

VOLKEL, NETHERLANDS

Latitude = 51.65 N

Longitude = 5.70 E

Period of Record = 1973 to 1996

WMO No. 063750

Elevation = 69 feet

Average Pressure = 29.89 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	89	69	74	9.2	E
0.4% Occurrence	84	67	74	8.4	E
1.0% Occurrence	81	66	73	8.3	E
2.0% Occurrence	77	64	69	8.1	E
Mean Daily Range	14	-	-	-	-
97.5% Occurrence	26	25	17	7.1	ENE
99.0% Occurrence	21	20	13	6.9	ENE
99.6% Occurrence	16	15	10	7.5	ENE
Median of Extreme Lows	12	12	9	6.6	ENE
	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	73	85	100	7.1	WSW
0.4% Occurrence	69	80	87	7.8	E
1.0% Occurrence	67	76	82	7.3	E
2.0% Occurrence	66	75	80	7.4	W
	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	104	78	0.70	6.6	E
0.4% Occurrence	94	75	0.63	6.7	W
1.0% Occurrence	88	71	0.59	6.3	WSW
2.0% Occurrence	84	70	0.57	6.3	SW
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		2	101	4	120

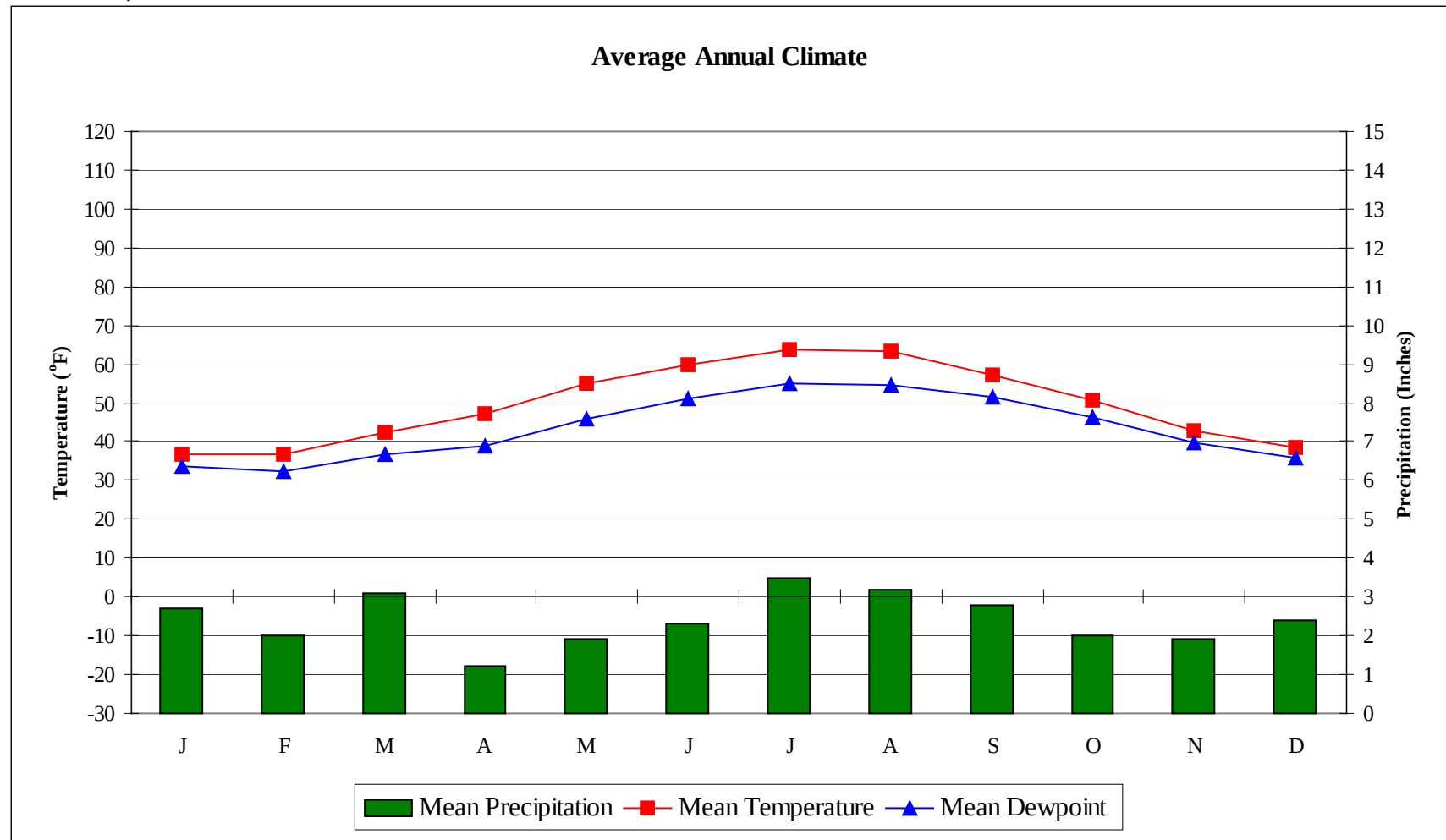
Other Site Data

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
6	N/A	N/A	0.1 + 0.1
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 (#)
52.1	N/A	N/A	36

