

UDON THANI TH

Latitude = 17.38 N

Longitude = 102.80 E

Period of Record = 1973 to 1996

WMO No. 483540

Elevation = 597 feet

Average Pressure = 29.17 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	104	76	91	4.3	S
0.4% Occurrence	101	75	93	4.2	S
1.0% Occurrence	99	75	97	4.1	S
2.0% Occurrence	97	76	104	3.8	S
Mean Daily Range	16	-	-	-	-
97.5% Occurrence	61	57	64	1.1	E
99.0% Occurrence	57	53	55	1.0	E
99.6% Occurrence	54	51	49	0.9	E
Median of Extreme Lows	50	47	44	0.5	SW
	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	82	91	148	2.8	S
0.4% Occurrence	81	90	145	2.5	S
1.0% Occurrence	80	88	141	2.6	W
2.0% Occurrence	80	88	141	2.6	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	163	88	1.05	1.5	SSW
0.4% Occurrence	154	84	0.99	2.0	E
1.0% Occurrence	149	84	0.96	1.5	S
2.0% Occurrence	146	83	0.94	1.6	S
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		500	4722	5062	6880

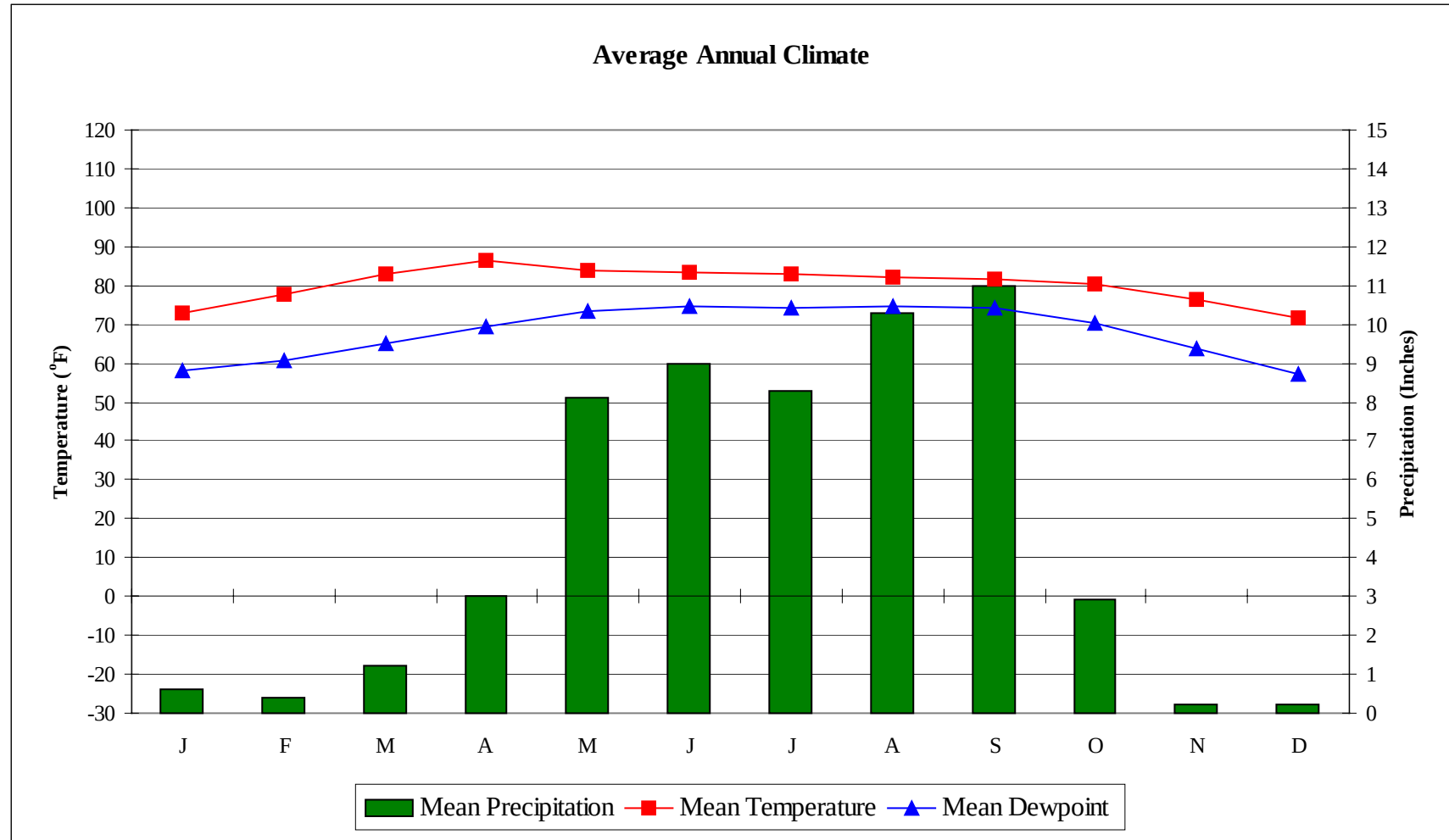
Other Site Data

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	5.8 + 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 (#)
82.6	N/A	N/A	0

