

SEMBACH AB GERMANY

Latitude = 49.50 N

Longitude = 7.87 E

Period of Record = 1966 to 1995

WMO No. 107120

Elevation = 1053 feet

Average Pressure = 28.87 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	88	67	68	7.5	E
0.4% Occurrence	84	67	76	6.7	WSW
1.0% Occurrence	81	66	73	6.5	ENE
2.0% Occurrence	77	64	72	6.4	WSW
Mean Daily Range	12	-	-	-	-
97.5% Occurrence	23	21	13	5.0	NE
99.0% Occurrence	18	17	11	3.9	NE
99.6% Occurrence	14	12	8	5.1	NE
Median of Extreme Lows	9	9	7	4.8	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	72	84	99	6.7	WSW
0.4% Occurrence	69	80	89	5.9	WSW
1.0% Occurrence	67	77	83	5.9	WSW
2.0% Occurrence	65	75	78	5.9	WSW
	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	76	0.68	3.2	ENE
0.4% Occurrence	94	73	0.61	4.5	WSW
1.0% Occurrence	88	72	0.57	5.4	WSW
2.0% Occurrence	83	70	0.54	5.3	WSW
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		1	115	3	111

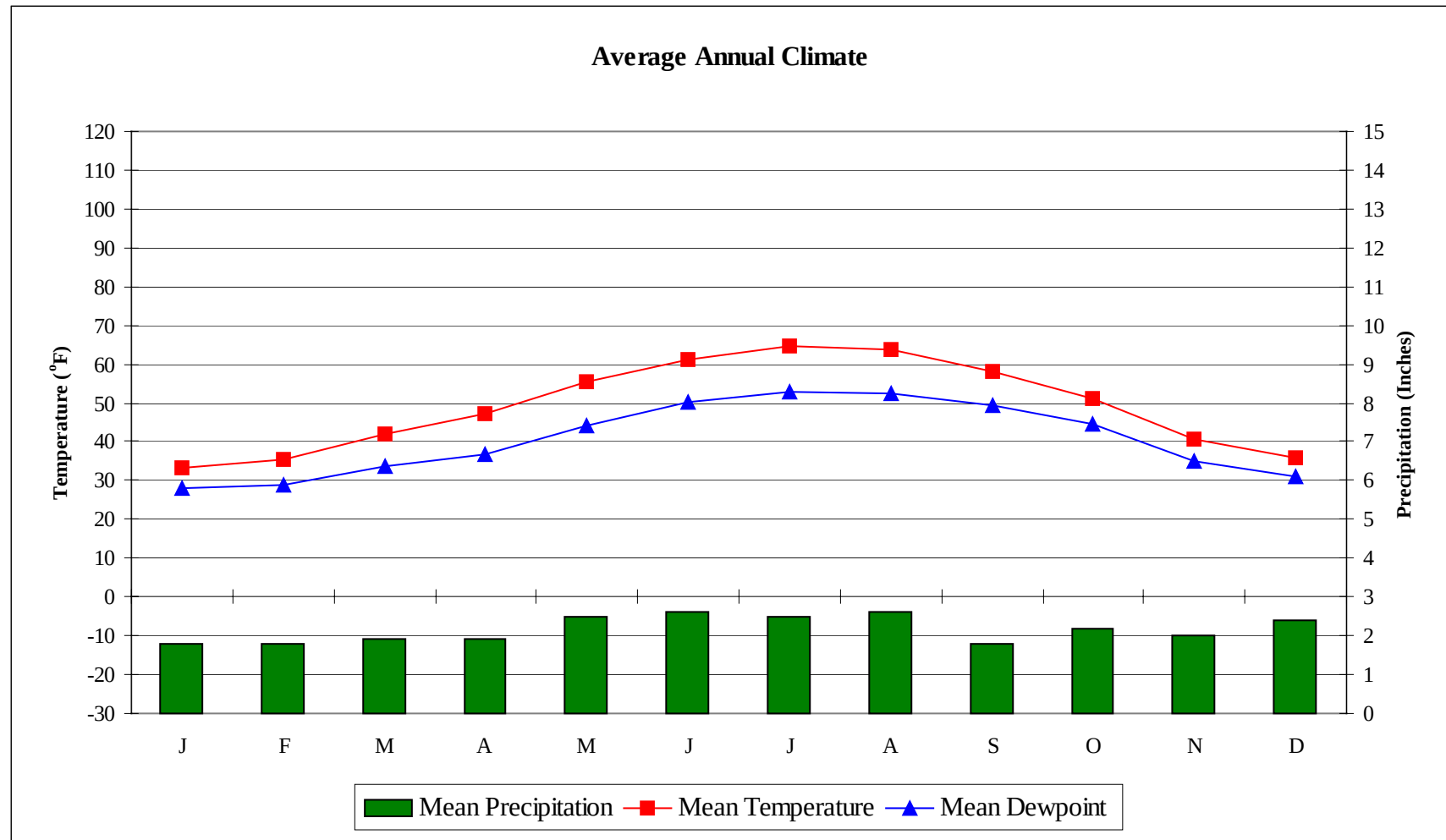
Other Site Data

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
7	N/A	N/A	0.0 + 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 (#)
51.7	N/A	N/A	29

