

MANGILSAN KO

Latitude = 36.93 N

Longitude = 126.45 E

Period of Record = 1973 to 1995

WMO No. 471260

Elevation = 991 feet

Average Pressure = 28.95 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	91	79	135	5.3	NNE
0.4% Occurrence	88	78	133	7.0	SSE
1.0% Occurrence	84	76	125	7.8	W
2.0% Occurrence	82	74	118	7.3	W
Mean Daily Range	12	-	-	-	-
97.5% Occurrence	19	16	10	9.6	NNW
99.0% Occurrence	16	14	8	9.7	N
99.6% Occurrence	14	12	8	9.8	N
Median of Extreme Lows	10	8	6	11.5	NNW
	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	81	87	153	7.2	WSW
0.4% Occurrence	79	85	143	7.8	S
1.0% Occurrence	77	82	135	8.6	S
2.0% Occurrence	76	81	132	8.6	S
	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	156	85	0.99	8.2	WSW
0.4% Occurrence	146	83	0.94	8.4	SW
1.0% Occurrence	138	80	0.88	9.2	S
2.0% Occurrence	130	77	0.83	10.6	S
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		2	285	523	1412

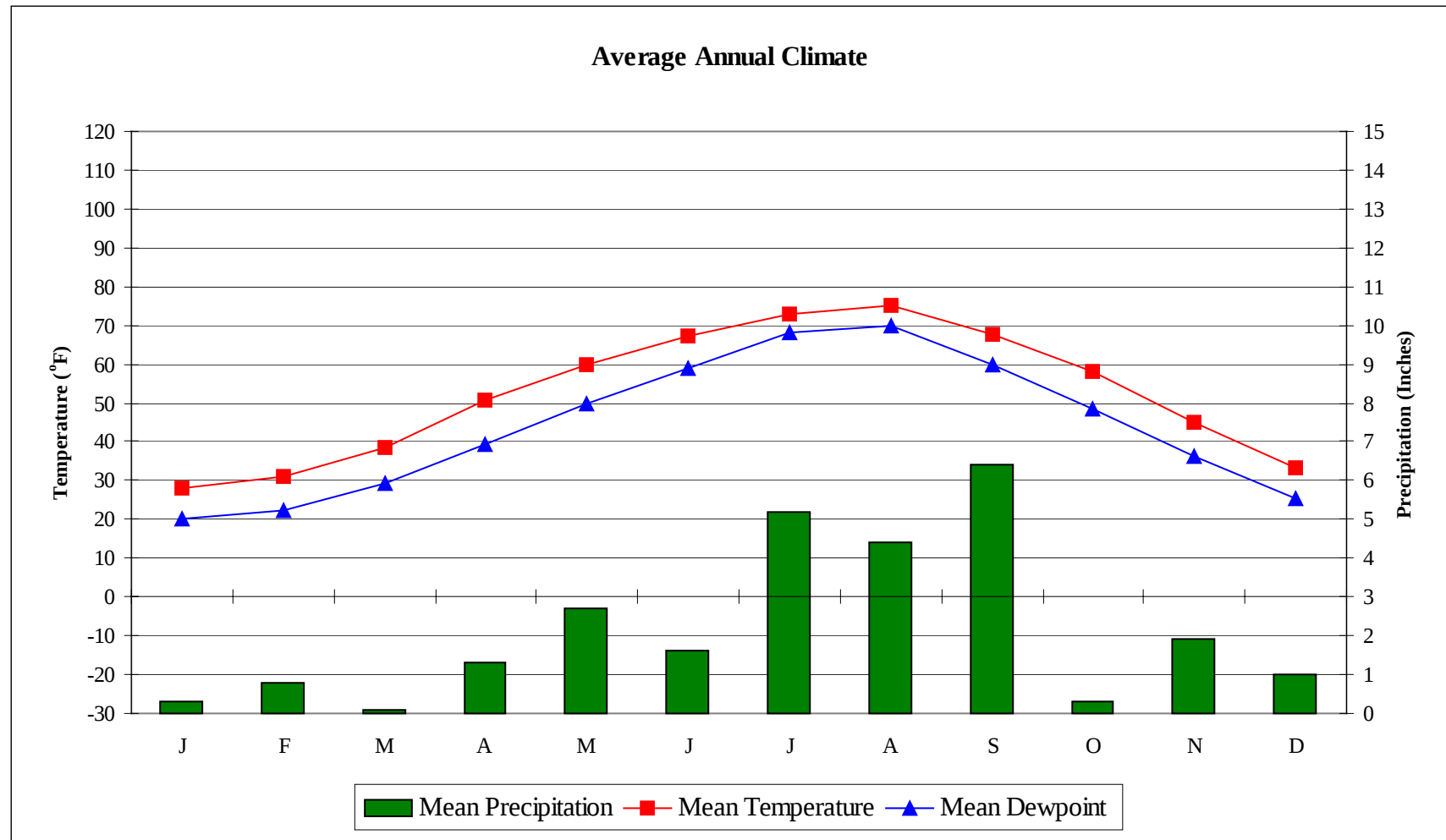
Other Site Data

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	1.4 + 0.2
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 (#)
55.2	N/A	N/A	39