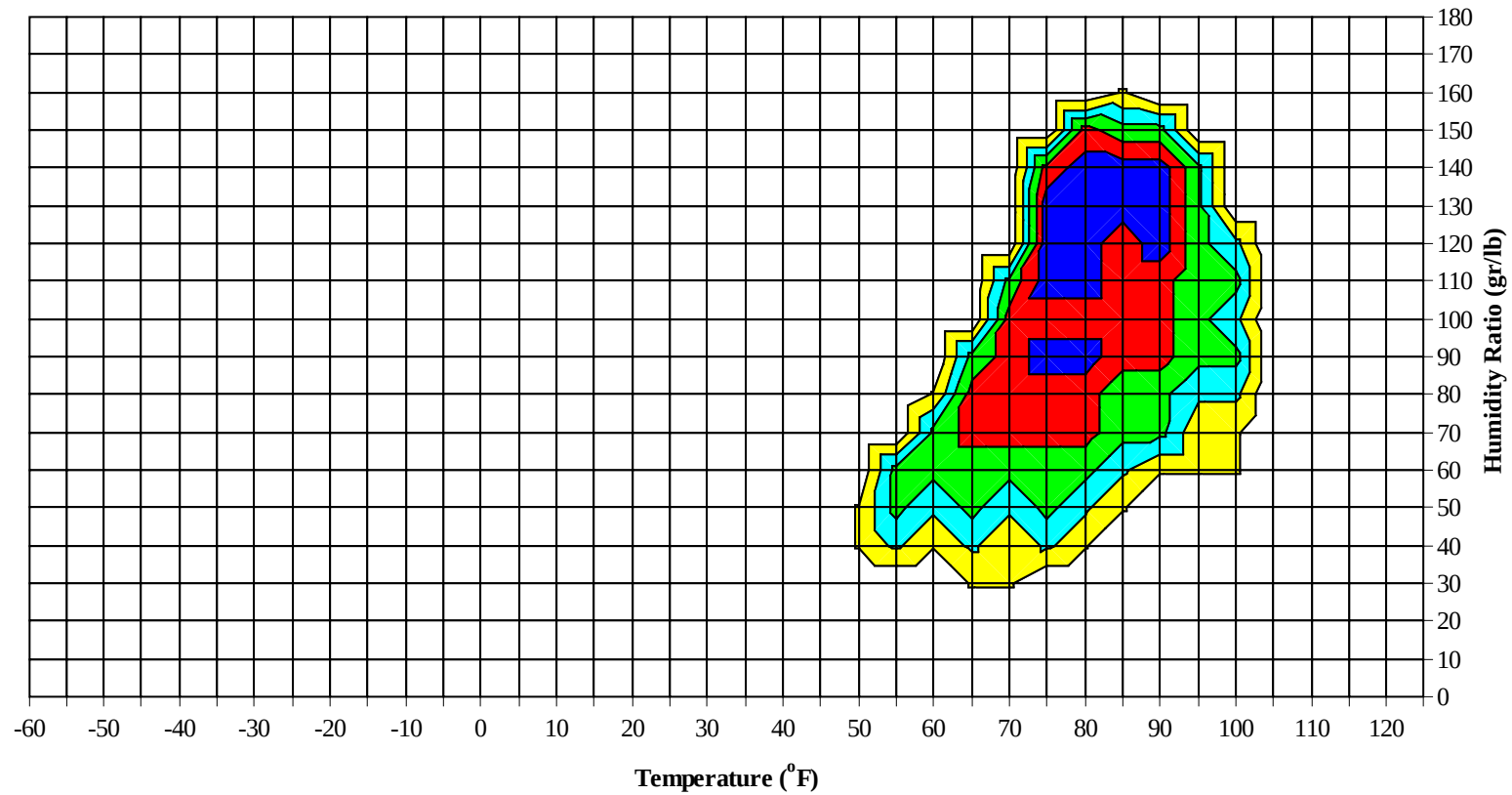
*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

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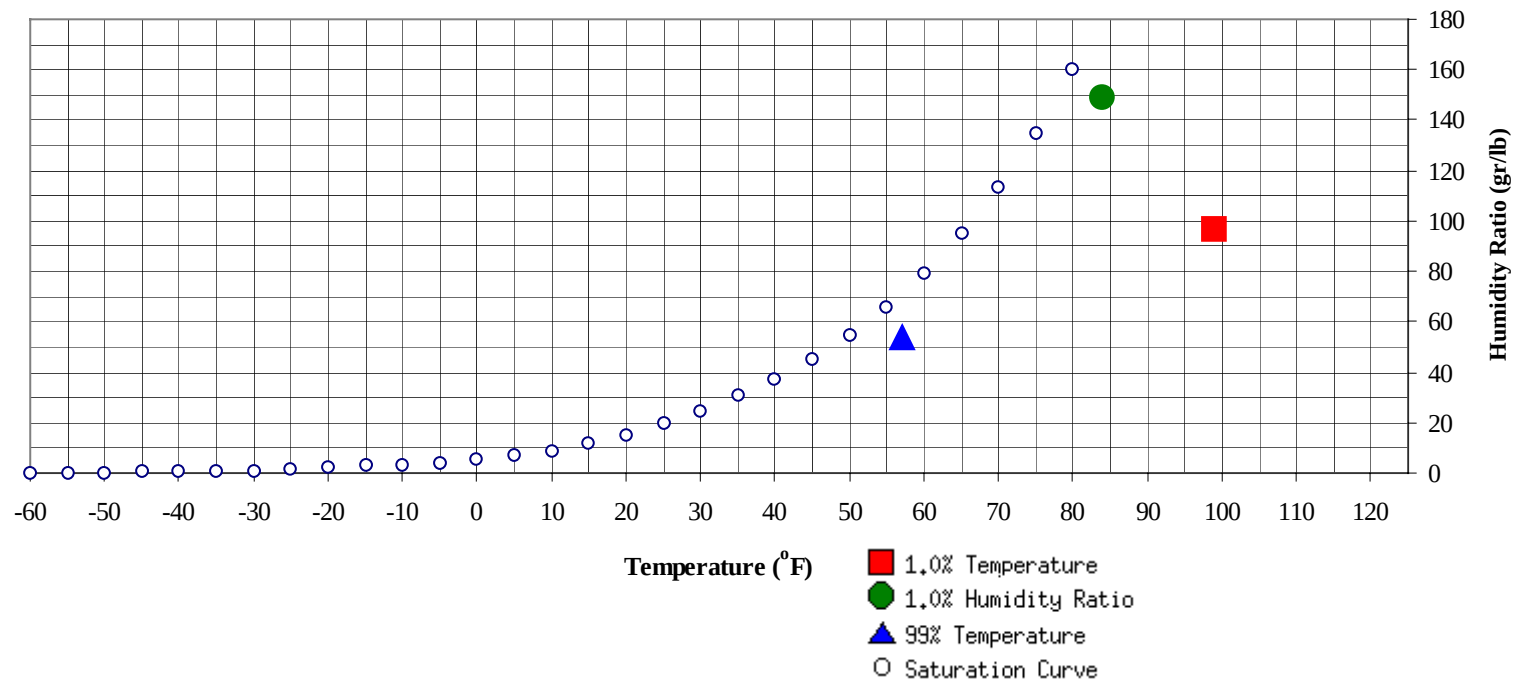