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

SEMBACH AB GERMANY

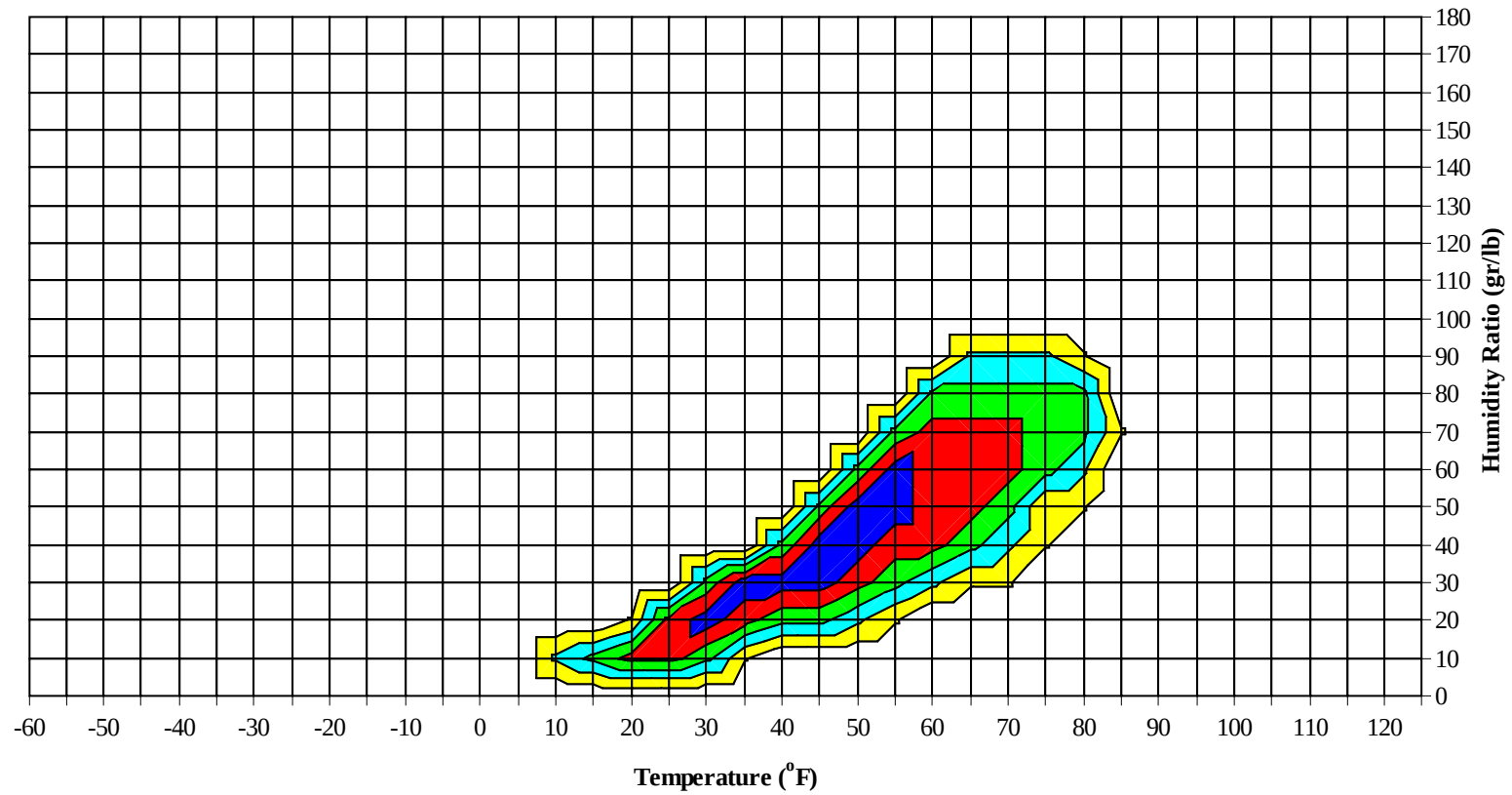
WMO No. 107120



SEMBACH AB GERMANY

WMO No. 107120

Long Term Psychrometric Summary

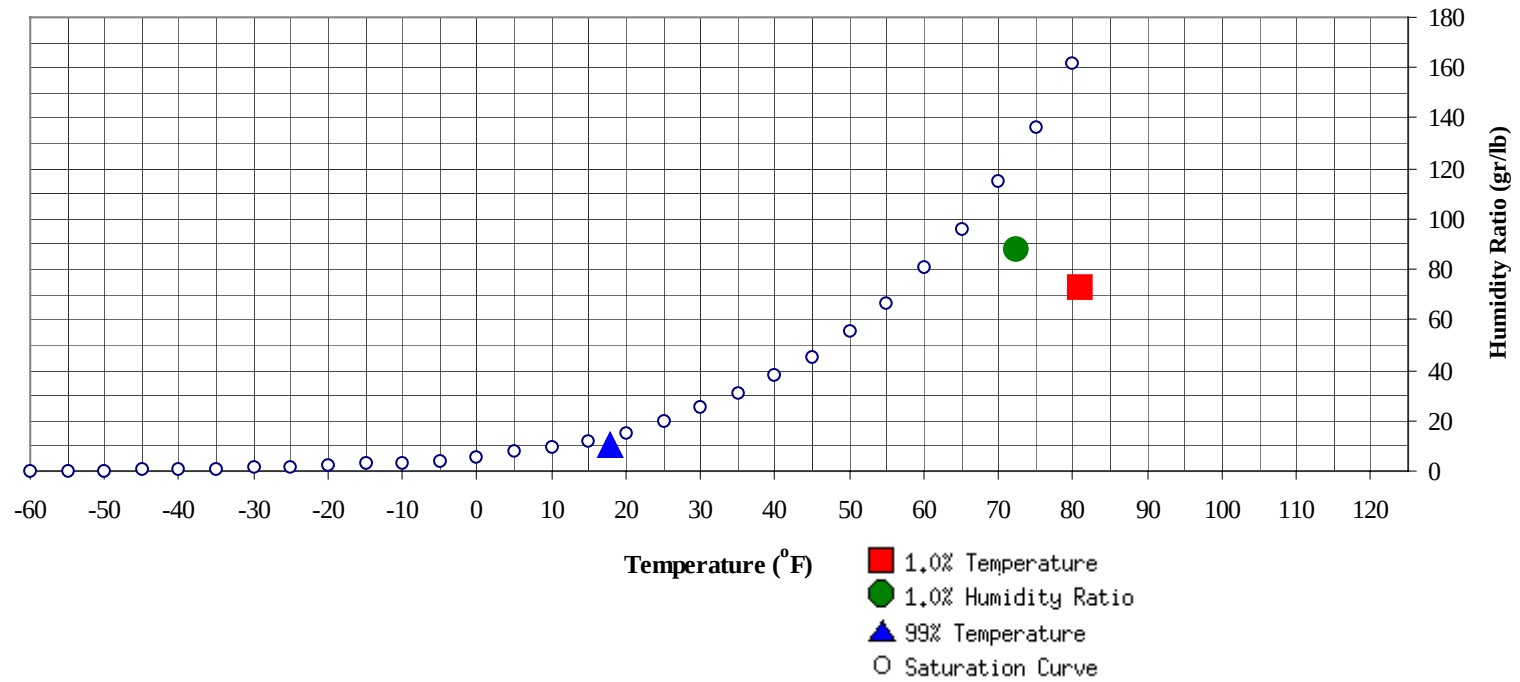


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

SEMBACH AB GERMANY

WMO No. 107120

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)
	18	10.2	5.9		88.2	72.4	65.9	62.6	31.1