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

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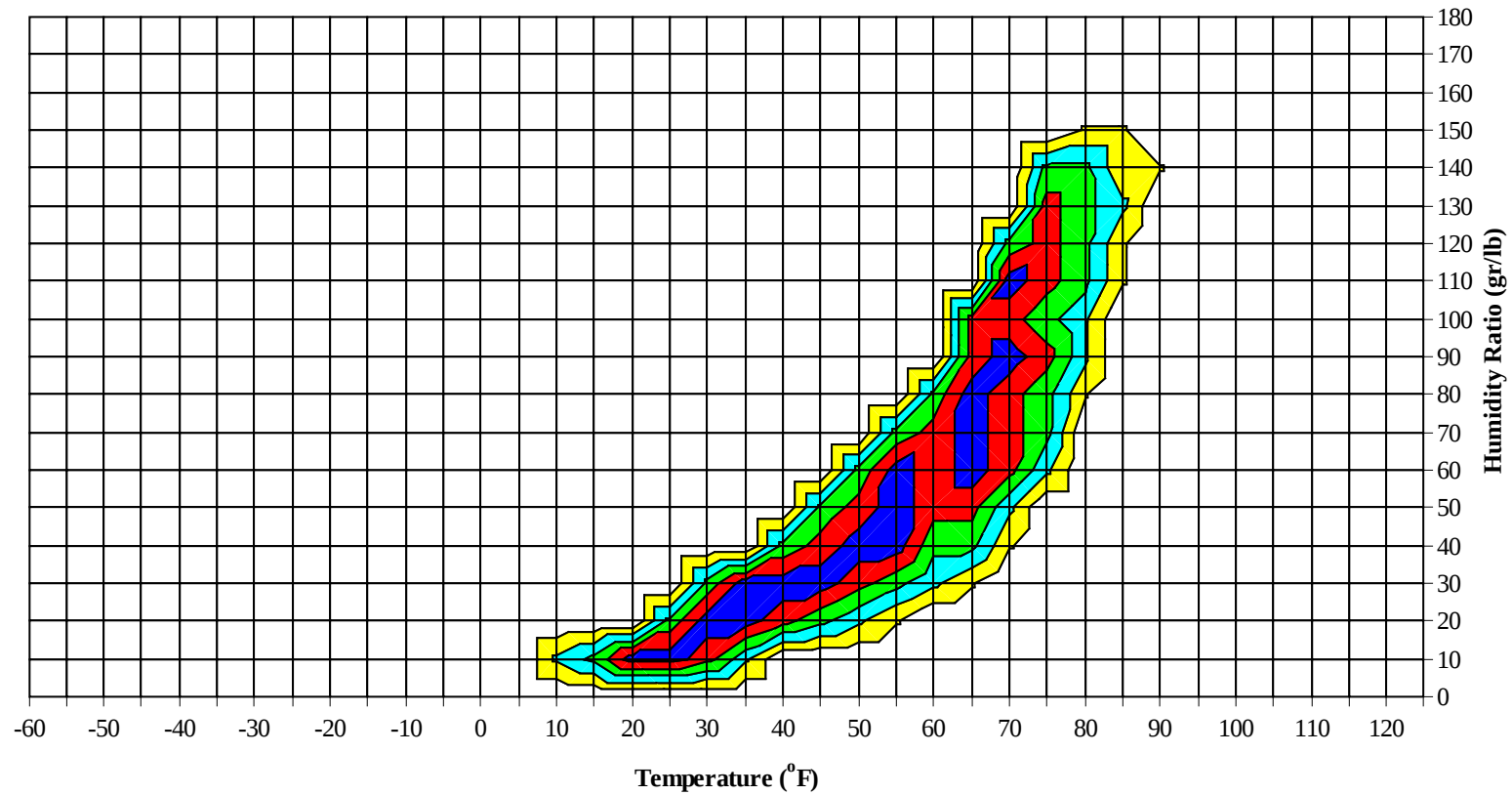
WMO No. 471260



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Long Term Psychrometric Summary

