7	8	24	6.5
0 / 4											5	3	5	13	1.5
-5 / -1											2	1	1	4	-2.8
-10 / -6											0	0	0	0	-6.7
-15 / -11															
-20 / -16															

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

Period of Record = 1973 to 1996

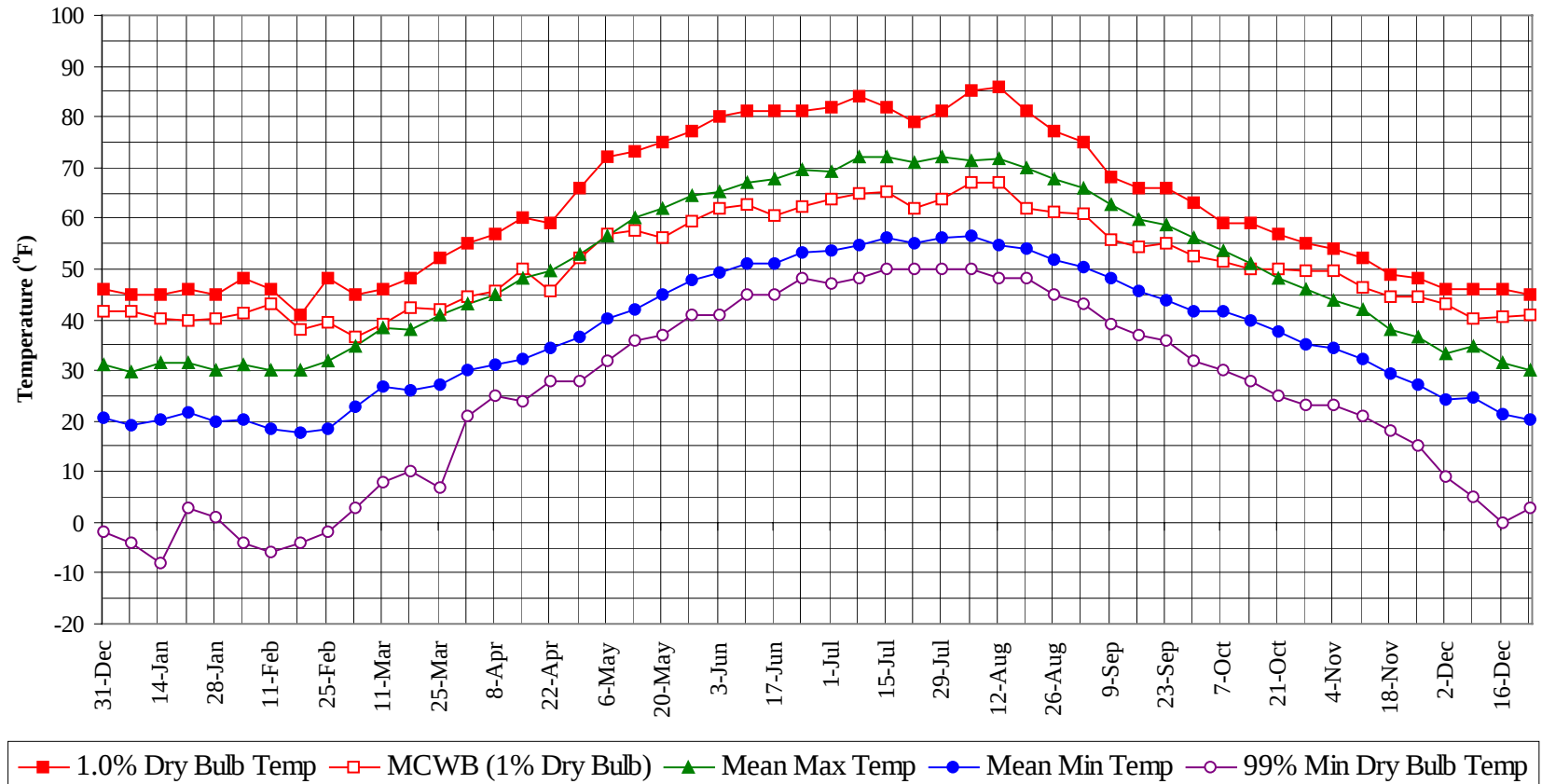
Annual Totals					
Temperature Range (oF)	Hour Group (LST)			Total Obs	M C W B (oF)
	01 To 08	09 To 16	17 To 00		
90 / 94		1 0		1	67.2
85 / 89		3 2		5	66.5
80 / 84	0	25	15	40	63.6
75 / 79	1	77	50	128	61.4
70 / 74	8	146	103	257	58.8
65 / 69	29	179	127	335	56.8
60 / 64	167	315	282	764	54.8
55 / 59	351	314	339	1004	51.5
50 / 54	359	263	291	913	47.2
45 / 49	311	252	269	832	42.5
40 / 44	240	211	207	658	38.6
35 / 39	346	322	333	1001	34.7
30 / 34	421	327	363	1110	30.5
25 / 29	278	216	229	723	25.4
20 / 24	140	105	111	355	21.0
15 / 19	119	83	97	299	16.8
10 / 14	67	43	51	161	11.7
5 / 9	43	23	31	97	6.6
0 / 4	23	10	15	48	1.3
-5 / -1	10	3 5		18	-3.1
-10 / -6	5	2	2	9	-7.5
-15 / -11	1	0	0	1	-11.8
-20 / -16	0			0	-15.0