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	81	73.2	65.7	30.9

SEMBACH AB GERMANY

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

Period of Record = 1966 to 1995

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												1	0	1	55.5
65 / 69												2	1	3	55.3
60 / 64							1	0	1	53.2		5	3	9	52.1
55 / 59	0	1		1	49.2	1	3	1	5	49.0	1	15	10	27	49.5
50 / 54	1	5	4	10	47.2	4	12	9	24	46.4	11	37	32	80	46.6
45 / 49	20	27	24	70	43.4	19	29	26	74	42.8	35	61	57	153	42.3
40 / 44	27	32	27	86	39.6	26	30	34	89	39.3	42	49	54	145	38.5
35 / 39	55	63	66	184	35.0	46	56	59	161	34.7	75	54	62	191	34.6
30 / 34	64	61	60	184	30.4	56	48	50	153	30.1	57	20	25	102	30.1
25 / 29	35	28	32	96	25.4	39	33	33	105	24.8	21	3	3	27	25.1
20 / 24	18	13	14	45	20.4	15	6	8	29	20.0	4	1	0	4	20.5
15 / 19	12	10	12	34	16.2	12	5	5	21	16.0	2	1	0	3	16.6
10 / 14	12	7	8	27	11.0	5	2	1	8	10.8	0			0	11.8
5 / 9	4	1	2	8	6.5	1	0	0	1	7.3					
0 / 4	0	0	0	0	0.8										

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.

SEMBACH AB GERMANY

WMO No. 107120

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

Period of Record = 1966 to 1995

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															
90 / 94												1	0	1	67.3
85 / 89												2	1	3	65.9
80 / 84							2	1	3	65.4		9	6	15	66.0
75 / 79							8	6	14	60.9					
70 / 74		5	2	8	55.5	0	21	14	35	58.5	0	23	14	38	64.1
65 / 69		8	5	12	53.6	1	25	20	46	56.5	2	41	28	71	61.6
60 / 64	0	20	14	34	51.6	8	54	45	107	54.0	8	32	28	68	59.3
55 / 59	5	37	29	70	48.6	37	60	57	154	51.0	38	58	56	152	56.3
50 / 54	24	55	53	133	46.4	79	49	58	186	48.1	65	49	60	174	52.8
45 / 49	53	56	65	174	42.3	71	25	33	129	43.8	82	22	36	140	49.1
40 / 44	54	35	38	127	38.7	27	4	9	40	40.0	38	3	11	52	45.0
35 / 39	65	22	30	117	35.1	23	1	4	28	36.0	6	0	0	6	41.1
30 / 34	32	2	3	38	30.4	2		0	2	31.8	1		0	1	38.0
25 / 29	6	0		6	26.2										
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															

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SEMBACH AB GERMANY

WMO No. 107120

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

Period of Record = 1966 to 1995

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	69.0										
90 / 94		3	1	4	68.8		2	0	2	66.9					
85 / 89		5	2	8	67.5		2	1	4	66.3		0	0	0	64.7
80 / 84	0	22	13	35	66.5		15	7	22	66.0		3	1	4	66.9
75 / 79	1	36	25	62	64.2	0	33	19	52	63.8		10	3	14	64.8
70 / 74	8	49	38	95	61.5	2	54	40	96	61.7	0	30	13	42	61.7
65 / 69	14	38	38	90	59.5	10	44	40	94	59.7	2	33	20	55	59.0
60 / 64	57	55	63	174	56.8	61	61	72	193	57.2	15	68	56	139	56.3
55 / 59	82	32	48	162	53.3	88	31	48	166	53.6	60	64	76	200	52.8
50 / 54	67	8	19	94	49.9	63	6	20	89	49.7	85	29	54	167	49.3
45 / 49	16		1	17	45.1	19	0	2	22	45.1	54	4	16	75	45.0
40 / 44	2			2	40.6	3		0	3	40.4	17	0	1	19	41.1
35 / 39	0			0	35.5	1			1	36.6	6			6	36.8
30 / 34															
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															

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SEMBACH AB GERMANY

WMO No. 107120

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

Period of Record = 1966 to 1995

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															
75 / 79		1	0	1	62.6										
70 / 74	0	6	1	7	60.7										
65 / 69	0	10	5	14	58.9										
60 / 64	7	29	21	58	56.2	0	1	0	1	54.8	0	0	0	0	52.4
55 / 59	27	61	52	139	52.7	4	11	5	20	51.8	1	2	1	5	51.1
50 / 54	73	75	81	229	48.8	17	34	25	77	48.3	10	8	11	29	47.9
45 / 49	68	44	54	167	44.0	43	58	54	154	43.7	19	33	26	77	43.9
40 / 44	28	14	22	65	40.0	33	43	37	113	39.5	29	30	33	92	39.9
35 / 39	29	6	9	45	35.8	57	51	64	172	35.4	62	71	69	203	35.3
30 / 34	13	1	2	17	30.9	57	33	40	130	30.5	66	63	65	194	30.7
25 / 29	1		0	1	27.0	24	9	14	48	25.2	37	29	28	95	25.3
20 / 24						4	1	1	6	20.5	12	7	11	31	20.8
15 / 19						1	0	0	1	16.2	9	4	2	16	17.2
10 / 14							0		0	12.0	2	1		3	12.2
5 / 9											0	0		0	6.0
0 / 4											0			0	3.0