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

VOLKEL, NETHERLANDS

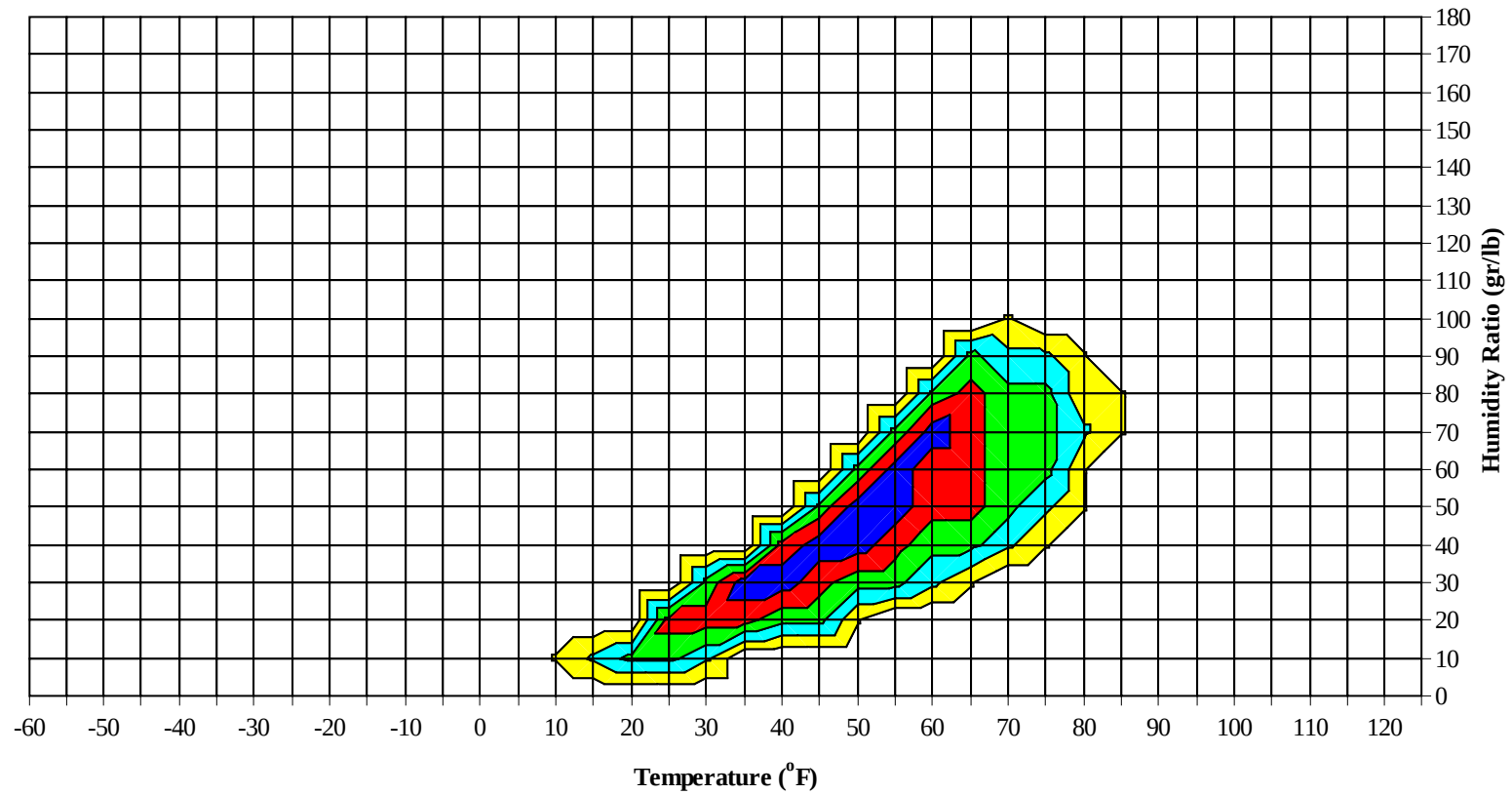
WMO No. 063750



VOLKEL, NETHERLANDS

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Long Term Psychrometric Summary

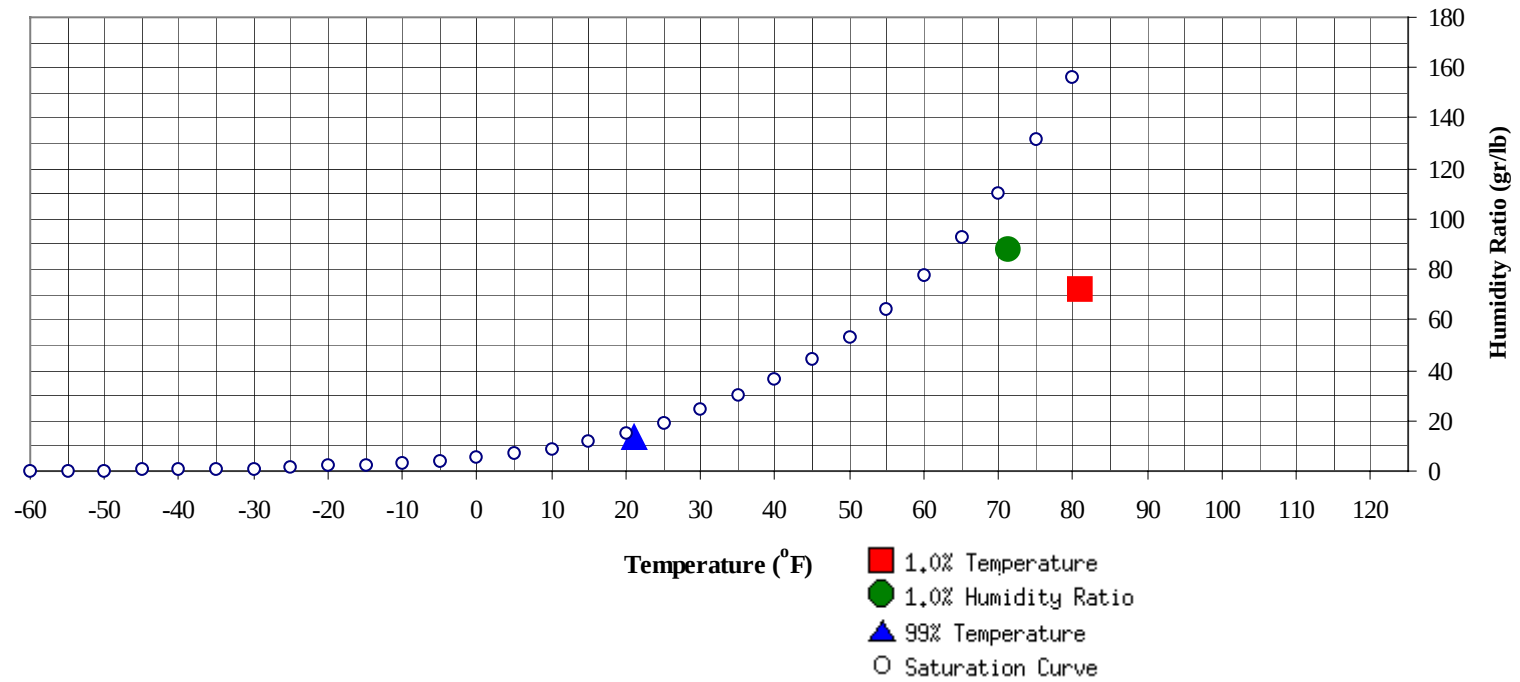


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

VOLKEL, NETHERLANDS

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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)
	21	13.5	7.1		88.2	71.2	66.1	63.5	30.9