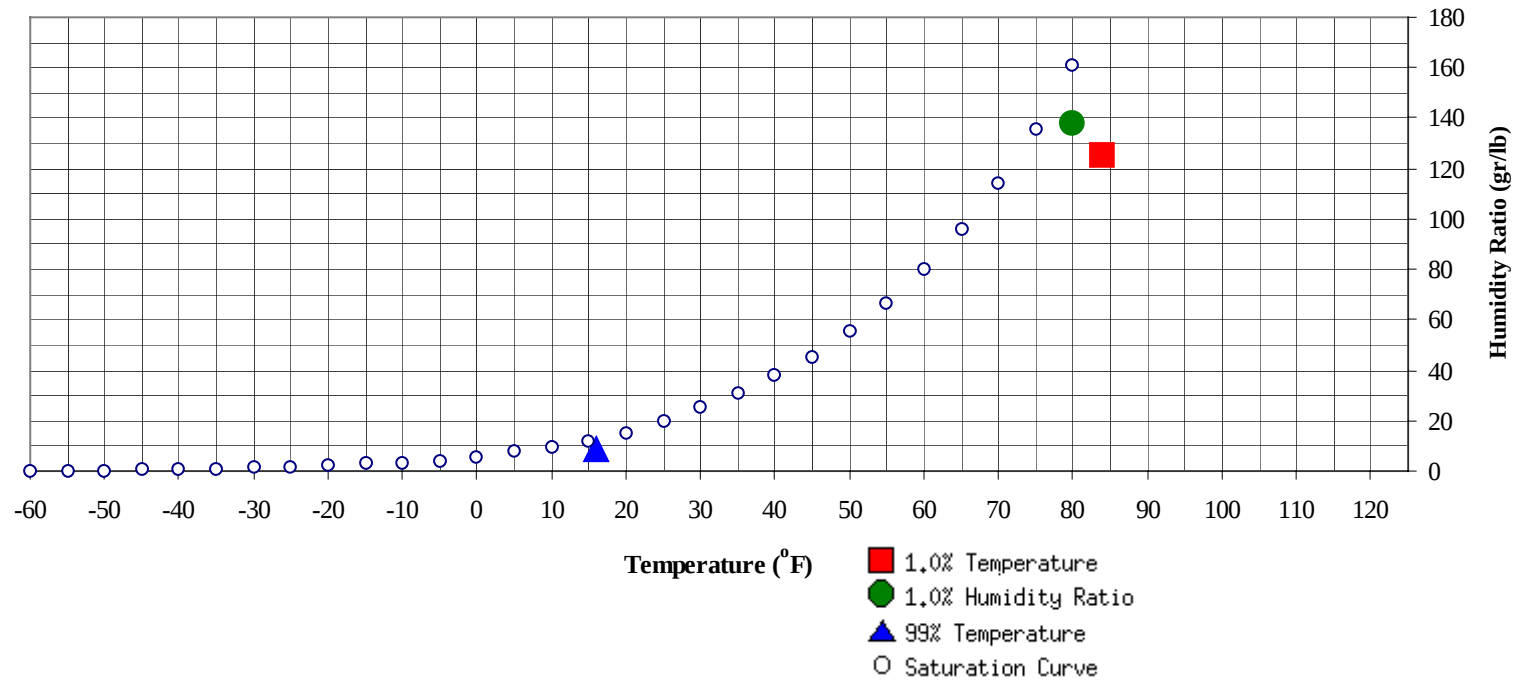


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

MANGILSAN KO

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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)
	16	8.5	5.1		137.9	79.9	76.5	75.2	40.8

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	84	125.5	75.8	39.9

MANGILSAN KO

WMO No. 471260

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

Period of Record = 1973 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															
65 / 69											0			0	49.0
60 / 64		1		1	47.1						0	3	0	3	52.2
55 / 59		0	0	0	44.5		0	0	0	50.0	0	13	2	15	48.0
50 / 54	1	0	0	1	43.5	0	5	1	6	45.6	4	38	12	54	44.8
45 / 49	1	6	1	8	40.8	4	19	6	29	40.6	12	55	35	102	40.9
40 / 44	3	18	6	27	37.7	5	28	16	49	37.6	27	47	42	116	37.8
35 / 39	15	57	30	102	34.0	31	60	49	140	33.6	79	59	82	220	34.2
30 / 34	59	72	69	200	29.3	56	54	66	176	29.2	77	27	55	159	29.5
25 / 29	58	50	66	173	24.2	59	34	45	138	24.0	38	6	18	62	24.4
20 / 24	40	21	31	92	19.8	27	13	23	64	19.8	8	1	2	10	20.2
15 / 19	47	20	35	102	15.8	31	9	16	55	15.9	2	0	1	3	16.4
10 / 14	19	4	11	33	11.2	9	2	3	14	10.8	1	0	0	1	12.2
5 / 9	4	0	0	4	6.9	1	0	0	1	6.4					

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 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	09	17			01	09	17			01	09	17		
	To 08	To 16	To 00			To 08	To 16	To 00			To 08	To 16	To 00		
95 / 99															
90 / 94															
85 / 89	0 0										0 0 66.5				
80 / 84	0 65.5					2 0 2 66.7					17 3 20 68.8				
75 / 79	1 58.8					17 3 20 64.0					0 66 17 83 66.8				
70 / 74	9 1 10 58.4					1 48 13 62 61.1					20 72 60 152 64.4				
65 / 69	0 15 5 20 56.5					6 50 28 84 58.8					59 42 68 169 62.2				
60 / 64	4 48 20 73 53.2					55 71 76 201 56.4					112 36 73 220 59.7				
55 / 59	24 56 41 120 50.1					84 41 67 192 52.6					42 6 18 67 55.5				
50 / 54	48 57 64 169 46.4					71 17 47 135 48.6					8 0 1 9 51.8				
45 / 49	72 37 60 169 42.5					25 3 14 42 44.5					0 0 45.0				
40 / 44	41 12 26 79 38.6					5 1 6 40.2									
35 / 39	40 5 20 64 34.8														
30 / 34	11 1 3 15 30.3														
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															