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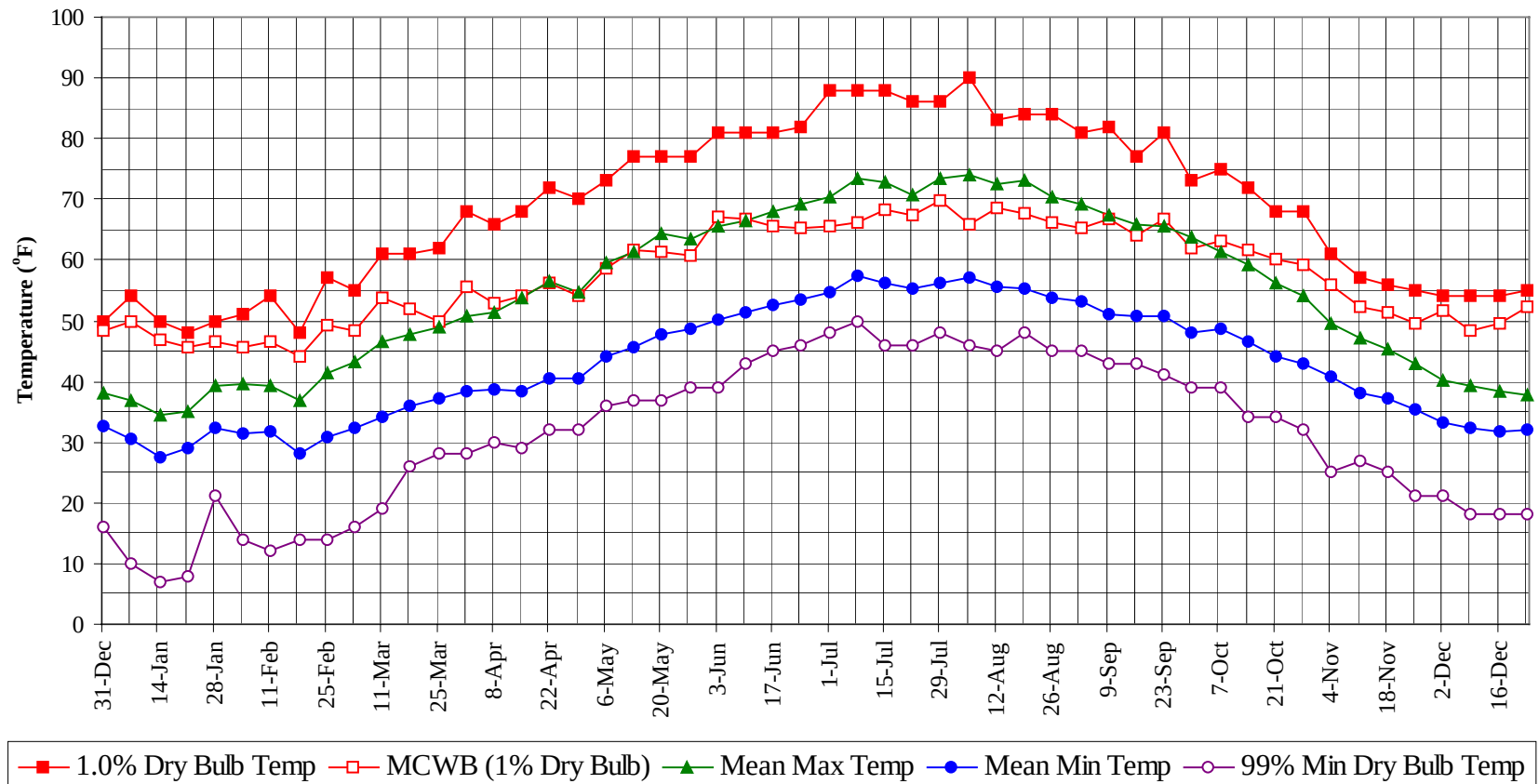
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1966 to 1995