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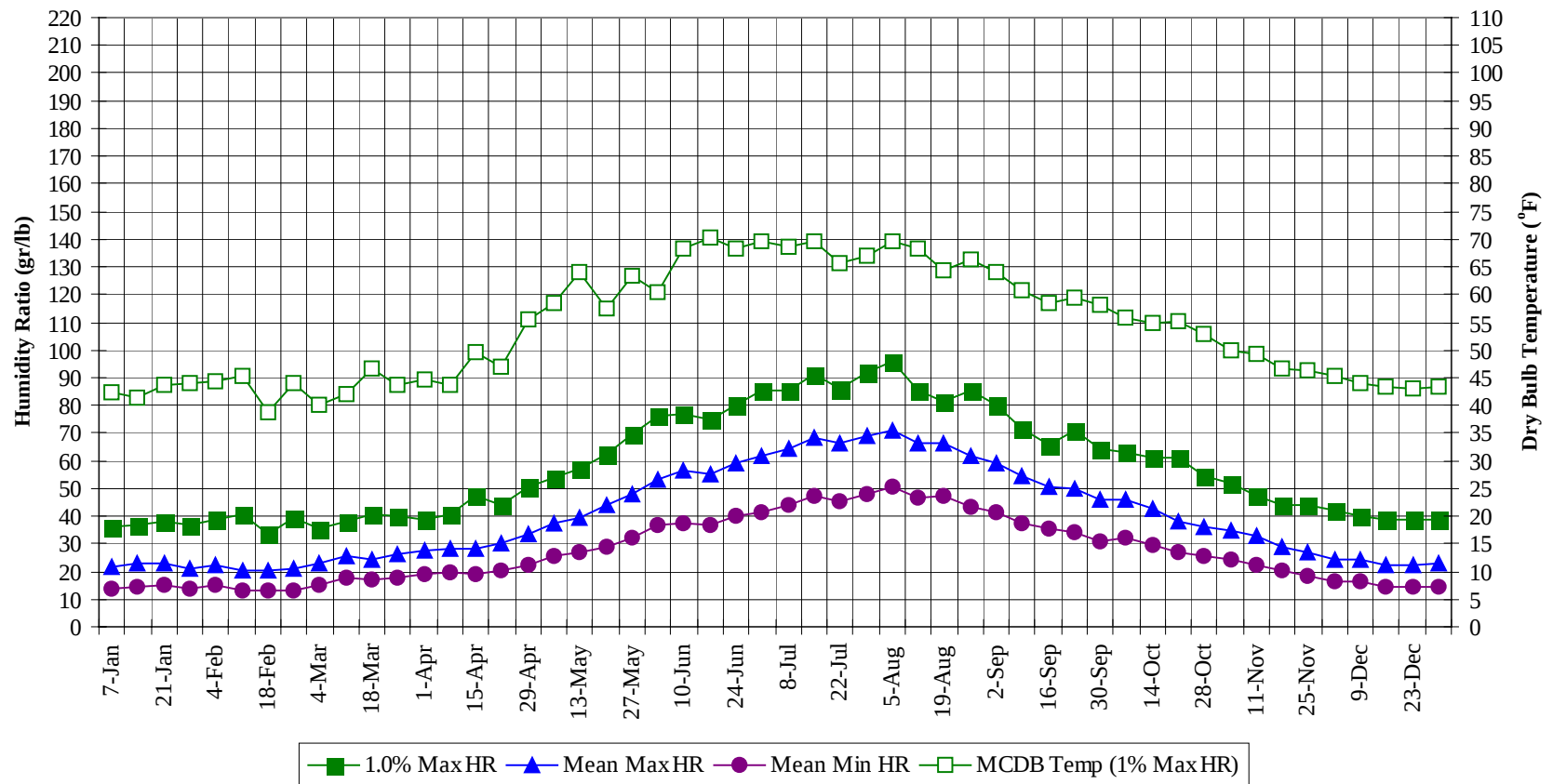
Annual Summary of Temperatures