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

Period of Record = 1973 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	82.0	0	0		0	80.5					
90 / 94		6	1	7	78.7	0	6	0	6	79.1					
85 / 89		12	4	15	77.8	0	29	6	35	77.4		0		0	74.8
80 / 84	5	46	20	72	74.8	2	70	34	107	75.1	0	15	2	16	72.0
75 / 79	35	77	66	178	72.4	68	83	99	250	72.5	1	61	20	83	68.8
70 / 74	107	75	102	284	69.4	131	46	87	264	69.8	31	87	65	184	65.7
65 / 69	72	24	43	139	65.8	34	10	17	60	65.5	68	45	69	182	62.9
60 / 64	27	6	10	43	61.7	14	4	5	22	62.5	100	27	69	196	59.1
55 / 59	2	2	2	6	55.8						38	5	13	55	54.3
50 / 54											3	0	1	4	48.8
45 / 49											0	0		0	45.0
40 / 44											0			0	41.0
35 / 39															
30 / 34															
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															

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 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	0	0		0	65.0										
75 / 79	0	6	0	6	63.8										
70 / 74	0	30	3	33	61.9		0		0	57.0					
65 / 69	3	43	15	61	59.2		1		1	57.1					
60 / 64	33	79	65	177	56.8	0	19	2	21	54.1		0	0	0	47.2
55 / 59	99	59	96	254	52.7	8	41	18	67	51.6		2	0	2	48.2
50 / 54	72	21	45	138	48.1	41	56	52	148	47.4	1	10	4	15	45.5
45 / 49	28	8	18	54	42.4	61	51	60	172	42.5	10	29	14	53	42.1
40 / 44	9	2	4	14	38.0	41	30	36	106	38.1	17	31	25	73	38.4
35 / 39	4	1	2	7	34.3	47	27	41	116	34.0	55	68	58	181	34.0
30 / 34	0	0	0	0	31.0	28	14	23	65	29.4	65	55	70	189	29.3
25 / 29						12	3	8	23	24.8	52	30	41	123	24.3
20 / 24						2	0	0	2	20.8	23	15	19	58	20.1
15 / 19						0	0		0	18.5	19	6	13	38	16.3
10 / 14											5	2	2	9	11.8
5 / 9											1	0	1	2	5.9

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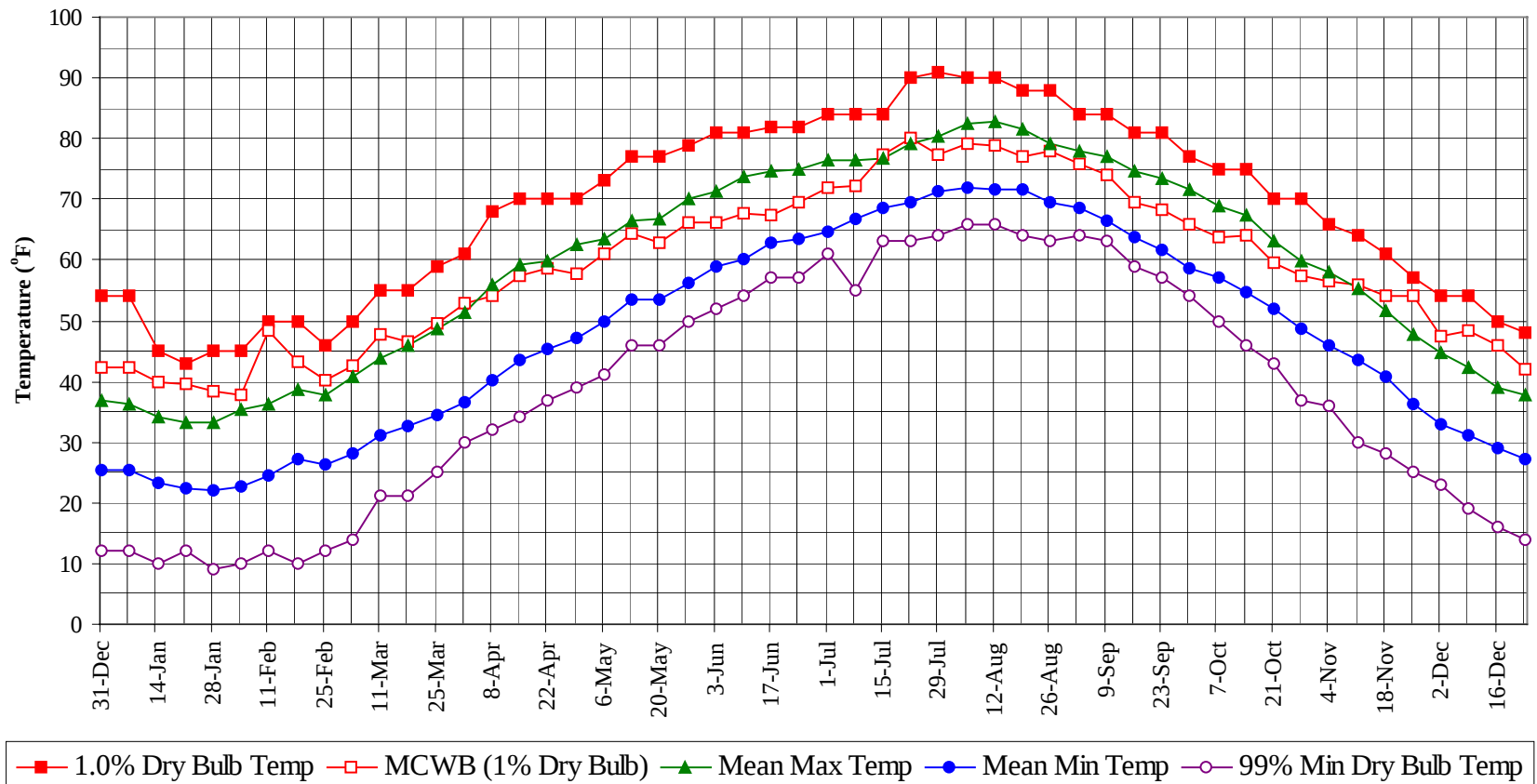
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1995