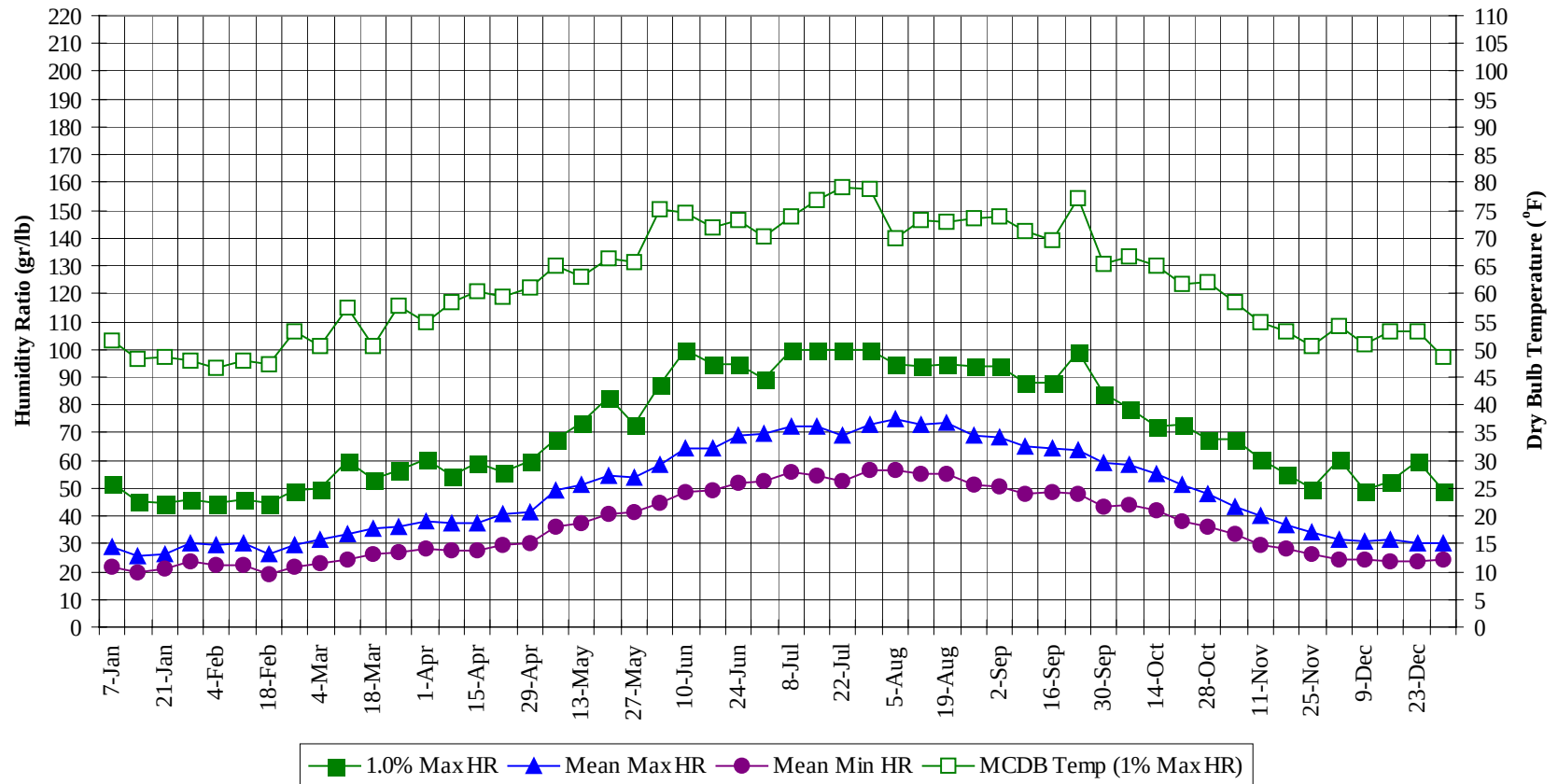
Annual Totals						
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	
	01 To 08	09 To 16	17 To 00			
95 / 99	0			0	69.0	
90 / 94	5			2	8	68.2
85 / 89	9			6	15	66.9
80 / 84	0	50	28	79	66.2	
75 / 79	1	112	68	181	63.8	
70 / 74	14	206	137	357	61.1	
65 / 69	37	190	156	383	58.8	
60 / 64	194	349	333	877	56.0	
55 / 59	382	363	386	1131	52.3	
50 / 54	526	339	403	1268	48.4	
45 / 49	455	340	369	1164	43.4	
40 / 44	292	239	259	790	39.3	
35 / 39	411	325	359	1095	35.1	
30 / 34	336	228	239	803	30.4	
25 / 29	158	105	109	372	25.2	
20 / 24	51	28	34	114	20.4	
15 / 19	37	21	19	76	16.4	
10 / 14	19	9	9	38	11.0	
5 / 9	5	2	2	9	6.6	
0 / 4	1	0	0	1	1.3	

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Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary