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	81	72.5	66.3	30.8

VOLKEL, NETHERLANDS

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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		
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74												0	0	0	57.7
65 / 69												1	0	1	54.4
60 / 64							0	0	0	53.5	0	5	2	7	52.7
55 / 59	1	1	1	3	51.3	1	5	2	8	50.8	1	14	10	25	50.8
50 / 54	10	16	11	37	48.7	4	15	9	28	47.8	14	48	33	95	47.6
45 / 49	29	46	37	112	44.4	22	41	31	94	44.2	40	73	59	172	43.6
40 / 44	48	55	50	153	40.2	33	42	43	118	40.1	54	55	62	171	39.8
35 / 39	59	56	60	175	36.1	47	49	52	148	35.5	65	35	53	153	35.8
30 / 34	50	39	47	136	31.4	56	42	49	147	30.9	50	14	24	88	31.2
25 / 29	22	16	20	58	26.1	34	20	25	79	26.0	19	2	4	25	26.0
20 / 24	12	9	10	31	21.3	15	7	8	30	21.2	4	0	1	5	21.3
15 / 19	11	6	7	24	16.7	9	2	3	14	16.6	1	0	0	1	17.9
10 / 14	5	3	4	12	11.8	3	1	1	5	11.5					
5 / 9	2	1	1	4	7.2	1		0	1	8.2					
0 / 4	0	0	0	0	3.3										
-5 / -1	0		0	0	-1.8										

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.

VOLKEL, NETHERLANDS

WMO No. 063750

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		
95 / 99												0		0	
90 / 94												1	0	1	68.6
85 / 89							1	0	1	66.4		2	1	3	68.3
80 / 84		0		0	58.0		4	1	5	64.9		10	5	15	66.1
75 / 79		2	1	3	58.9		14	6	20	62.4	0	19	11	30	63.9
70 / 74		5	2	7	57.2	0	21	11	32	59.6	2	31	21	54	61.3
65 / 69	0	11	5	16	54.9	2	27	19	48	57.1	8	36	29	73	59.1
60 / 64	1	20	12	33	52.3	11	47	36	94	54.8	30	59	52	141	56.6
55 / 59	5	40	28	73	49.7	35	61	59	155	51.9	74	64	70	208	53.7
50 / 54	22	58	51	131	47.0	69	51	63	183	48.8	86	16	41	143	50.3
45 / 49	52	61	61	174	43.5	75	19	39	133	44.8	32	1	9	42	46.1
40 / 44	65	31	46	141	40.0	35	2	11	48	40.9	5	0	1	6	41.7
35 / 39	59	10	29	98	36.1	18	1	4	23	36.9	3		0	3	37.3
30 / 34	29	1	6	36	31.6	3		0	3	32.5					
25 / 29	5		0	5	27.1										
20 / 24	1			1	22.4										
15 / 19															
10 / 14															
5 / 9															
0 / 4															
-5 / -1															

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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		
95 / 99		0	0	0	70.4		0	0	0	71.6					
90 / 94		3	1	4	69.4		2	1	3	70.7					
85 / 89		7	3	10	69.0		5	2	7	68.3		0		0	67.3
80 / 84	0	18	10	28	67.5		14	7	21	66.4		2	1	3	66.5
75 / 79	0	27	18	45	65.0	0	29	15	44	64.3		7	2	9	64.9
70 / 74	5	42	33	80	62.7	3	50	29	82	62.3	0	20	8	28	62.4
65 / 69	20	52	44	116	60.5	12	60	45	117	60.4	2	40	18	60	59.8
60 / 64	59	68	67	195	58.1	60	64	69	193	58.5	22	81	56	159	57.6
55 / 59	101	29	55	186	55.0	99	23	56	178	55.2	69	65	79	213	54.5
50 / 54	50	1	16	67	51.1	57	1	22	80	51.2	82	22	55	159	50.7
45 / 49	11		1	12	46.7	15		2	17	46.7	45	3	18	66	46.2
40 / 44	1			1	42.3	2			2	42.6	16	0	3	19	41.8
35 / 39						0			0	39.0	4		0	4	37.6
30 / 34															
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															
-5 / -1															

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VOLKEL, NETHERLANDS

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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		
95 / 99															
90 / 94															
85 / 89															
80 / 84		0		0	63.3										
75 / 79		1	0	1	63.9										
70 / 74		4	1	5	62.7										
65 / 69	0	11	3	14	59.6		0		0	57.0					
60 / 64	4	34	16	54	57.0	0	2	0	2	55.2					
55 / 59	30	70	50	150	53.8	9	20	12	41	53.5	3	4	4	11	52.7
50 / 54	68	69	71	209	49.9	31	50	37	118	49.7	17	23	20	60	49.3
45 / 49	61	39	61	161	45.3	46	64	58	168	44.9	36	49	39	124	44.9
40 / 44	43	13	29	85	41.3	55	47	52	154	40.7	44	49	51	144	40.7
35 / 39	31	5	15	51	36.8	51	32	45	128	36.5	57	55	54	166	36.4
30 / 34	10	1	1	12	32.4	29	18	27	74	31.4	49	44	49	142	31.4
25 / 29	1	0	0	1	27.5	17	6	8	31	26.5	25	16	19	60	26.2
20 / 24						4	1	1	6	22.4	10	4	6	20	21.5
15 / 19						0		0	0	18.4	5	2	4	11	17.1
10 / 14											2	1	1	4	11.9
5 / 9											0	0	0	0	7.1
0 / 4											0	0		0	1.5
-5 / -1															