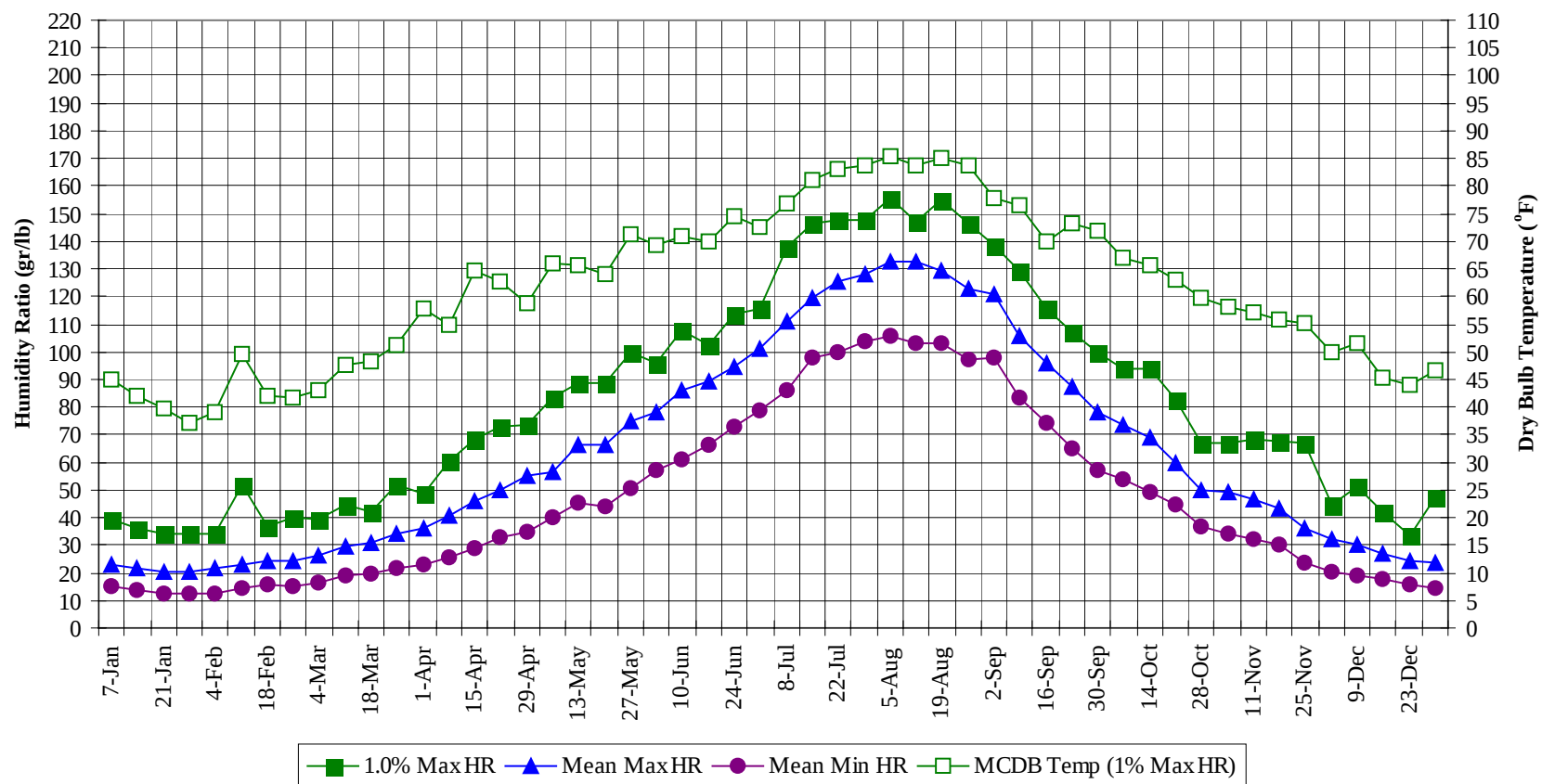
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
95 / 99	0	0		0	81.3
90 / 94	0	13	1	13	78.7
85 / 89	0	44	10	54	77.4
80 / 84	9	155	62	226	74.1
75 / 79	110	313	210	632	70.9
70 / 74	299	367	338	1004	67.2
65 / 69	243	231	245	719	62.5
60 / 64	343	292	318	953	57.8
55 / 59	298	224	259	781	52.4
50 / 54	253	206	233	692	47.3
45 / 49	220	209	211	640	42.2
40 / 44	150	165	156	471	38.1
35 / 39	270	273	278	820	34.0
30 / 34	288	219	278	784	29.3
25 / 29	212	120	172	504	24.2
20 / 24	96	48	73	217	19.9
15 / 19	95	34	61	189	15.9
10 / 14	31	8	16	54	11.2
5 / 9	5	0	1	6	6.6