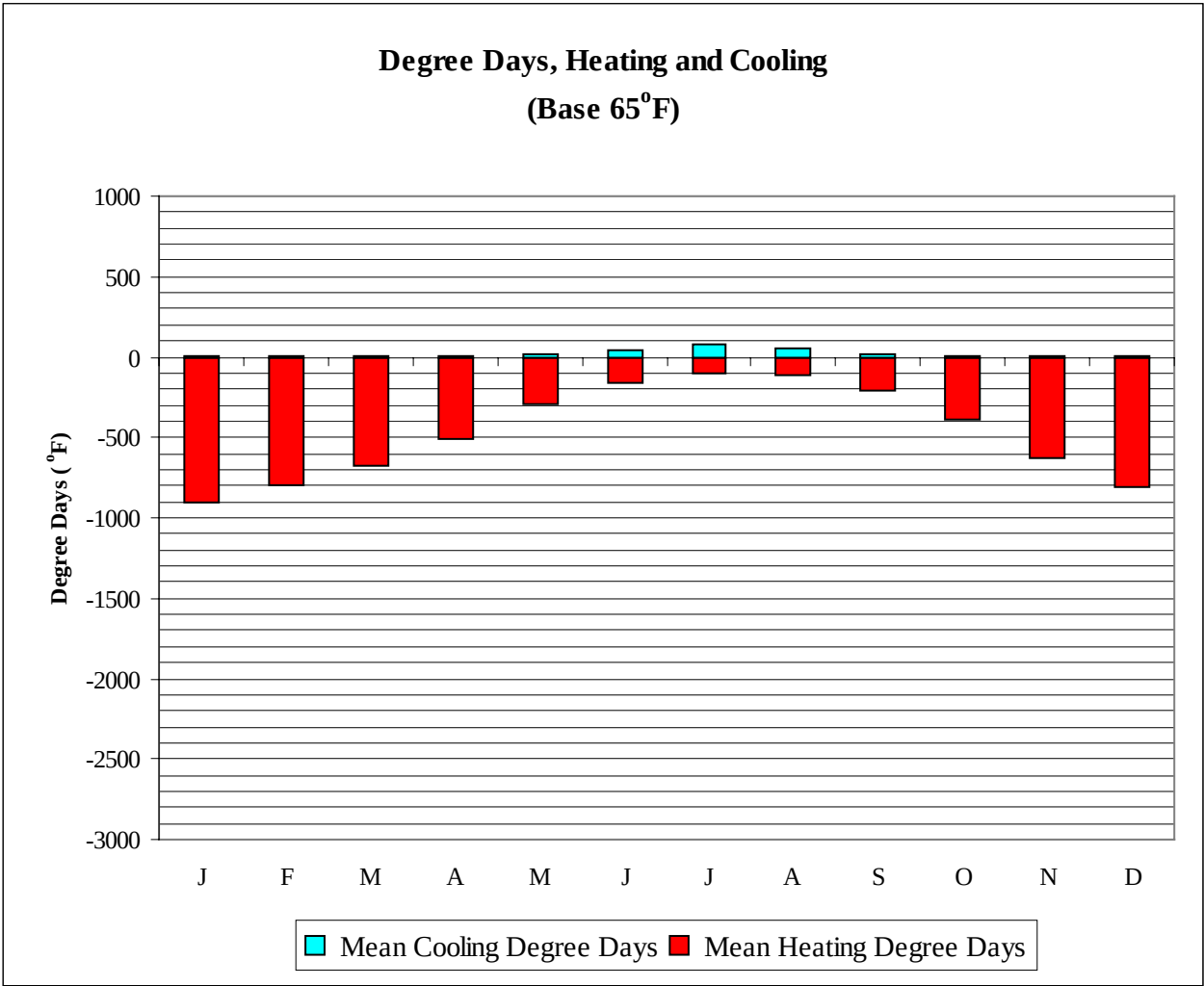


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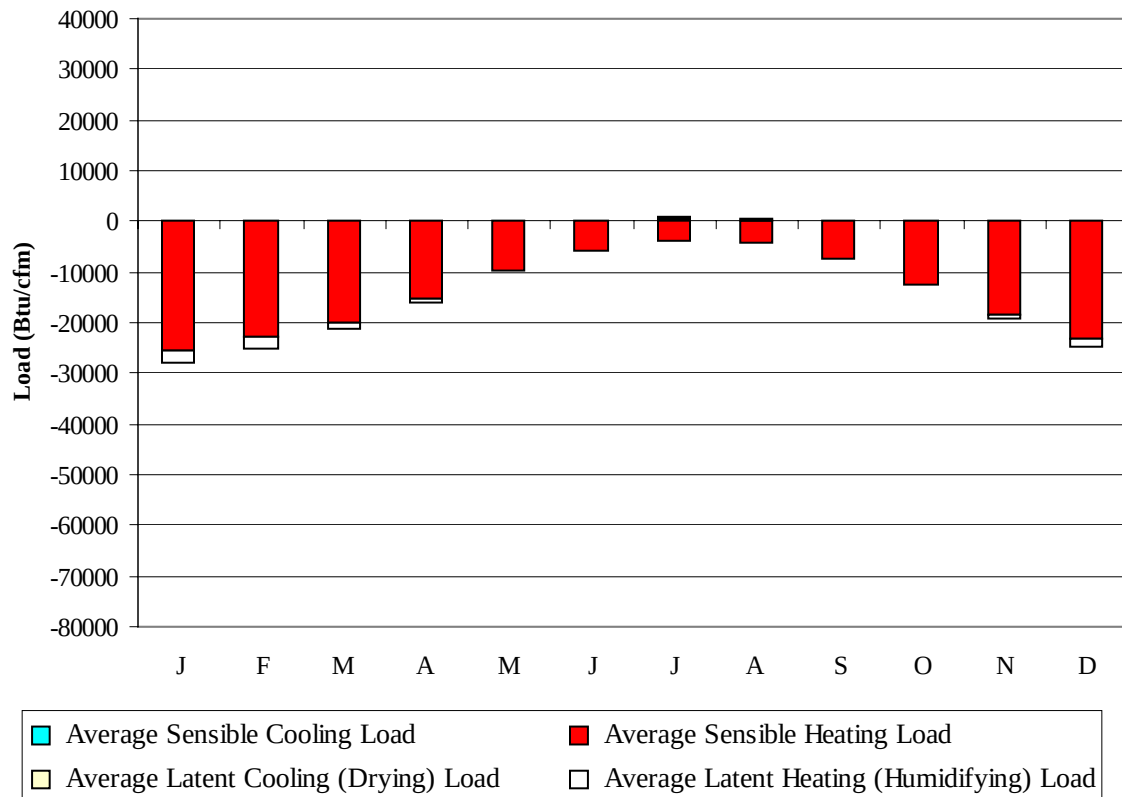
Long Term Dry Bulb Temperature and Humidity Summary