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Long Term Humidity and Dry Bulb Temperature Summary

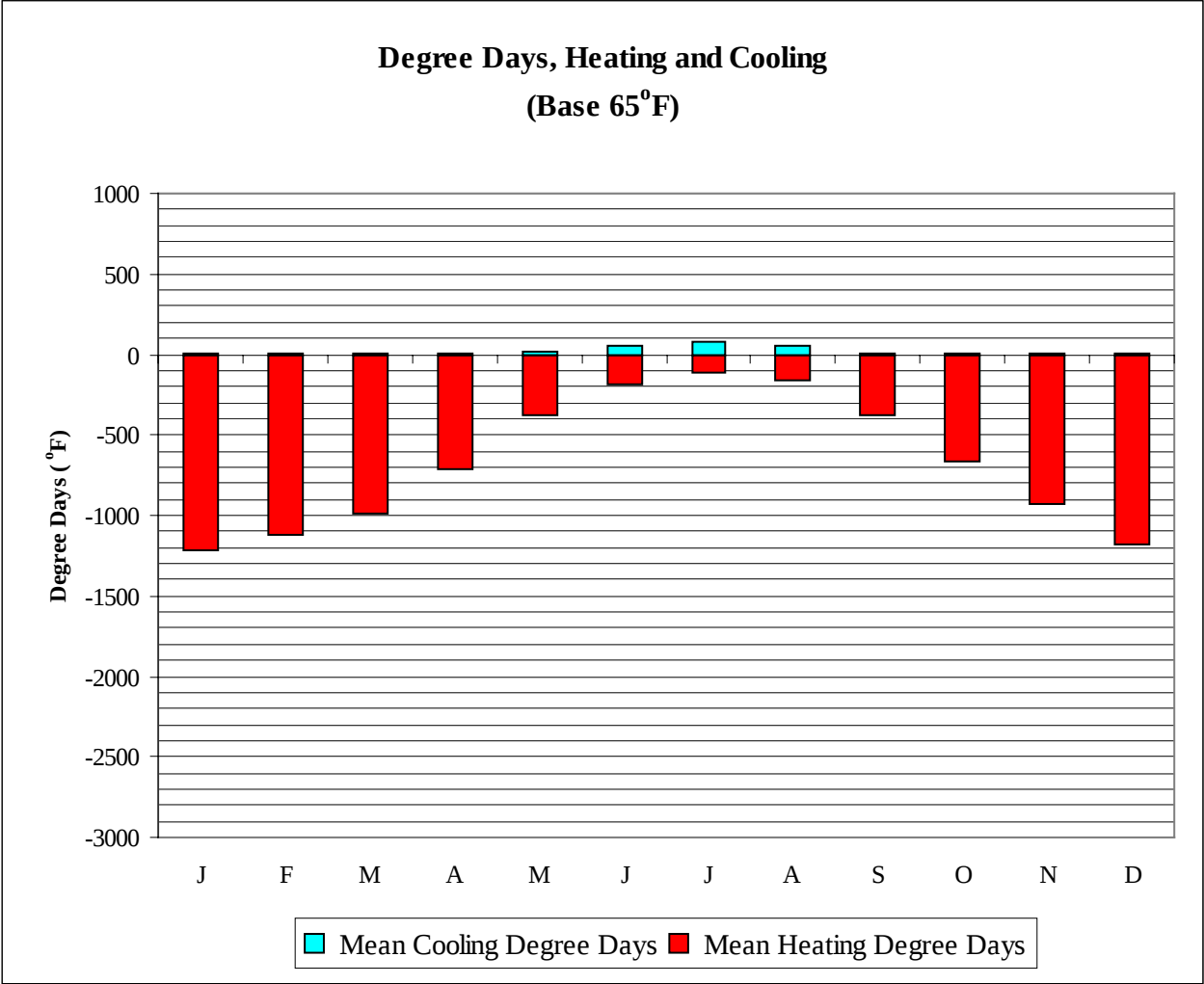