Long Term Psychrometric Summary



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

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)
	57	54	22.1		149.1	84	79.4	77.7	43.6

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	99	96.7	75.2	39.0

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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		
105 / 109															
100 / 104															
95 / 99		1		1	74.6		19	3	22	70.7		19	1	20	72.7
90 / 94		20	2	23	69.8		47	15	62	71.4		51	9	61	73.9
85 / 89	0	43	6	49	69.1	0	40	32	72	70.6	0	60	55	114	73.7
80 / 84	1	67	48	116	67.5	4	49	64	117	69.2	3	43	55	101	72.8
75 / 79	4	56	72	132	65.8	35	40	60	136	67.5	39	41	76	156	71.5
70 / 74	47	41	74	162	64.1	84	19	35	138	65.3	102	20	33	155	69.8
65 / 69	72	14	27	114	61.8	53	6	9	68	61.9	74	9	14	97	66.5
60 / 64	84	5	14	103	58.6	36	4	5	44	58.1	21	4	5	29	61.8
55 / 59	25	1	4	30	53.7	10	1	0	11	52.5	7	1	1	9	57.4
50 / 54	11	0	0	11	49.2	2	0		2	48.9	2	0	0	2	51.2
45 / 49	4			4	43.6	0	0		0	45.0	0			0	47.0
40 / 44	0			0	39.8	0			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		
105 / 109		2	0	2	75.3		0		0	77.5					
100 / 104		37	6	43	75.9		5		5	78.0		0		0	78.3
95 / 99	0	57	26	83	76.6	0	30	5	35	78.5		12	2	15	78.7
90 / 94	3	68	61	132	75.9	1	80	31	112	77.9	0	76	25	101	78.3
85 / 89	18	36	60	115	74.9	6	68	58	132	77.4	4	78	56	138	77.9
80 / 84	99	25	58	182	74.1	94	49	103	246	76.4	114	61	116	291	76.9
75 / 79	92	12	24	128	72.3	140	13	49	202	74.7	120	12	41	173	75.4
70 / 74	26	3	5	33	69.1	8	2	2	12	71.4	2	1	0	3	72.5
65 / 69	2	0		2	63.6	0	0	0	0	66.7					
60 / 64	0			0	59.0										
55 / 59															
50 / 54															
45 / 49															
40 / 44															

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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		
105 / 109															
100 / 104		0		0	82.0							0		0	80.0
95 / 99		6	1	7	78.8		2		2	79.3		0		0	81.0
90 / 94	0	64	19	83	78.2	0	48	7	55	78.6	0	45	4	49	77.8
85 / 89	1	87	51	139	77.8	0	80	35	115	78.0	0	86	37	123	77.5
80 / 84	94	70	123	287	76.7	73	88	137	298	76.9	49	83	128	260	76.9
75 / 79	147	20	54	221	75.1	168	30	67	264	75.3	181	25	69	275	75.1
70 / 74	6	1	0	7	72.2	8	1	1	10	72.6	10	1	2	13	72.2
65 / 69		0		0											
60 / 64															
55 / 59															
50 / 54															
45 / 49															
40 / 44															

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 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		
105 / 109															
100 / 104								0	0	76.0					
95 / 99		0		0	78.5		0	0	0	73.0					
90 / 94		33	2	36	76.3		12	0	12	73.6		5	1	7	73.1
85 / 89	0	97	21	118	75.0	0	67	4	71	72.2	0	38	2	41	70.2
80 / 84	16	92	126	235	74.2	2	93	66	161	70.5	1	74	27	102	67.5
75 / 79	165	22	83	271	73.2	42	49	98	190	69.1	3	64	67	134	65.5
70 / 74	56	4	13	73	69.1	103	15	52	169	66.6	41	44	80	165	63.3
65 / 69	9	0	1	10	64.3	51	3	13	67	63.0	69	14	37	120	61.5
60 / 64	2			2	59.0	29	1	7	37	58.7	75	7	22	104	57.8
55 / 59	0			0	58.0	12	0	0	12	54.1	37	2	8	47	53.3
50 / 54						1			1	51.1	16	0	2	18	49.0
45 / 49											7			7	44.7
40 / 44											0			0	41.0