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Annual Summary of Temperatures

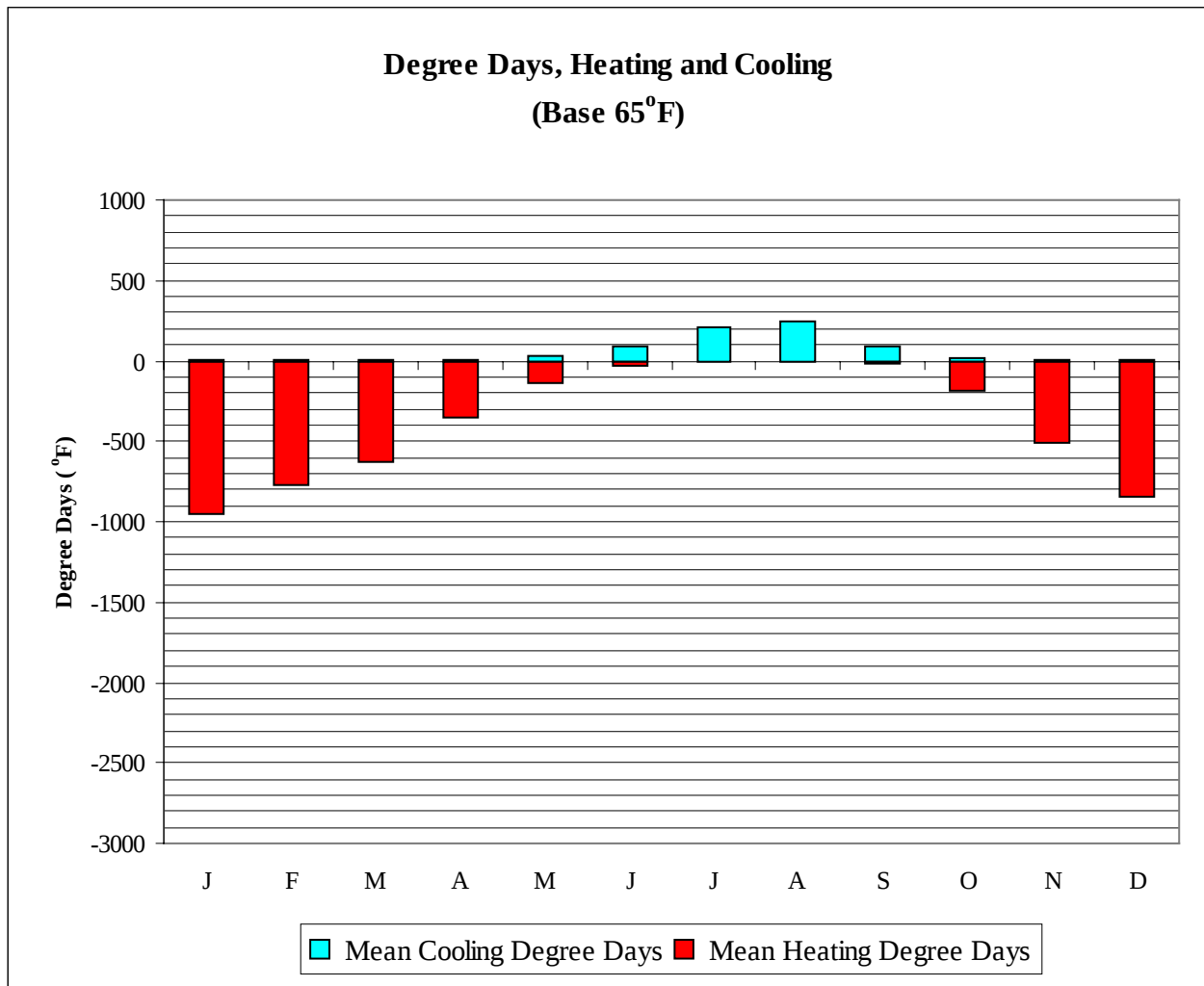


Long Term Humidity and Dry Bulb Temperature Summary



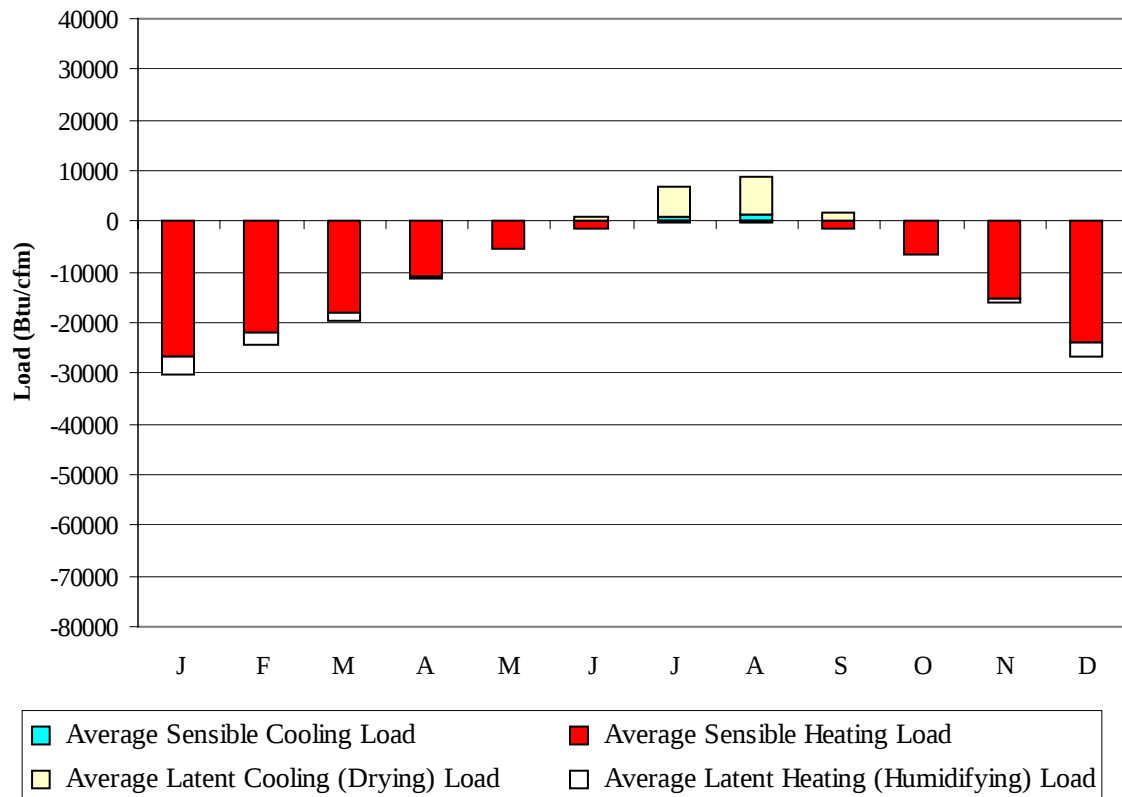
MANGILSAN KO**WMO No. 471260****Long Term Dry Bulb Temperature and Humidity Summary**

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	42.3	36.2	25.5	12.0	39.2	45.0	23.3	14.9
14-Jan	45.0	39.8	34.1	23.2	10.0	36.4	42.0	21.8	13.6
21-Jan	43.0	39.4	33.4	22.5	12.0	34.3	39.8	20.3	12.7
28-Jan	45.0	38.2	33.1	22.0	9.0	34.3	37.1	20.2	12.5
4-Feb	45.0	37.6	35.2	22.7	10.0	34.3	39.2	21.7	12.6
11-Feb	50.0	48.4	36.4	24.6	12.0	51.8	49.6	23.0	14.4
18-Feb	50.0	43.3	38.7	27.1	10.0	37.1	42.0	24.5	15.9
25-Feb	46.0	40.2	37.8	26.4	12.0	39.9	41.7	24.3	15.3
4-Mar	50.0	42.7	40.9	28.2	14.0	39.2	43.1	26.1	16.3
11-Mar	55.0	47.6	43.9	31.0	21.0	44.8	47.6	29.7	19.3
18-Mar	55.0	46.6	46.0	32.6	21.0	42.0	48.2	30.8	19.9
25-Mar	59.0	49.5	48.7	34.5	25.0	51.8	51.1	33.9	21.8
1-Apr	61.0	52.8	51.5	36.7	30.0	48.3	57.9	35.8	23.2
8-Apr	68.0	54.1	56.0	40.1	32.0	60.2	54.9	40.6	25.7
15-Apr	70.0	57.4	59.2	43.4	34.0	68.6	64.7	46.2	29.1
22-Apr	70.0	58.5	59.7	45.2	37.0	72.8	62.8	49.9	32.6
29-Apr	70.0	57.7	62.4	47.3	39.0	73.5	58.8	55.2	35.0
6-May	73.0	61.0	63.3	49.9	41.0	83.3	66.1	56.5	39.8
13-May	77.0	64.3	66.6	53.5	46.0	88.9	65.7	66.4	45.6
20-May	77.0	62.8	66.7	53.5	46.0	88.9	64.1	66.2	44.3
27-May	79.0	66.1	70.1	56.2	50.0	100.1	71.2	74.6	50.8
3-Jun	81.0	66.2	71.4	59.0	52.0	95.9	69.4	77.9	57.2
10-Jun	81.0	67.7	73.6	60.0	54.0	107.8	71.0	85.7	60.9