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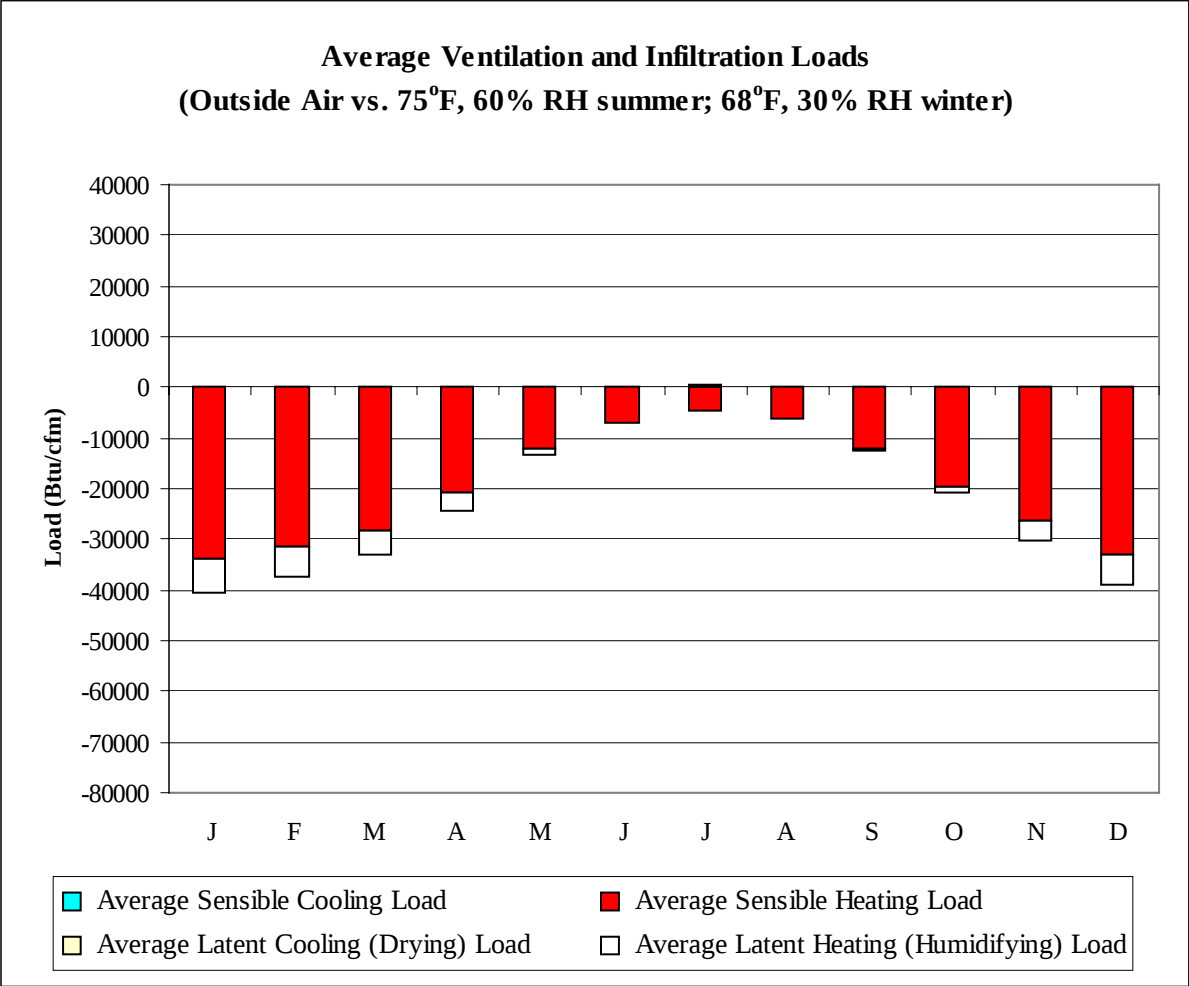
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Long Term Dry Bulb Temperature and Humidity Summary