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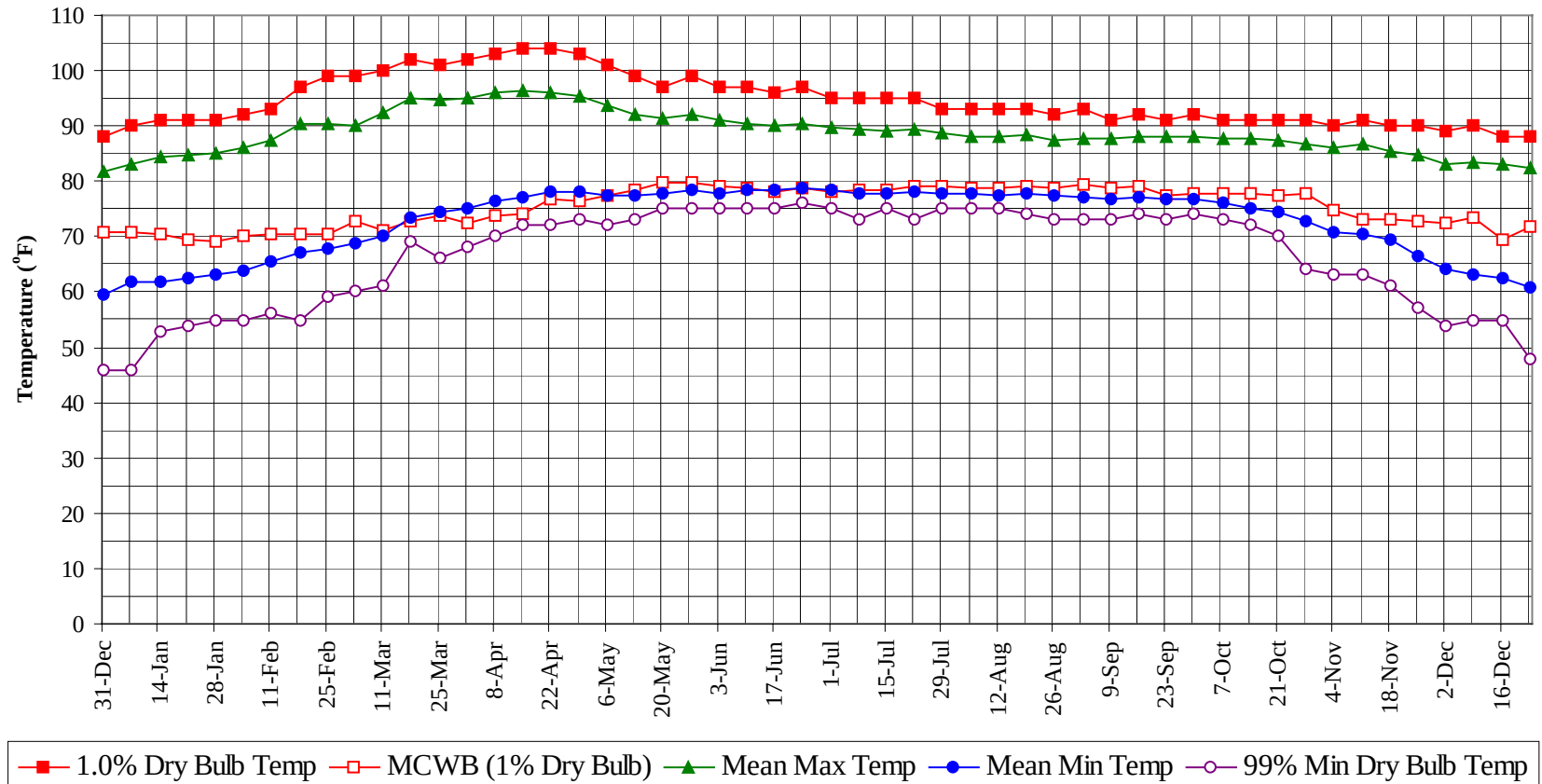
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1996

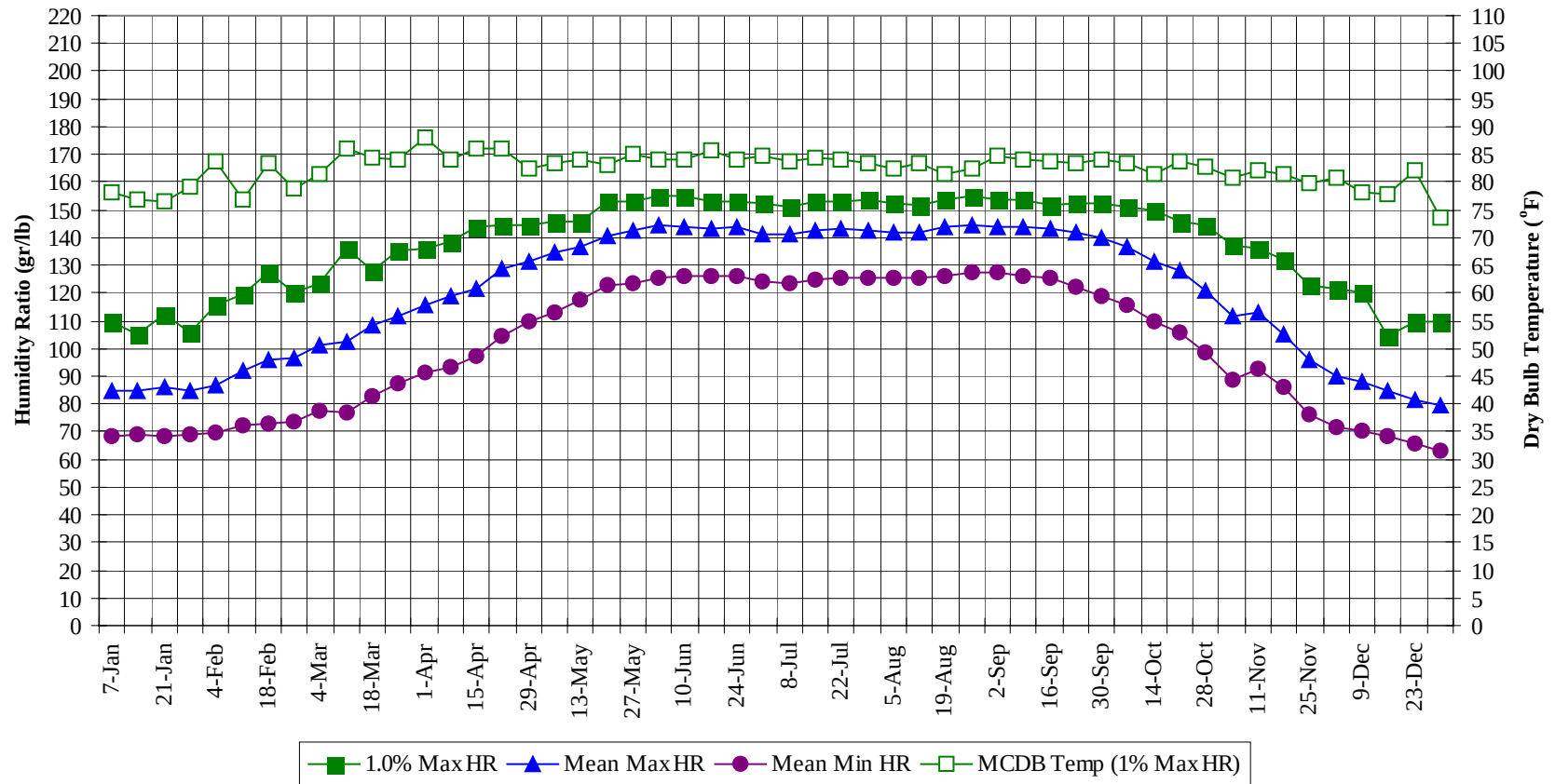
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
105 / 109		2	0	2	75.5
100 / 104		63	7	70	75.2
95 / 99	0	182	48	229	75.8
90 / 94	5	556	226	788	76.1
85 / 89	35	758	417	1210	75.3
80 / 84	580	789	1061	2430	74.3
75 / 79	1185	363	715	2263	72.3
70 / 74	469	142	286	896	65.9
65 / 69	281	41	94	417	62.0
60 / 64	237	19	50	306	58.3
55 / 59	87	4	13	104	53.4
50 / 54	30	1	2	33	49.1
45 / 49	11	0		11	44.3
40 / 44	1			1	40.0