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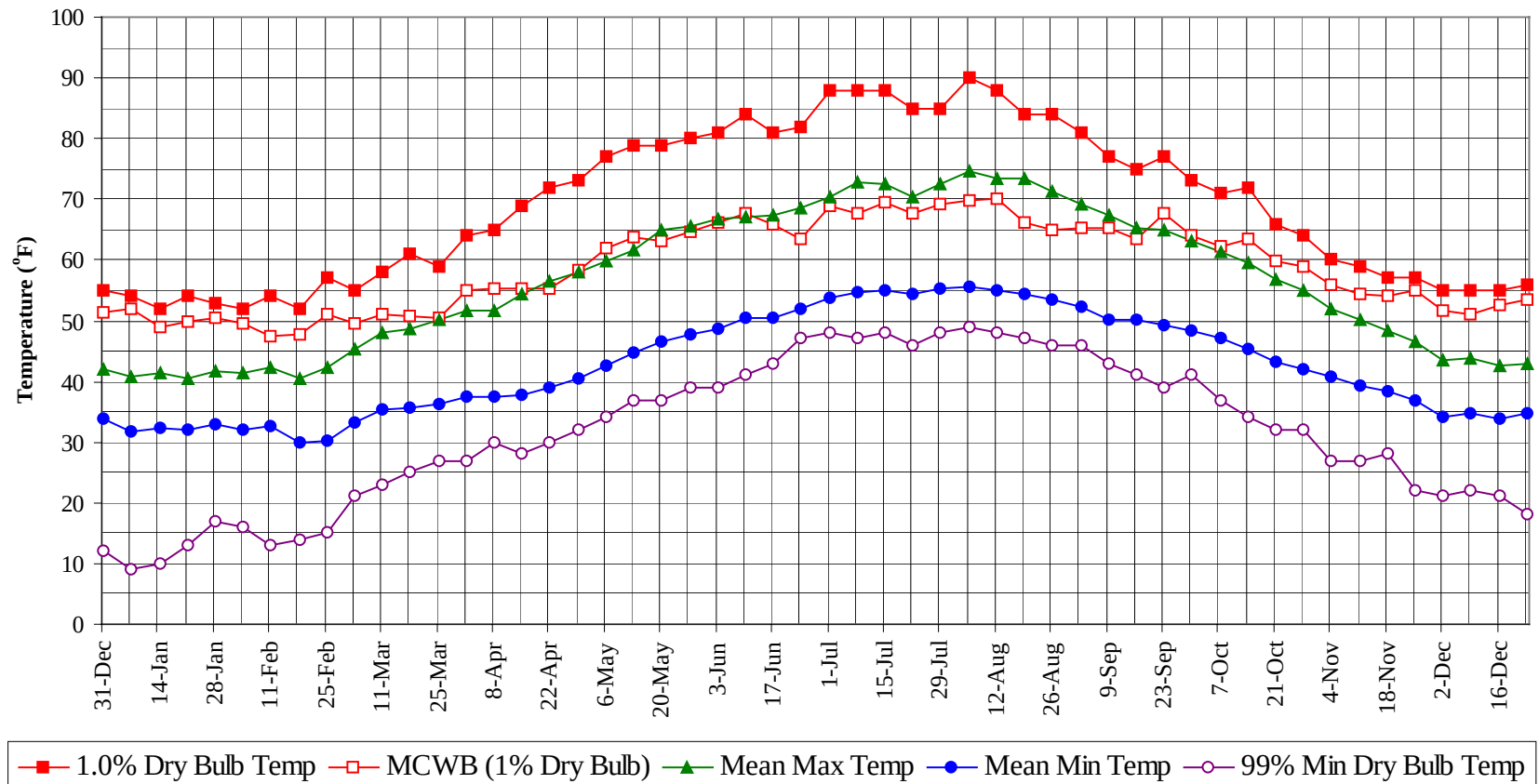
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1996

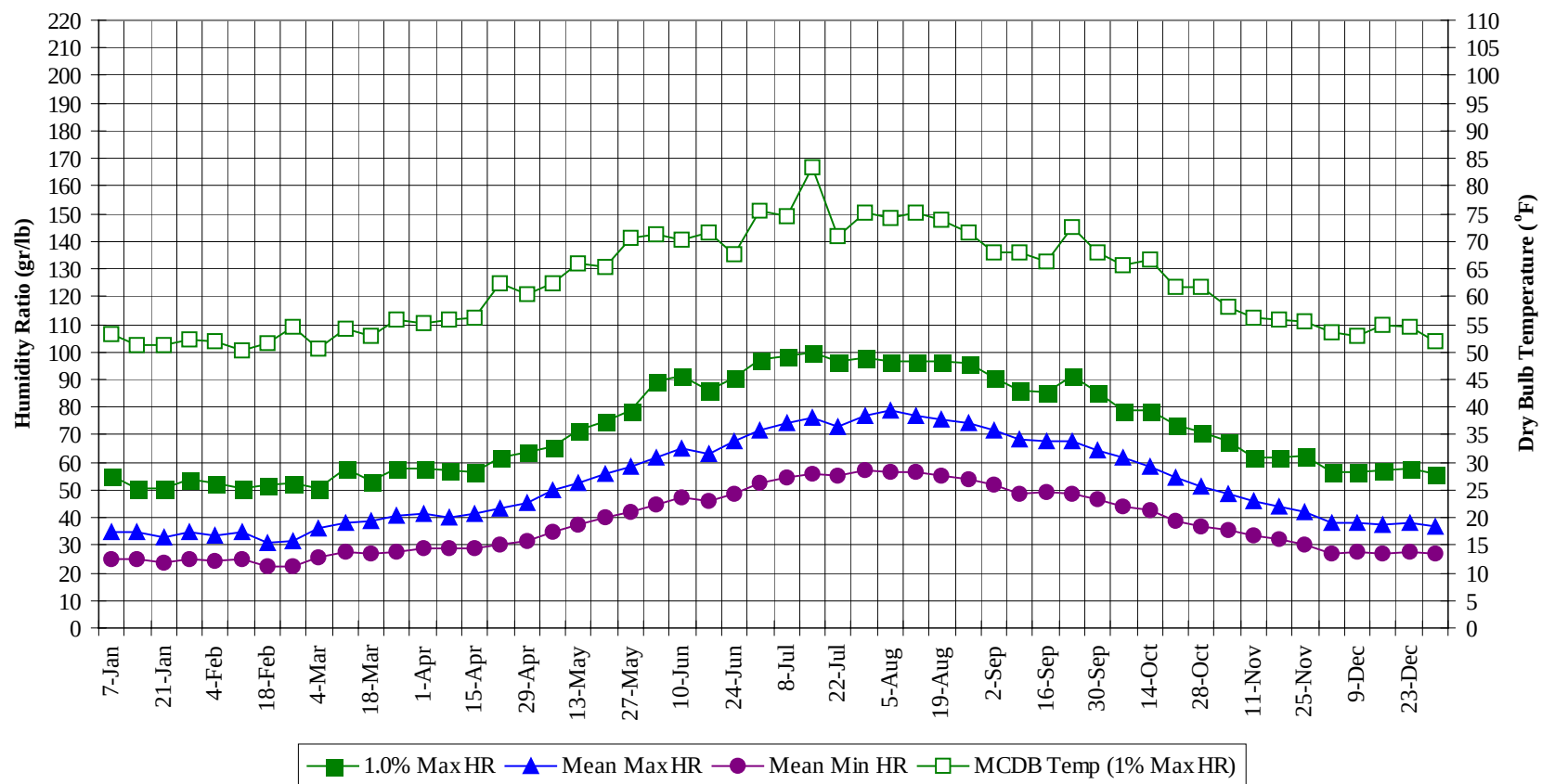
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
95 / 99		1	0	1	71.1
90 / 94		6	2	8	69.6
85 / 89		15	6	21	68.5
80 / 84	0	48	23	71	66.7
75 / 79	1	98	52	151	64.2
70 / 74	10	174	106	289	61.8
65 / 69	45	239	164	447	59.5
60 / 64	188	380	310	879	57.2
55 / 59	426	397	425	1248	53.7
50 / 54	510	372	429	1311	49.4
45 / 49	464	396	415	1276	44.6
40 / 44	399	295	349	1043	40.4
35 / 39	393	243	312	948	36.1
30 / 34	276	158	204	638	31.3
25 / 29	123	59	76	258	26.1
20 / 24	45	21	25	91	21.4
15 / 19	26	11	15	52	16.8
10 / 14	10	5	6	21	11.7
5 / 9	3	1	1	5	7.3
0 / 4	0	0	0	0	2.6
-5 / -1	0		0	0	-1.8
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Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary