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	45.0	41.5	29.8	19.3	-4.0	36.4	42.5	21.6	13.7
14-Jan	45.0	40.3	31.6	20.3	-8.0	37.1	41.5	23.0	14.3
21-Jan	46.0	39.7	31.5	21.8	3.0	37.8	43.8	22.8	15.2
28-Jan	45.0	40.2	30.1	19.9	1.0	37.1	44.1	21.0	13.8
4-Feb	48.0	41.4	31.1	20.1	-4.0	38.5	44.3	22.1	14.8
11-Feb	46.0	43.1	30.1	18.5	-6.0	40.6	45.5	20.2	13.2
18-Feb	41.0	38.2	30.0	17.6	-4.0	33.6	38.8	20.4	12.9
25-Feb	48.0	39.4	31.9	18.4	-2.0	39.2	44.0	21.0	12.9
4-Mar	45.0	36.6	34.9	22.6	3.0	35.7	40.1	22.9	15.1
11-Mar	46.0	38.9	38.4	26.7	8.0	37.8	42.1	25.5	17.5
18-Mar	48.0	42.4	38.1	25.9	10.0	40.6	46.8	24.1	17.0
25-Mar	52.0	42.2	40.8	27.1	7.0	39.9	43.8	26.5	17.9
1-Apr	55.0	44.5	43.2	29.9	21.0	38.5	44.6	27.4	18.8
8-Apr	57.0	45.7	45.0	31.3	25.0	40.6	43.6	28.0	19.7
15-Apr	60.0	50.0	48.1	32.0	24.0	47.6	49.6	28.5	18.9
22-Apr	59.0	45.6	49.7	34.4	28.0	44.1	46.9	30.1	20.1
29-Apr	66.0	52.1	53.0	36.5	28.0	50.4	55.4	33.4	22.3
6-May	72.0	57.0	56.6	40.1	32.0	53.9	58.3	37.5	25.9
13-May	73.0	57.5	60.2	42.2	36.0	57.4	64.0	39.6	27.2
20-May	75.0	56.1	61.9	44.7	37.0	62.3	57.5	43.7	29.1
27-May	77.0	59.3	64.6	47.8	41.0	69.3	63.5	47.9	32.1
3-Jun	80.0	61.8	65.0	49.1	41.0	76.3	60.5	53.1	36.6
10-Jun	81.0	62.8	67.0	50.9	45.0	77.0	68.4	56.5	37.6
17-Jun	81.0	60.3	67.8	51.1	45.0	74.9	70.2	55.0	36.6
24-Jun	81.0	62.4	69.7	53.1	48.0	79.8	68.1	59.1	39.8
1-Jul	82.0	63.8	69.1	53.7	47.0	85.4	69.6	61.8	41.7
8-Jul	84.0	64.8	72.1	54.7	48.0	85.4	68.6	64.1	44.1
15-Jul	82.0	65.3	72.0	56.0	50.0	91.0	69.5	68.4	47.4
22-Jul	79.0	62.0	70.8	55.2	50.0	86.1	65.6	66.2	45.5
29-Jul	81.0	63.9	72.1	56.1	50.0	91.7	66.9	68.7	48.2
5-Aug	85.0	67.0	71.5	56.4	50.0	95.9	69.8	70.8	50.3
12-Aug	86.0	67.0	71.6	54.7	48.0	85.4	68.4	66.1	46.7
19-Aug	81.0	62.1	70.0	54.1	48.0	81.2	64.5	66.5	47.1
26-Aug	77.0	61.1	67.7	51.8	45.0	85.4	66.2	62.0	43.2
2-Sep	75.0	60.8	65.8	50.2	43.0	79.8	64.1	59.1	41.1
9-Sep	68.0	55.9	62.6	48.3	39.0	71.4	60.7	54.3	37.4
16-Sep	66.0	54.4	59.7	45.7	37.0	65.8	58.5	50.8	35.4
23-Sep	66.0	54.9	58.6	43.9	36.0	70.7	59.6	49.9	34.1
30-Sep	63.0	52.5	56.0	41.7	32.0	64.4	58.0	46.1	30.7
7-Oct	59.0	51.4	53.6	41.6	30.0	63.0	55.9	46.0	32.5
14-Oct	59.0	49.9	51.2	39.8	28.0	60.9	54.9	43.0	29.8
21-Oct	57.0	49.9	48.1	37.5	25.0	60.9	55.2	38.4	27.0
28-Oct	55.0	49.7	45.8	35.1	23.0	54.6	53.0	36.3	25.7
4-Nov	54.0	49.6	44.0	34.5	23.0	51.8	50.1	34.8	24.0
11-Nov	52.0	46.4	41.8	32.2	21.0	47.6	49.2	32.8	22.0
18-Nov	49.0	44.4	38.2	29.4	18.0	44.1	46.6	29.1	20.4
25-Nov	48.0	44.4	36.4	27.3	15.0	44.1	46.3	26.9	18.1
2-Dec	46.0	43.2	33.2	24.1	9.0	42.0	45.4	24.0	16.6
9-Dec	46.0	40.1	34.6	24.6	5.0	39.9	43.9	24.6	16.4
16-Dec	46.0	40.7	31.6	21.4	0.0	38.5	43.5	22.4	14.6
23-Dec	45.0	41.0	30.2	20.1	3.0	38.5	43.0	22.3	14.2
31-Dec	46.0	41.7	31.0	20.6	-2.0	38.5	43.2	22.8	14.7