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.

Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary

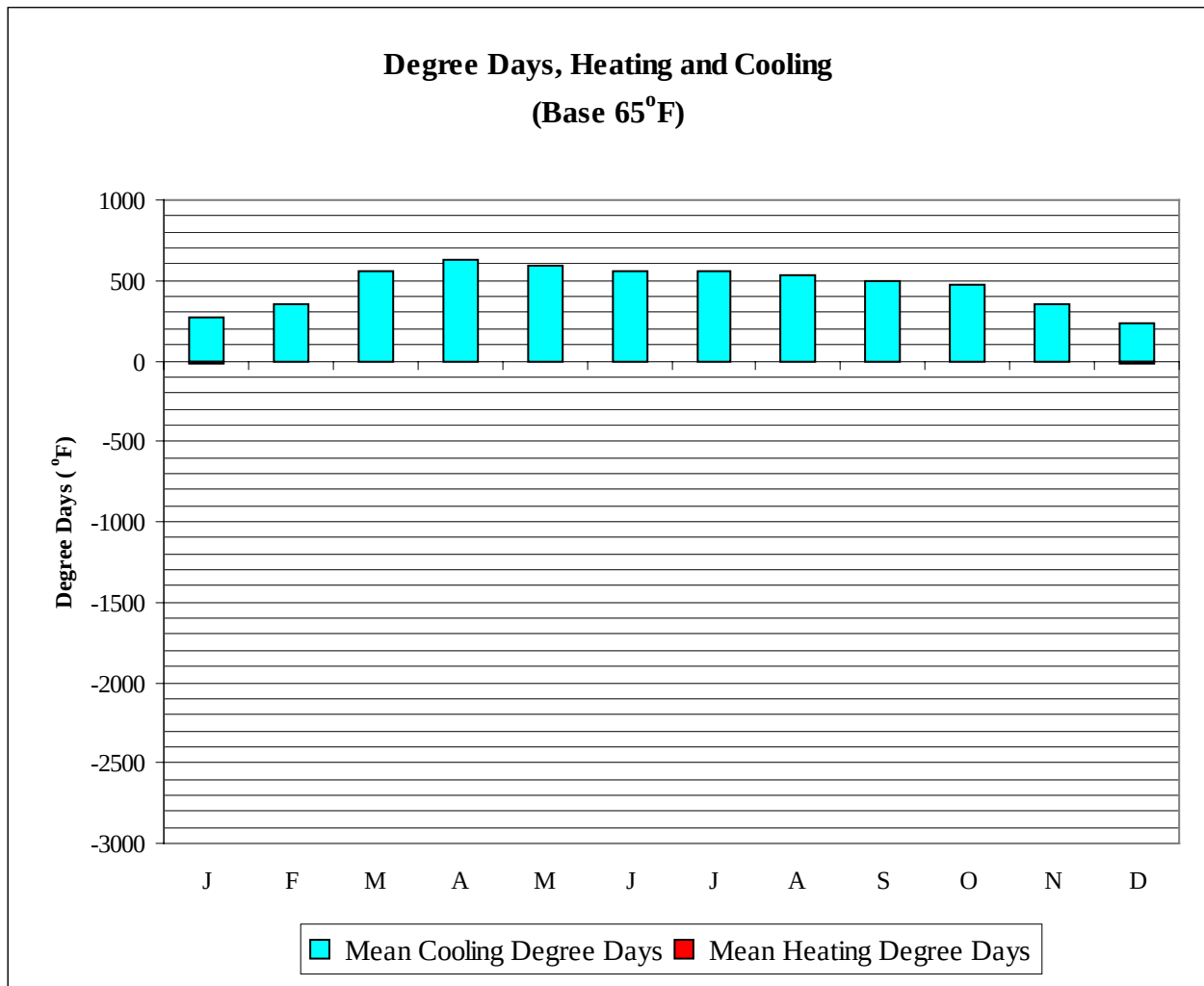


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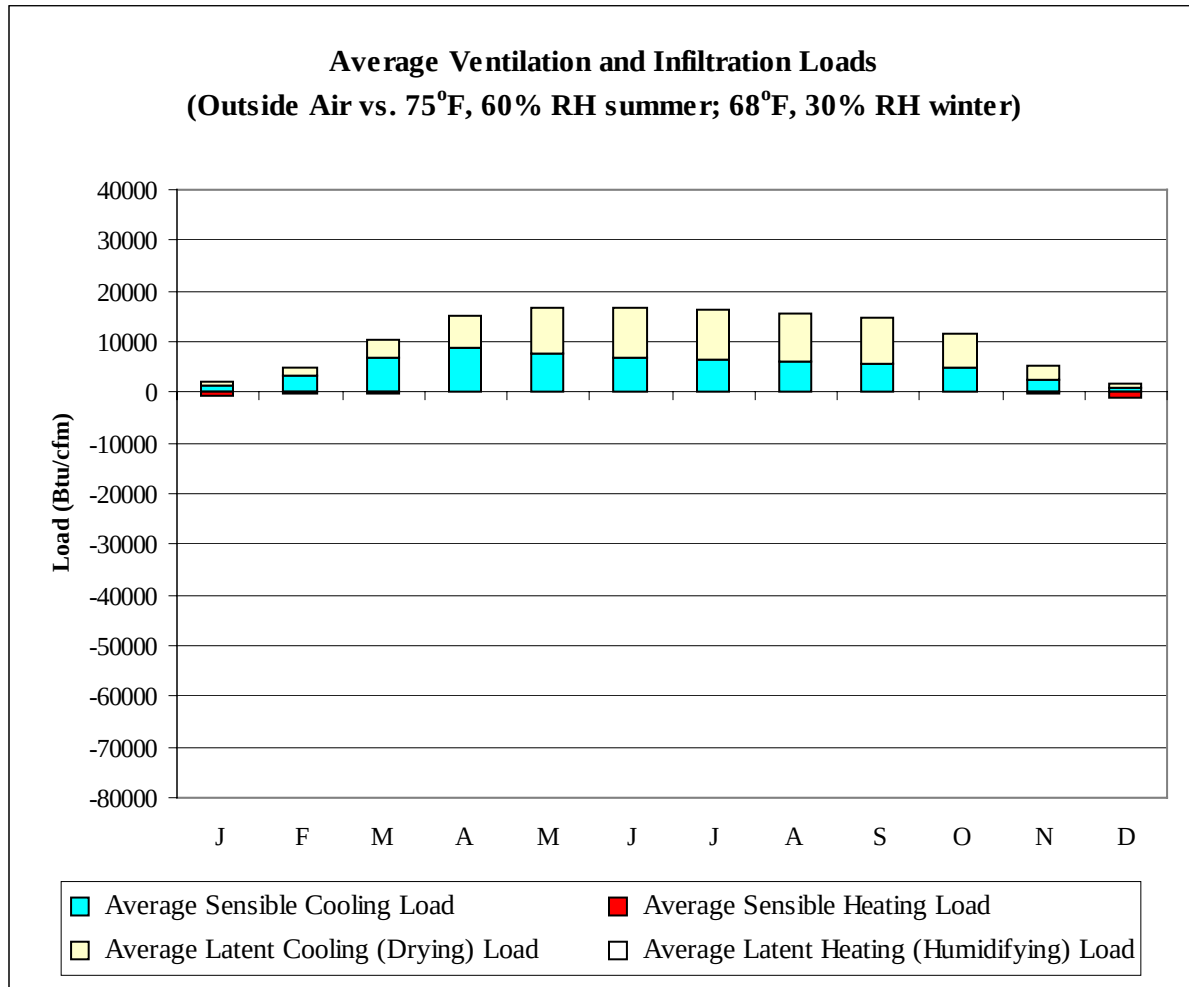
WMO No. 483540

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	90.0	70.7	83.2	61.9	46.0	109.9	78.0	84.6	68.5
14-Jan	91.0	70.3	84.3	61.8	53.0	105.0	76.7	85.0	68.7
21-Jan	91.0	69.6	84.8	62.6	54.0	112.0	76.6	86.2	68.5
28-Jan	91.0	69.2	85.2	63.3	55.0	105.7	79.2	84.9	68.7
4-Feb	92.0	70.3	86.2	63.7	55.0	115.5	83.6	86.6	69.5
11-Feb	93.0	70.4	87.5	65.4	56.0	119.7	76.9	91.9	72.2
18-Feb	97.0	70.5	90.3	67.1	55.0	127.4	83.4	95.9	72.7
25-Feb	99.0	70.4	90.3	67.8	59.0	120.4	78.7	96.3	73.5
4-Mar	99.0	72.9	90.1	68.9	60.0	123.2	81.3	100.9	77.5
11-Mar	100.0	71.2	92.6	70.2	61.0	135.8	86.1	102.2	76.7
18-Mar	102.0	72.6	95.1	73.5	69.0	128.1	84.5	108.2	82.6
25-Mar	101.0	73.7	94.8	74.3	66.0	135.1	84.2	111.5	87.4
1-Apr	102.0	72.4	95.0	75.1	68.0	135.8	88.1	115.3	91.1
8-Apr	103.0	73.8	96.2	76.6	70.0	138.6	84.2	119.1	93.1
15-Apr	104.0	74.2	96.4	77.1	72.0	143.5	86.0	121.7	97.3
22-Apr	104.0	76.8	95.9	78.0	72.0	144.2	85.9	128.5	104.6
29-Apr	103.0	76.4	95.3	78.1	73.0	144.2	82.3	131.3	109.5
6-May	101.0	77.4	93.8	77.5	72.0	145.6	83.3	134.6	112.9
13-May	99.0	78.5	92.0	77.5	73.0	145.6	84.0	136.4	117.8
20-May	97.0	79.8	91.5	77.8	75.0	153.3	83.2	140.7	122.6
27-May	99.0	79.9	92.0	78.5	75.0	153.3	85.1	142.7	123.2
3-Jun	97.0	79.2	91.0	77.9	75.0	154.7	84.2	144.8	125.7
10-Jun	97.0	78.9	90.4	78.4	75.0	154.7	84.2	144.0	125.9