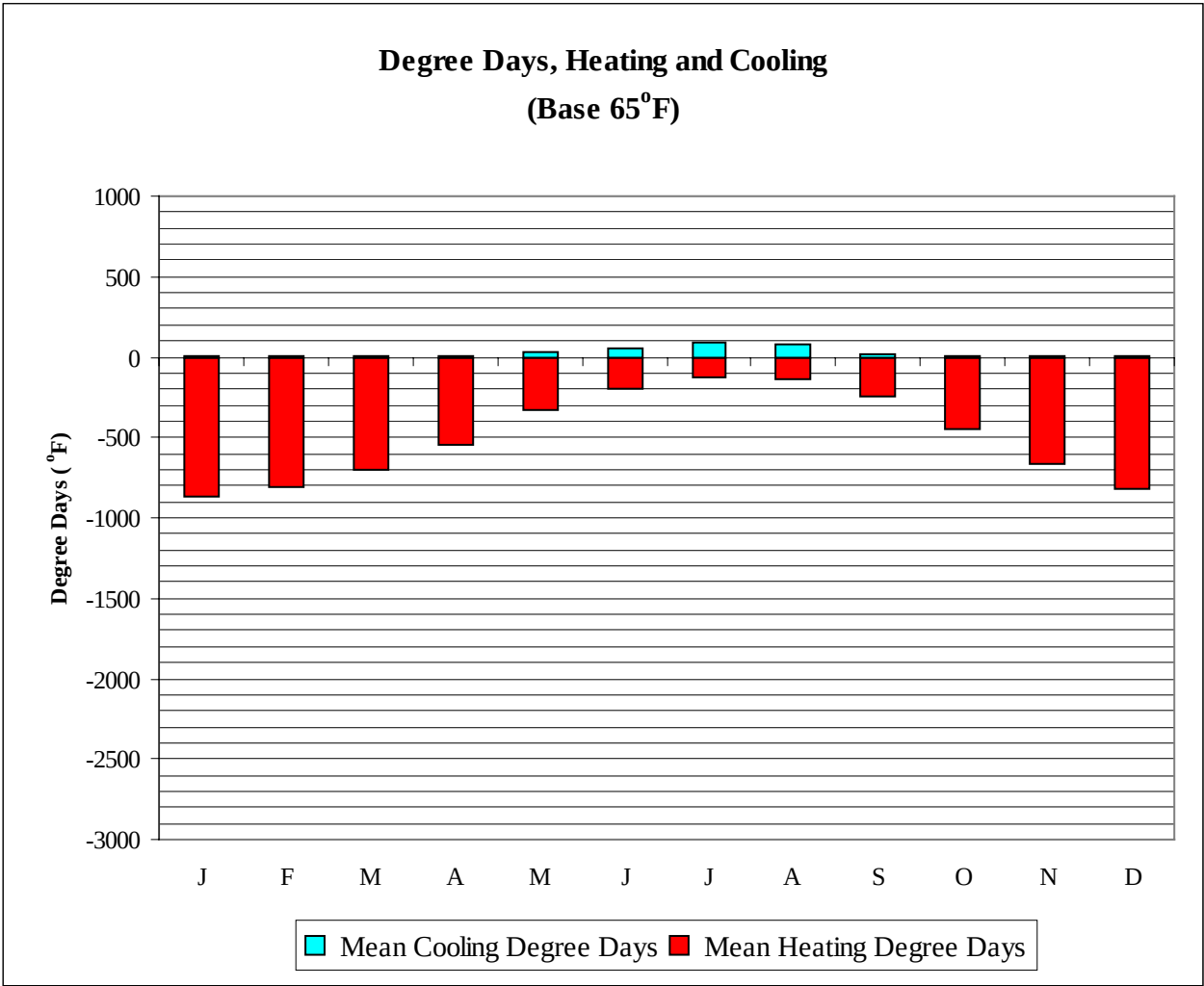


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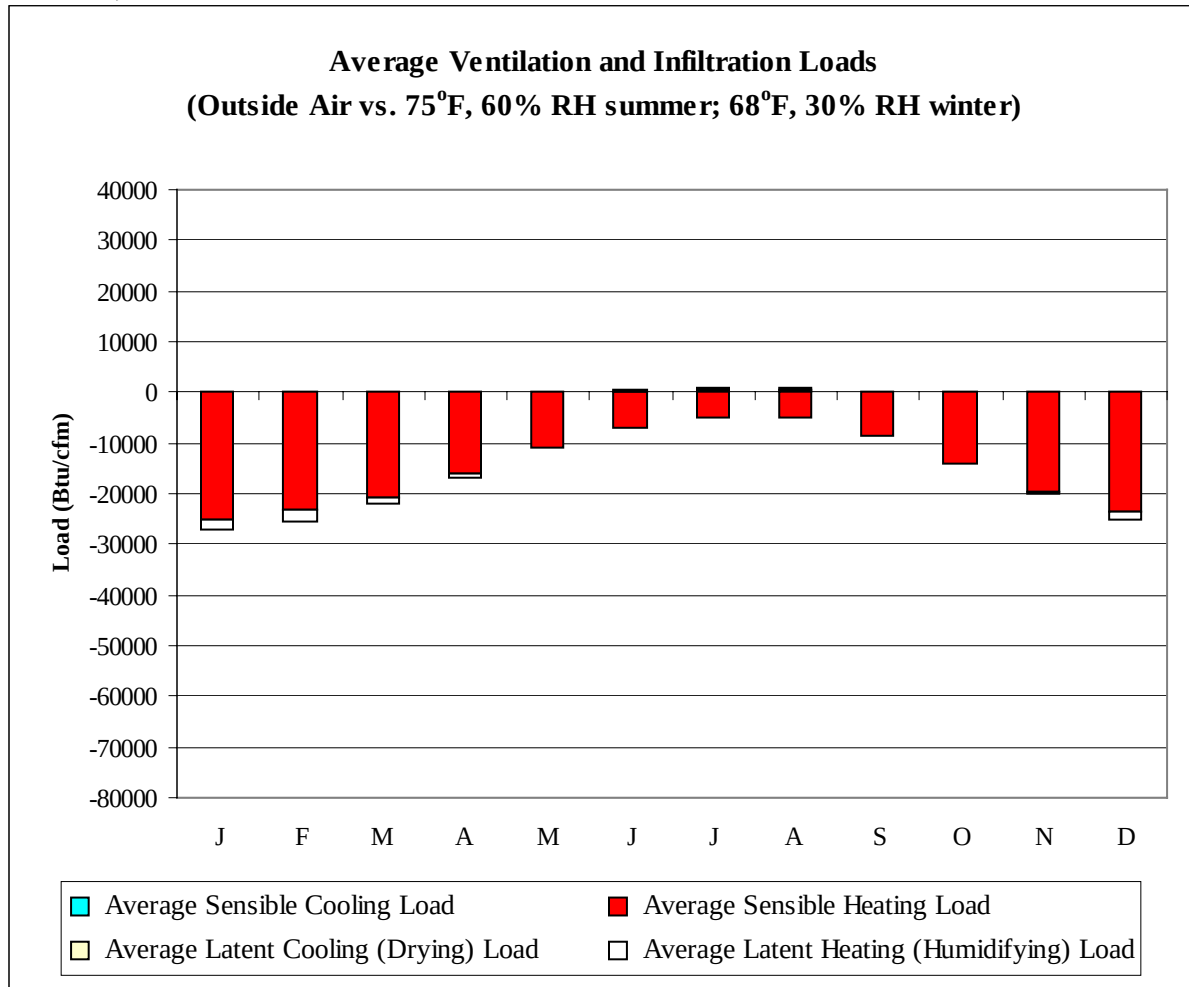
WMO No. 063750