17-Jun	82.0	67.5	74.7	62.7	57.0	102.2	69.8	89.4	66.4
24-Jun	82.0	69.5	74.8	63.5	57.0	113.4	74.5	94.8	72.8
1-Jul	84.0	71.9	76.6	64.7	61.0	115.5	72.5	101.2	78.6
8-Jul	84.0	72.2	76.5	66.7	55.0	137.9	76.9	110.7	86.3
15-Jul	84.0	77.3	76.8	68.5	63.0	146.3	81.1	119.4	98.1
22-Jul	90.0	79.9	79.0	69.6	63.0	147.7	83.1	125.5	99.9
29-Jul	91.0	77.3	80.2	71.3	64.0	147.7	83.8	128.2	104.0
5-Aug	90.0	79.3	82.5	71.8	66.0	155.4	85.3	132.6	105.8
12-Aug	90.0	78.8	82.7	71.6	66.0	147.0	83.6	132.4	103.4
19-Aug	88.0	77.2	81.7	71.7	64.0	154.7	85.0	129.5	103.2
26-Aug	88.0	77.8	79.2	69.5	63.0	146.3	83.8	122.5	96.9
2-Sep	84.0	76.0	78.0	68.7	64.0	138.6	77.8	120.9	97.6
9-Sep	84.0	74.1	77.1	66.6	63.0	129.5	76.4	106.0	83.2
16-Sep	81.0	69.4	74.8	63.7	59.0	115.5	70.0	95.7	74.1
23-Sep	81.0	68.3	73.5	61.5	57.0	107.1	73.1	87.3	65.1
30-Sep	77.0	65.8	71.5	58.7	54.0	100.1	71.9	78.1	57.0
7-Oct	75.0	63.7	68.9	57.2	50.0	93.8	67.1	73.6	53.9
14-Oct	75.0	64.1	67.3	54.7	46.0	93.8	65.7	68.8	49.5
21-Oct	70.0	59.6	63.2	51.9	43.0	82.6	62.9	60.1	44.5
28-Oct	70.0	57.5	59.9	48.5	37.0	67.2	59.9	50.2	37.0
4-Nov	66.0	56.5	58.1	45.9	36.0	67.2	58.1	49.3	34.2
11-Nov	64.0	55.8	55.2	43.4	30.0	68.6	57.0	46.6	32.1
18-Nov	61.0	54.2	51.8	40.8	28.0	67.9	55.8	43.3	30.1
25-Nov	57.0	54.2	47.7	36.2	25.0	67.2	55.2	36.0	23.5
2-Dec	54.0	47.6	44.8	32.9	23.0	44.8	50.0	32.4	20.3
9-Dec	54.0	48.2	42.3	31.3	19.0	51.1	51.5	29.9	19.3
16-Dec	50.0	45.8	39.0	29.1	16.0	42.0	45.3	27.0	17.8
23-Dec	48.0	42.1	37.8	27.1	14.0	33.6	43.9	24.1	15.5
31-Dec	54.0	42.3	36.8	25.4	12.0	47.6	46.8	23.8	14.7