17-Jun	96.0	78.0	90.1	78.5	75.0	153.3	85.6	143.4	125.9
24-Jun	97.0	78.8	90.2	78.8	76.0	153.3	84.0	143.5	126.1
1-Jul	95.0	78.1	89.6	78.5	75.0	152.6	84.8	141.2	124.0
8-Jul	95.0	78.6	89.4	77.9	73.0	151.2	83.8	141.5	123.4
15-Jul	95.0	78.4	89.2	77.7	75.0	153.3	84.6	142.4	125.0
22-Jul	95.0	79.0	89.5	78.0	73.0	153.3	84.1	143.0	125.3
29-Jul	93.0	79.1	88.8	77.8	75.0	154.0	83.6	142.2	125.3
5-Aug	93.0	78.7	88.2	77.7	75.0	152.6	82.3	142.1	125.5
12-Aug	93.0	78.8	88.2	77.4	75.0	151.9	83.3	142.1	125.5
19-Aug	93.0	79.2	88.4	77.7	74.0	154.0	81.6	143.8	126.2
26-Aug	92.0	78.8	87.4	77.3	73.0	154.7	82.4	144.5	127.5
2-Sep	93.0	79.6	87.7	77.1	73.0	154.0	84.6	143.9	127.7
9-Sep	91.0	78.7	87.6	76.6	73.0	154.0	84.1	143.7	126.4
16-Sep	92.0	79.1	88.0	77.0	74.0	151.9	83.6	142.8	125.7
23-Sep	91.0	77.3	88.0	76.8	73.0	152.6	83.4	141.8	122.1
30-Sep	92.0	77.9	88.2	76.9	74.0	152.6	84.2	140.2	118.9
7-Oct	91.0	77.7	87.9	76.0	73.0	151.2	83.3	136.4	115.3
14-Oct	91.0	77.7	87.8	75.2	72.0	149.8	81.3	131.6	109.6
21-Oct	91.0	77.3	87.4	74.5	70.0	145.6	83.8	128.4	105.8
28-Oct	91.0	77.7	86.8	72.9	64.0	144.2	82.6	121.1	98.6
4-Nov	90.0	74.7	86.2	70.7	63.0	137.2	80.8	111.7	88.9
11-Nov	91.0	73.2	86.6	70.6	63.0	135.8	82.2	113.2	92.3
18-Nov	90.0	73.2	85.5	69.5	61.0	132.3	81.3	105.3	85.9
25-Nov	90.0	72.9	84.6	66.4	57.0	122.5	79.7	95.8	76.4
2-Dec	89.0	72.4	82.9	64.2	54.0	121.8	80.8	90.0	71.4
9-Dec	90.0	73.5	83.4	63.2	55.0	120.4	78.1	87.8	70.6
16-Dec	88.0	69.6	83.0	62.5	55.0	104.3	77.9	85.0	68.1
23-Dec	88.0	71.7	82.5	60.8	48.0	109.9	82.0	81.3	65.5
31-Dec	88.0	70.8	81.7	59.6	46.0	109.9	73.5	79.2	63.2