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	54.0	51.9	40.8	31.9	9.0	55.3	53.2	35.0	25.0
14-Jan	52.0	48.9	41.3	32.4	10.0	50.4	51.3	35.0	25.1
21-Jan	54.0	49.9	40.6	32.0	13.0	50.4	51.4	33.1	23.9
28-Jan	53.0	50.3	41.7	33.1	17.0	53.9	52.2	35.1	25.3
4-Feb	52.0	49.6	41.3	31.9	16.0	52.5	51.9	33.7	24.1
11-Feb	54.0	47.6	42.4	32.6	13.0	50.4	50.2	34.9	25.1
18-Feb	52.0	47.8	40.4	29.9	14.0	51.8	51.6	31.1	22.1
25-Feb	57.0	51.1	42.4	30.3	15.0	52.5	54.6	31.8	22.5
4-Mar	55.0	49.6	45.4	33.2	21.0	50.4	50.6	35.8	25.4
11-Mar	58.0	51.0	48.0	35.3	23.0	58.1	54.2	38.0	27.6
18-Mar	61.0	50.8	48.7	35.5	25.0	53.2	52.9	38.5	27.2
25-Mar	59.0	50.5	50.2	36.3	27.0	58.1	55.8	40.5	27.9
1-Apr	64.0	55.0	51.7	37.4	27.0	58.1	55.3	41.4	28.9
8-Apr	65.0	55.4	51.7	37.5	30.0	57.4	56.0	40.0	28.8
15-Apr	69.0	55.4	54.4	37.8	28.0	56.7	56.3	41.2	28.7
22-Apr	72.0	55.3	56.5	39.1	30.0	61.6	62.4	43.2	30.2
29-Apr	73.0	58.4	58.0	40.4	32.0	63.7	60.4	45.5	31.6
6-May	77.0	61.9	59.7	42.6	34.0	65.8	62.5	49.7	35.1
13-May	79.0	63.6	61.7	44.6	37.0	71.4	65.9	52.4	37.4
20-May	79.0	63.1	65.1	46.5	37.0	74.9	65.3	55.9	40.0
27-May	80.0	64.7	65.4	47.7	39.0	79.1	70.6	58.3	42.3
3-Jun	81.0	66.3	66.7	48.6	39.0	89.6	71.4	61.7	44.6
10-Jun	84.0	67.8	67.2	50.6	41.0	91.0	70.3	64.8	47.6
17-Jun	81.0	66.0	67.3	50.5	43.0	86.1	71.6	63.3	46.0
24-Jun	82.0	63.5	68.7	52.0	47.0	90.3	67.5	67.6	48.9
1-Jul	88.0	68.8	70.4	53.8	48.0	97.3	75.5	71.9	52.3
8-Jul	88.0	67.7	72.7	54.7	47.0	98.7	74.4	74.0	54.2
15-Jul	88.0	69.5	72.7	55.1	48.0	100.1	83.3	76.1	55.7
22-Jul	85.0	67.8	70.3	54.4	46.0	96.6	70.9	72.6	55.0
29-Jul	85.0	69.2	72.4	55.2	48.0	98.0	75.3	76.7	57.0
5-Aug	90.0	69.9	74.5	55.5	49.0	96.6	74.1	78.6	56.7
12-Aug	88.0	70.2	73.4	55.1	48.0	96.6	75.3	76.9	56.5
19-Aug	84.0	66.2	73.5	54.5	47.0	96.6	74.0	75.7	55.1
26-Aug	84.0	64.8	71.3	53.6	46.0	95.9	71.6	74.3	53.8
2-Sep	81.0	65.1	69.2	52.2	46.0	90.3	68.1	71.4	51.9
9-Sep	77.0	65.2	67.4	50.3	43.0	86.1	68.1	68.2	48.9
16-Sep	75.0	63.4	65.4	50.2	41.0	85.4	66.5	67.7	49.1
23-Sep	77.0	67.6	64.9	49.4	39.0	91.0	72.5	67.8	48.3
30-Sep	73.0	64.0	63.0	48.4	41.0	85.4	68.0	64.6	46.6
7-Oct	71.0	62.1	61.2	47.0	37.0	79.1	65.6	61.9	44.3
14-Oct	72.0	63.3	59.6	45.3	34.0	79.1	66.8	58.8	42.7
21-Oct	66.0	59.7	56.8	43.2	32.0	73.5	61.8	54.5	38.6
28-Oct	64.0	58.9	55.0	41.9	32.0	70.7	61.6	51.2	36.6
4-Nov	60.0	55.8	52.0	40.7	27.0	67.9	58.1	48.9	35.4
11-Nov	59.0	54.3	50.0	39.4	27.0	61.6	56.2	46.1	33.4
18-Nov	57.0	54.0	48.4	38.4	28.0	61.6	55.7	44.0	32.1
25-Nov	57.0	54.9	46.4	36.9	22.0	62.3	55.5	42.1	30.1
2-Dec	55.0	51.8	43.6	34.1	21.0	56.7	53.5	38.1	27.1
9-Dec	55.0	51.1	43.8	34.9	22.0	56.7	52.8	38.3	27.8
16-Dec	55.0	52.5	42.5	33.9	21.0	57.4	55.0	37.3	26.8
23-Dec	56.0	53.4	43.0	34.8	18.0	58.1	54.6	38.0	27.5
31-Dec	55.0	51.2	42.0	33.9	12.0	56.0	51.9	36.6	27.1



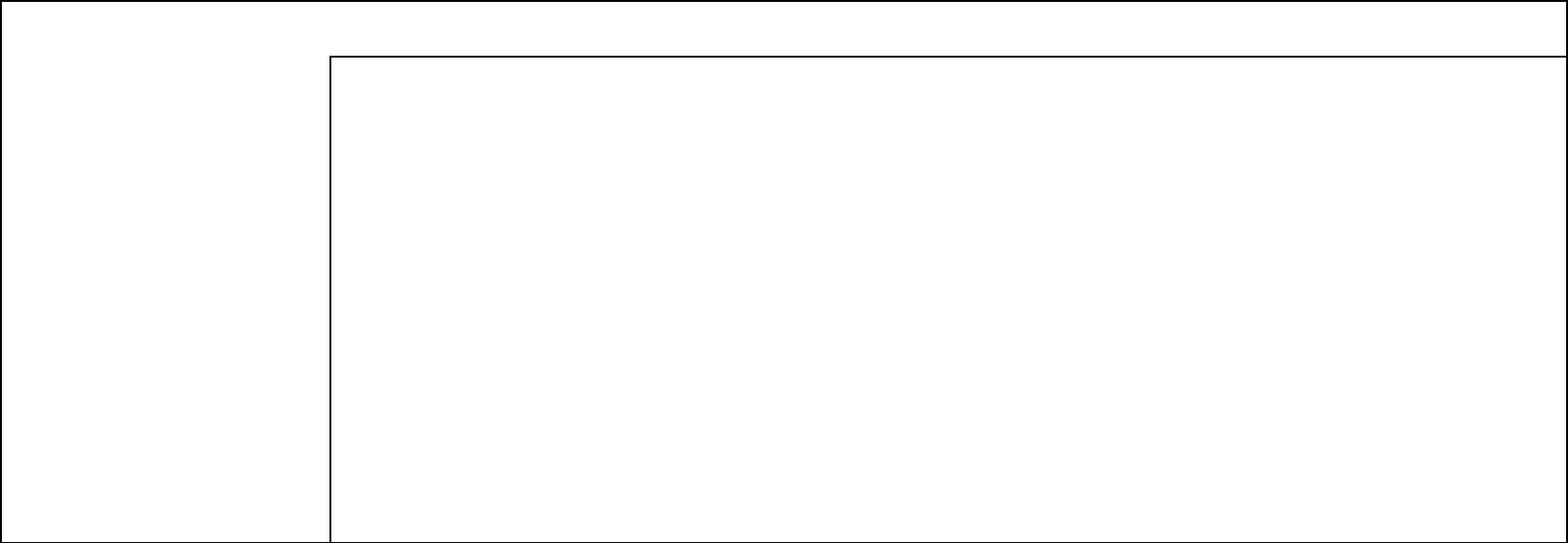
	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	872
FEB	0	806
MAR	0	705
APR	4	539
MAY	26	335
JUN	50	200
JUL	85	127
AUG	77	135
SEP	18	247
OCT	3	451
NOV	0	661
DEC	0	819
ANN	264	5897