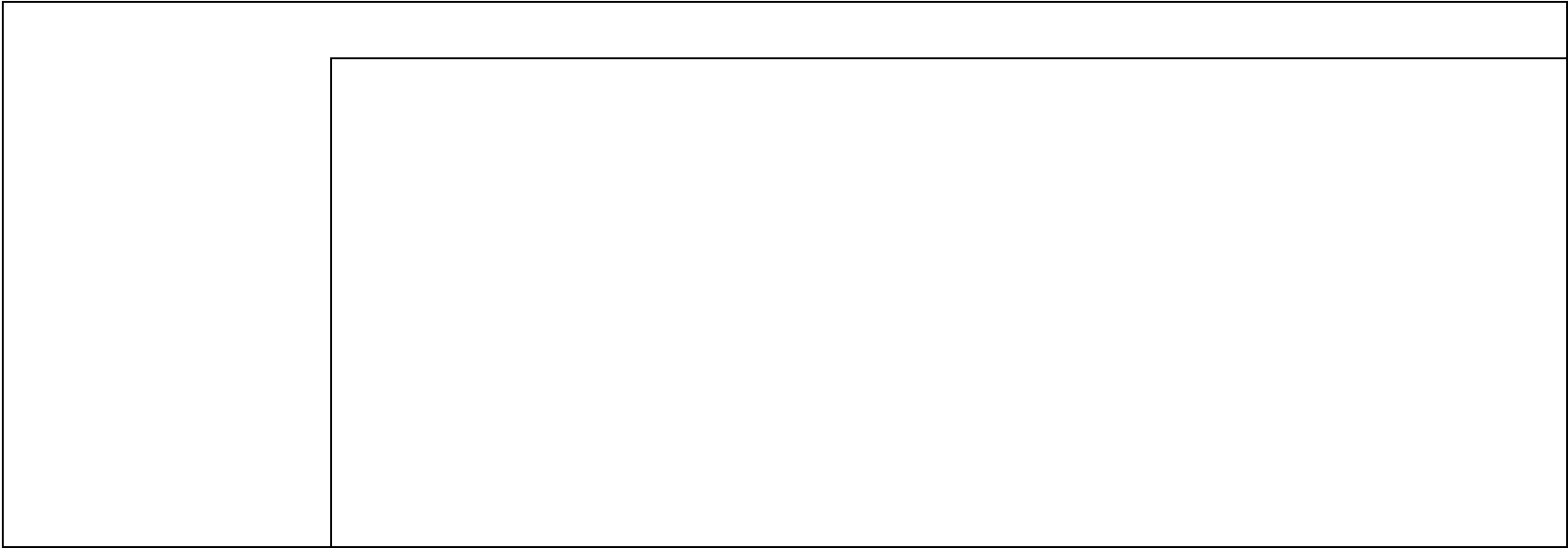
	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1219
FEB	0	1125
MAR	0	994
APR	0	715
MAY	17	383
JUN	48	191
JUL	72	112
AUG	48	161
SEP	2	377
OCT	0	660
NOV	0	930
DEC	0	1179
ANN	188	8046