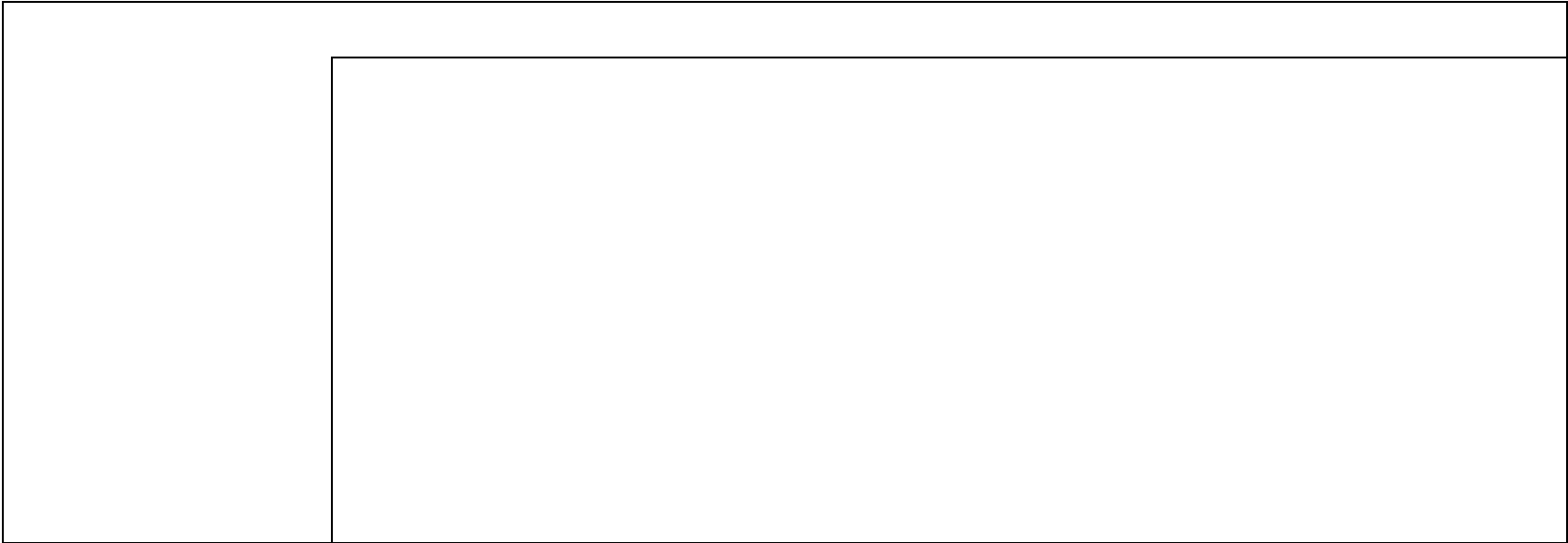
	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	273	14
FEB	359	4
MAR	554	1
APR	633	0
MAY	590	0
JUN	558	0
JUL	553	0
AUG	530	0
SEP	499	0
OCT	476	0
NOV	350	3
DEC	234	18
ANN	5609	40



	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	1437	-699	813	-9
FEB	3199	-230	1640	0
MAR	6901	-66	3558	-1
APR	8938	-1	6085	0
MAY	7720	0	8909	0
JUN	7012	0	9657	0
JUL	6624	0	9724	0
AUG	6006	0	9651	0
SEP	5525	0	9016	0
OCT	4691	-9	6891	0
NOV	2459	-209	2779	0
DEC	998	-909	822	-8
ANN	61510	-2123	69545	-18