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	54.0	49.9	36.8	30.5	10.0	51.8	51.6	29.0	22.0
14-Jan	50.0	46.9	34.3	27.5	7.0	45.5	48.2	25.4	19.7
21-Jan	48.0	45.6	35.1	29.0	8.0	44.8	48.5	26.3	20.7
28-Jan	50.0	46.5	39.2	32.5	21.0	46.2	48.0	30.4	23.5
4-Feb	51.0	45.5	39.5	31.5	14.0	44.8	46.6	29.2	22.3
11-Feb	54.0	46.5	39.3	31.6	12.0	46.2	47.8	30.0	22.6
18-Feb	48.0	44.2	37.0	28.1	14.0	44.8	47.3	26.0	19.4
25-Feb	57.0	49.3	41.5	30.7	14.0	49.0	53.1	29.9	21.4
4-Mar	55.0	48.4	43.1	32.3	16.0	49.7	50.5	31.6	22.8
11-Mar	61.0	53.9	46.5	34.3	19.0	59.5	57.4	33.7	24.4
18-Mar	61.0	51.9	47.8	35.9	26.0	53.2	50.7	35.6	26.0
25-Mar	62.0	50.0	48.9	37.3	28.0	56.7	57.9	35.9	26.6
1-Apr	68.0	55.6	50.7	38.3	28.0	60.2	55.0	37.9	28.2
8-Apr	66.0	52.8	51.3	38.7	30.0	54.6	58.5	37.3	27.6
15-Apr	68.0	54.2	53.6	38.3	29.0	58.8	60.4	37.5	27.4
22-Apr	72.0	56.3	56.5	40.5	32.0	56.0	59.3	40.8	29.5
29-Apr	70.0	54.0	54.7	40.6	32.0	59.5	61.0	41.5	30.5
6-May	73.0	58.5	59.4	44.1	36.0	67.9	64.9	49.0	36.1
13-May	77.0	61.6	61.2	45.7	37.0	73.5	63.1	51.2	37.6
20-May	77.0	61.4	64.4	47.7	37.0	82.6	66.4	54.6	40.7
27-May	77.0	60.6	63.5	48.7	39.0	72.8	65.7	53.7	41.2
3-Jun	81.0	67.1	65.5	50.3	39.0	87.5	75.2	58.3	44.8
10-Jun	81.0	66.8	66.6	51.5	43.0	100.1	74.7	64.3	48.6
17-Jun	81.0	65.7	68.0	52.7	45.0	94.5	72.0	64.6	49.2
24-Jun	82.0	65.4	69.1	53.6	46.0	94.5	73.1	68.7	52.1
1-Jul	88.0	65.5	70.5	54.7	48.0	89.6	70.3	69.7	52.6
8-Jul	88.0	66.3	73.4	57.3	50.0	100.1	73.8	72.2	56.1
15-Jul	88.0	68.3	73.0	56.1	46.0	100.1	76.8	72.1	54.3
22-Jul	86.0	67.5	70.8	55.2	46.0	100.1	79.1	69.1	52.3
29-Jul	86.0	69.7	73.4	56.2	48.0	100.1	78.7	73.1	56.4
5-Aug	90.0	65.9	74.1	57.0	46.0	94.5	70.0	75.0	56.6
12-Aug	83.0	68.7	72.5	55.5	45.0	93.8	73.4	72.6	55.0
19-Aug	84.0	67.6	73.0	55.3	48.0	94.5	73.0	73.7	54.9
26-Aug	84.0	66.2	70.5	53.9	45.0	93.8	73.5	68.8	51.2
2-Sep	81.0	65.3	69.0	53.1	45.0	93.8	73.9	68.5	50.7
9-Sep	82.0	66.8	67.2	51.2	43.0	88.2	71.2	65.1	48.1
16-Sep	77.0	64.2	65.9	50.9	43.0	88.2	69.6	64.7	48.3
23-Sep	81.0	66.8	65.6	50.6	41.0	99.4	77.2	64.0	47.9
30-Sep	73.0	62.0	63.7	48.2	39.0	84.0	65.4	59.2	43.5
7-Oct	75.0	63.2	61.3	48.5	39.0	79.1	66.5	58.4	43.9
14-Oct	72.0	61.7	59.3	46.6	34.0	72.1	64.9	55.3	42.3
21-Oct	68.0	60.3	56.3	44.2	34.0	72.8	61.8	51.3	38.1
28-Oct	68.0	59.3	54.1	42.9	32.0	67.9	62.1	47.6	36.3
4-Nov	61.0	56.0	49.6	40.7	25.0	67.9	58.4	43.2	33.2
11-Nov	57.0	52.3	47.2	38.1	27.0	60.2	54.8	40.0	29.8
18-Nov	56.0	51.3	45.5	37.1	25.0	55.3	53.1	37.0	28.4
25-Nov	55.0	49.7	42.8	35.3	21.0	49.7	50.7	34.1	26.6
2-Dec	54.0	51.8	40.3	33.2	21.0	60.2	54.1	31.5	24.5
9-Dec	54.0	48.3	39.4	32.2	18.0	49.0	51.0	31.0	24.1
16-Dec	54.0	49.5	38.3	31.8	18.0	52.5	53.1	31.2	23.6
23-Dec	55.0	52.3	37.9	32.1	18.0	59.5	53.3	30.3	23.6
31-Dec	50.0	48.3	38.2	32.8	16.0	49.0	48.5	30.2	24.1



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	899
FEB	0	793
MAR	0	677
APR	2	507
MAY	14	293
JUN	40	161
JUL	79	103
AUG	57	109
SEP	19	209
OCT	3	392
NOV	0	628
DEC	0	809
ANN	215	5580

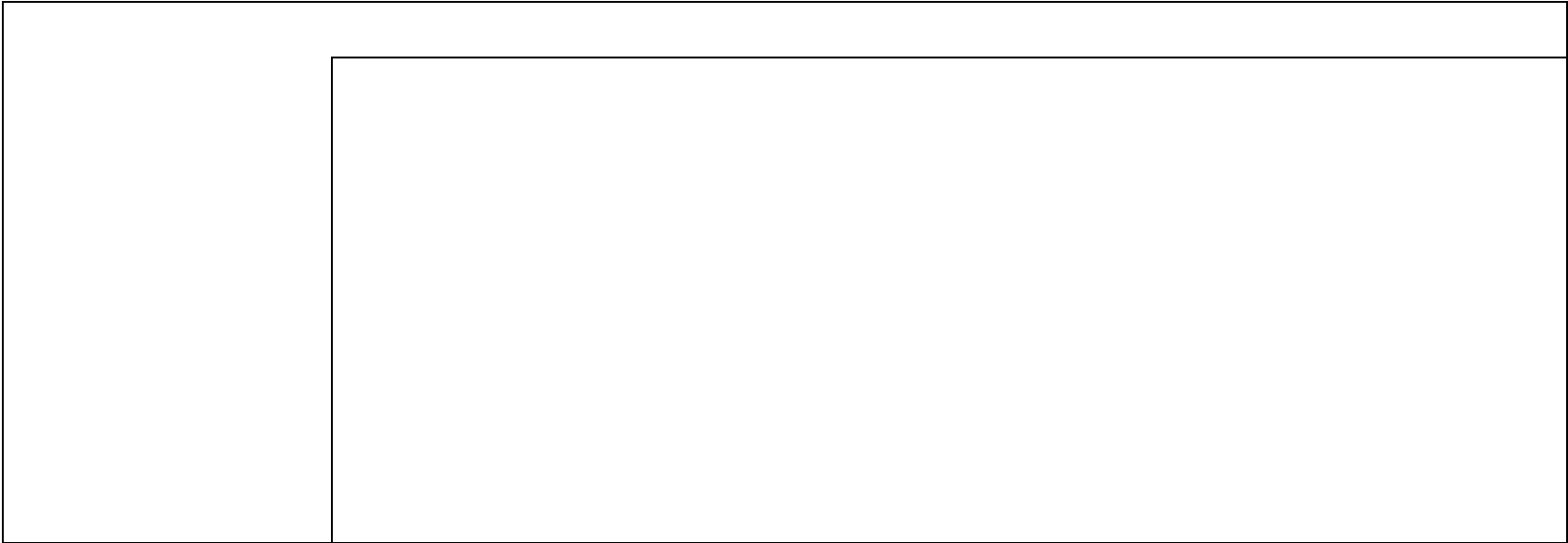
Average Ventilation and Infiltration Loads
(Outside Air vs. 75°F, 60% RH summer; 68°F, 30% RH winter)