	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	-25026	0	-2067
FEB	0	-23096	0	-2358
MAR	0	-20683	0	-1260
APR	5	-16235	0	-693
MAY	81	-10795	14	-84
JUN	236	-7056	195	-3
JUL	477	-4922	559	0
AUG	377	-5184	438	0
SEP	36	-8497	133	-3
OCT	1	-14058	6	-109
NOV	0	-19478	0	-696
DEC	0	-23651	0	-1537
ANN	1213	-178681	1345	-8810

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

No Solar Radiation
Data Available

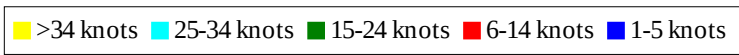
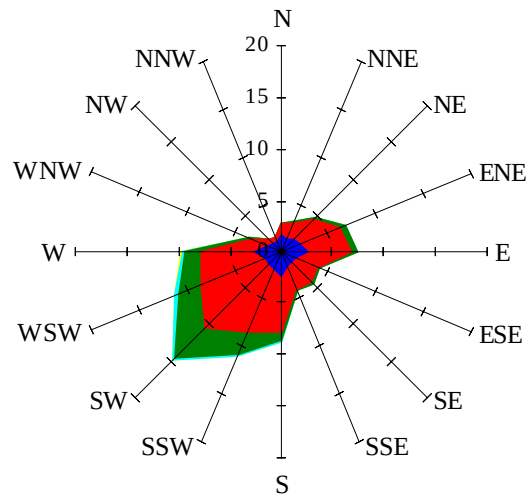


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

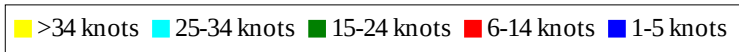
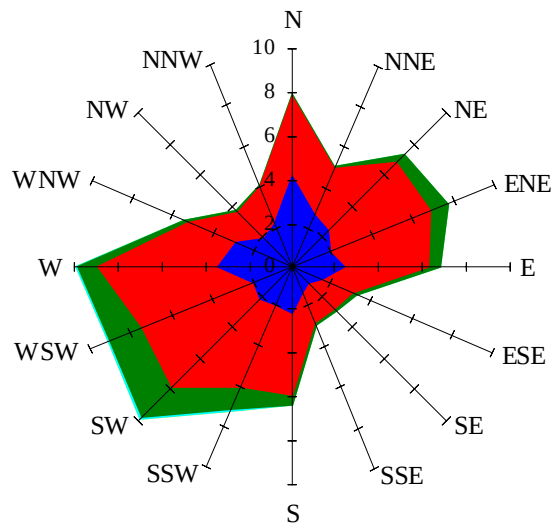
Labels of Percent Frequency on North Axis



Percent Calm = 1.01

Wind Summary - March, April, and May

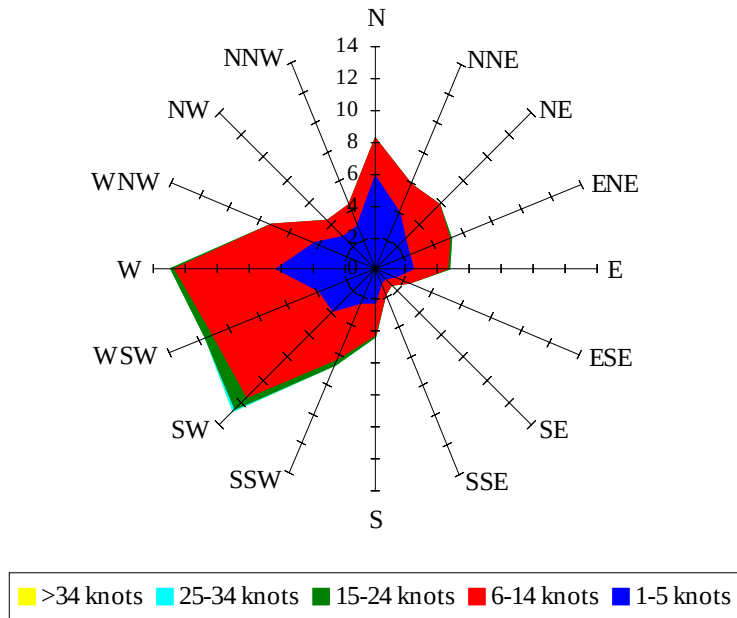
Labels of Percent Frequency on North Axis



Percent Calm = 1.01

Wind Summary - June, July, and August

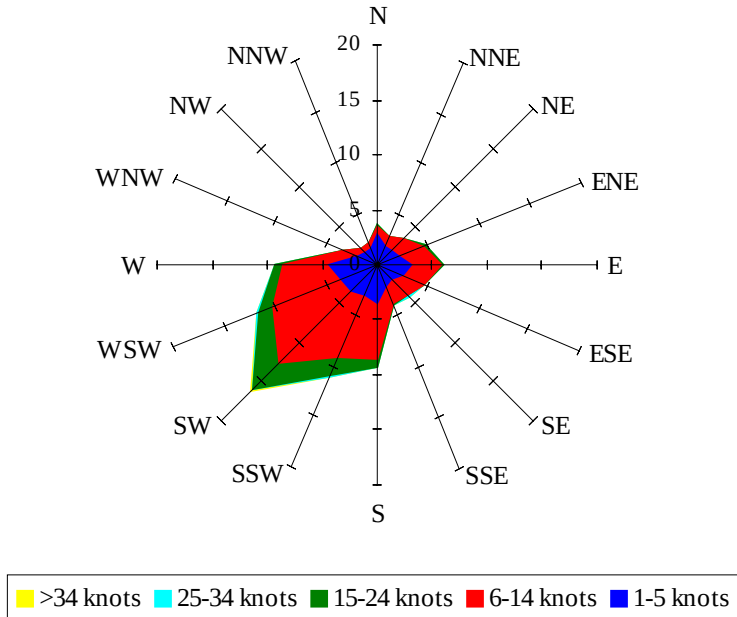
Labels of Percent Frequency on North Axis



Percent Calm = 1.33

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 1.72