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

No Solar Radiation
Data Available

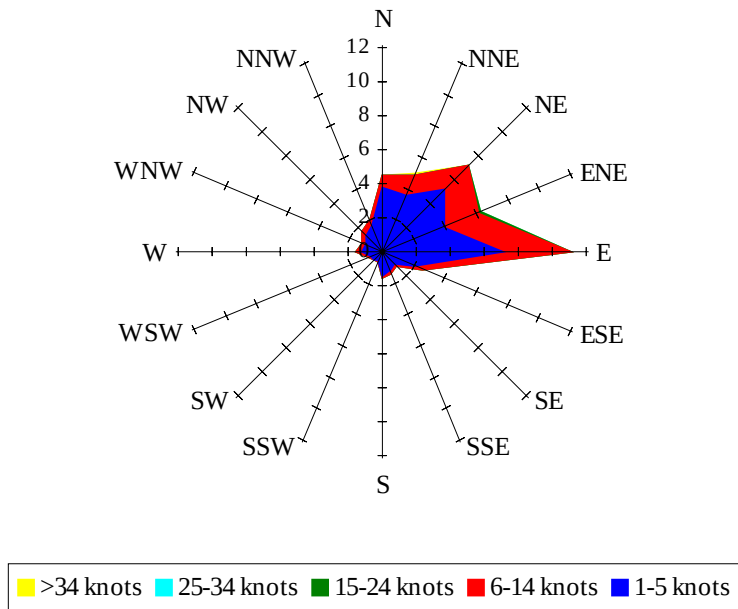


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

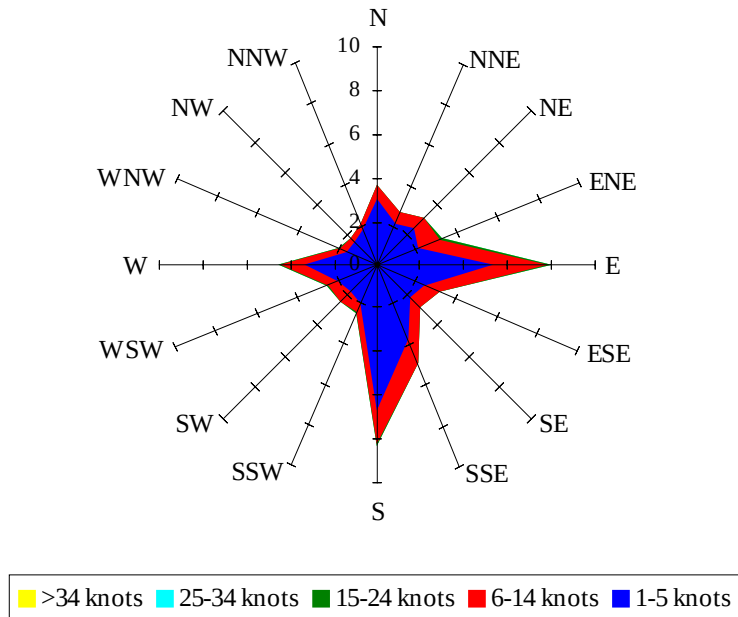
Labels of Percent Frequency on North Axis



Percent Calm = 51.54

Wind Summary - March, April, and May

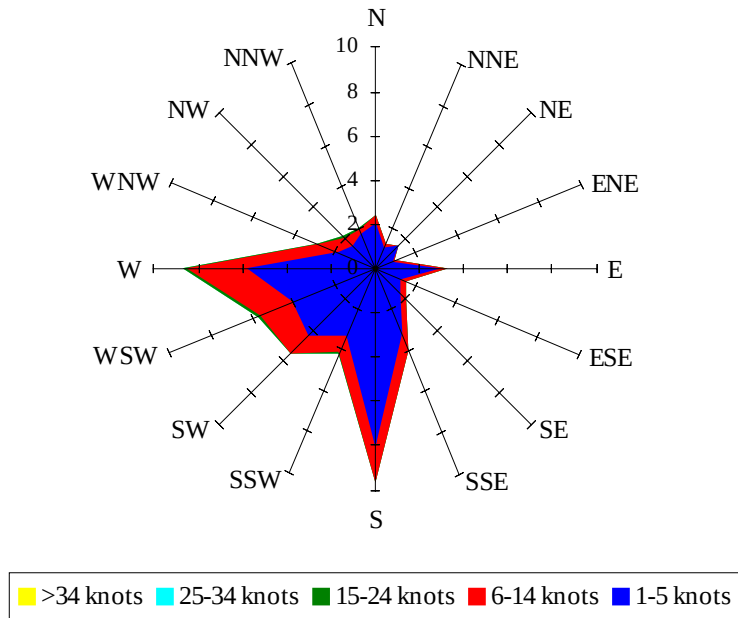
Labels of Percent Frequency on North Axis



Percent Calm = 43.68

Wind Summary - June, July, and August

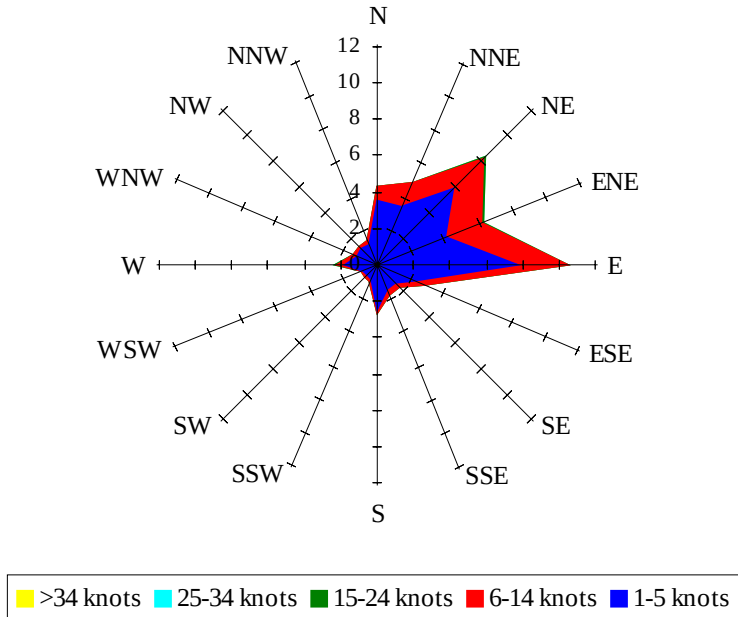
Labels of Percent Frequency on North Axis



Percent Calm = 43.78

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 47.80