	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	0	-34009	0	-6506
FEB	0	-31351	0	-6142
MAR	0	-28184	0	-4910
APR	0	-20857	0	-3451
MAY	26	-12150	1	-1142
JUN	160	-6799	29	-173
JUL	218	-4551	144	-50
AUG	164	-6063	100	-41
SEP	1	-12066	0	-459
OCT	0	-19526	0	-1438
NOV	0	-26430	0	-3727
DEC	0	-32982	0	-6035
ANN	569	-234968	274	-34074

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

No Solar Radiation
Data Available

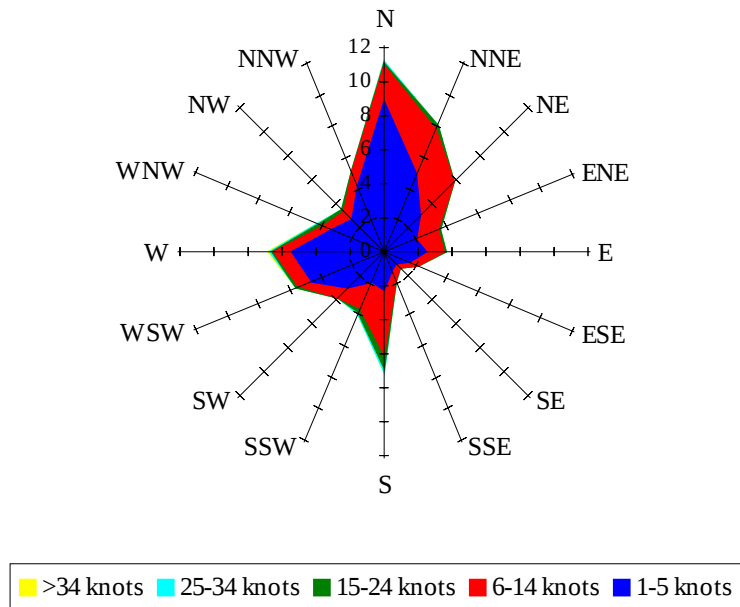