	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	-25539	0	-2431
FEB	0	-22680	0	-2362
MAR	0	-19906	0	-1405
APR	0	-15400	0	-830
MAY	30	-9679	6	-189
JUN	184	-5859	129	-6
JUL	556	-4012	230	-1
AUG	286	-4302	155	-5
SEP	49	-7338	78	-17
OCT	2	-12370	1	-180
NOV	0	-18337	0	-1050
DEC	0	-23145	0	-1671
ANN	1107	-168567	599	-10147

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

No Solar Radiation
Data Available

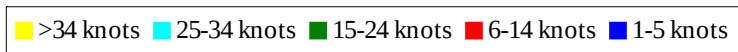
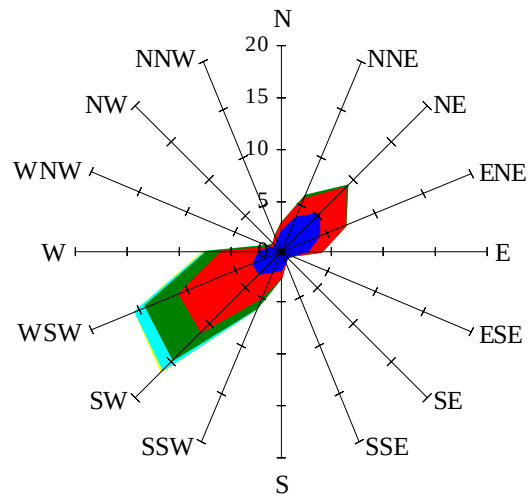


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

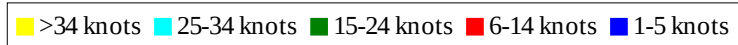
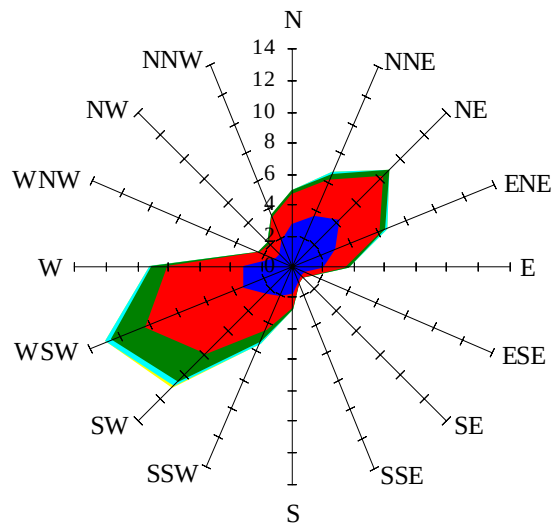
Labels of Percent Frequency on North Axis



Percent Calm = 15.76

Wind Summary - March, April, and May

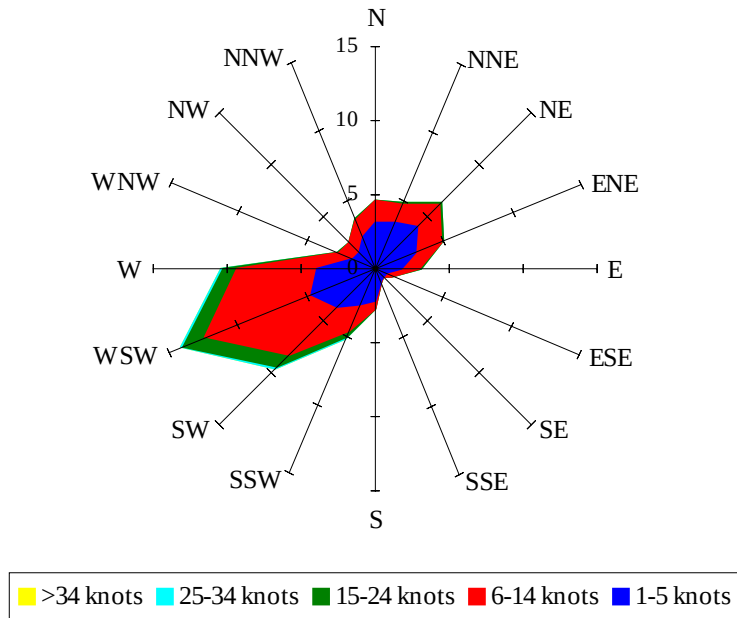
Labels of Percent Frequency on North Axis



Percent Calm = 17.36

Wind Summary - June, July, and August

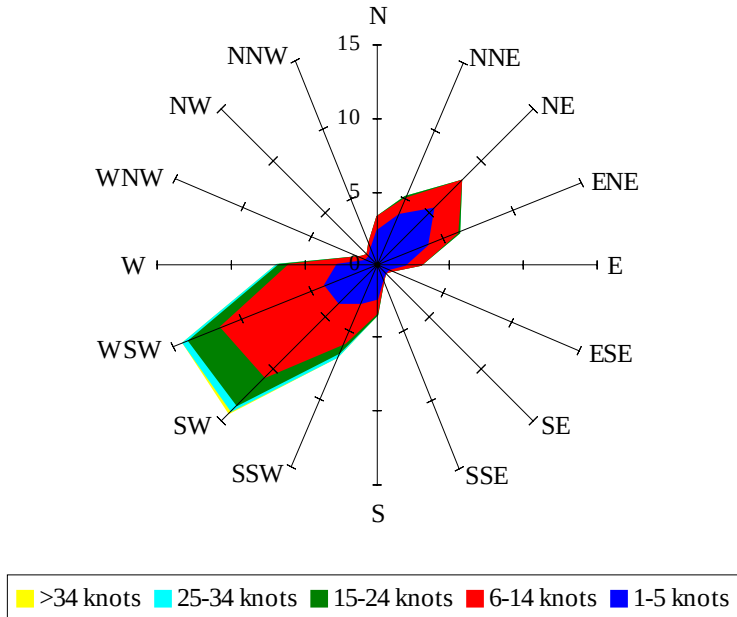
Labels of Percent Frequency on North Axis



Percent Calm = 22.34

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 21.98