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

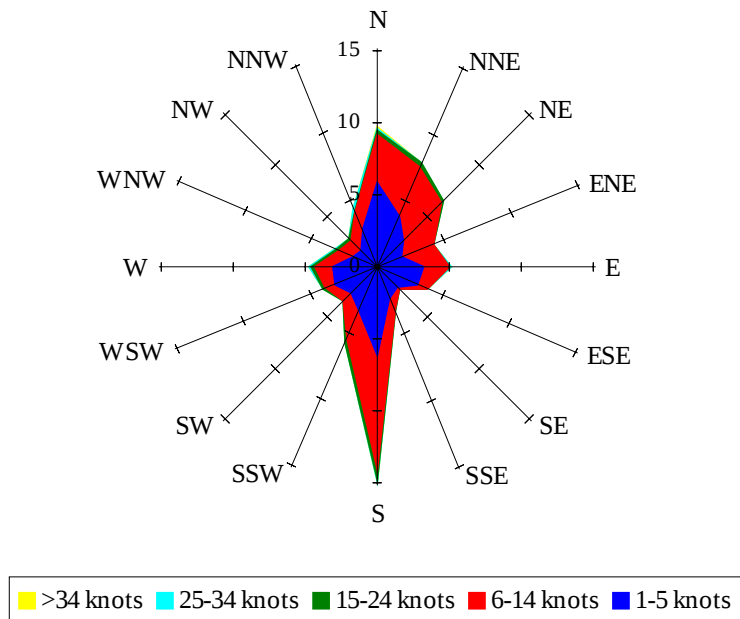
Labels of Percent Frequency on North Axis



Percent Calm = 22.78

Wind Summary - March, April, and May

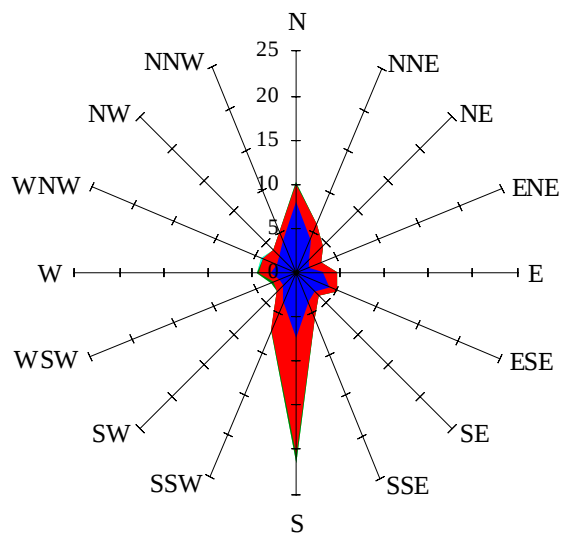
Labels of Percent Frequency on North Axis



Percent Calm = 15.19

Wind Summary - June, July, and August

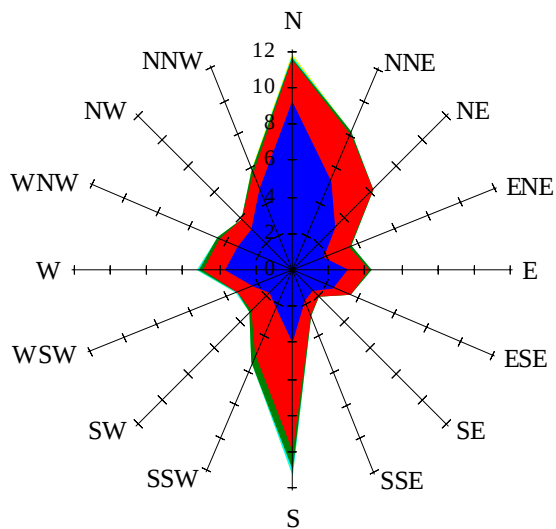
Labels of Percent Frequency on North Axis



Percent Calm = 8.47

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 15.85