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	957
FEB	0	774
MAR	0	625
APR	3	355
MAY	24	142
JUN	88	25
JUL	205	2
AUG	247	1
SEP	91	22
OCT	13	191
NOV	0	514
DEC	0	848
ANN	670	4456

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	-26774	0	-3327
FEB	0	-21788	0	-2634
MAR	0	-17995	0	-1672
APR	3	-11024	2	-447
MAY	24	-5236	84	-23
JUN	181	-1380	799	-1
JUL	909	-223	6121	0
AUG	1315	-90	7602	0
SEP	172	-1273	1695	0
OCT	5	-6612	54	-76
NOV	0	-15246	0	-944
DEC	0	-24012	0	-2653
ANN	2609	-131653	16357	-11777

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

No Solar Radiation
Data Available

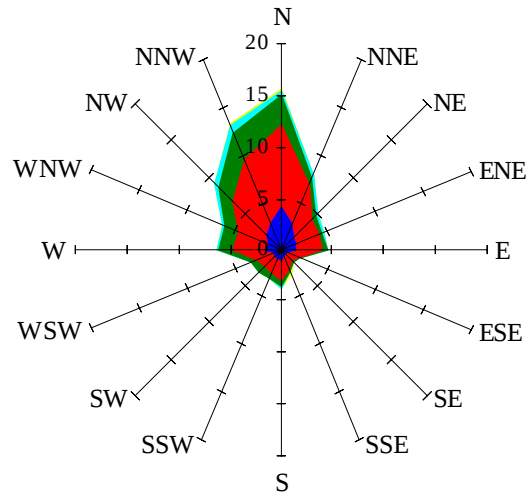


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

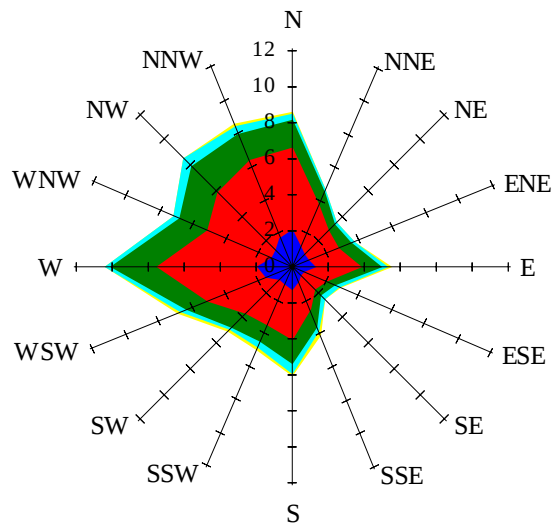
Labels of Percent Frequency on North Axis



Percent Calm = 9.21

Wind Summary - March, April, and May

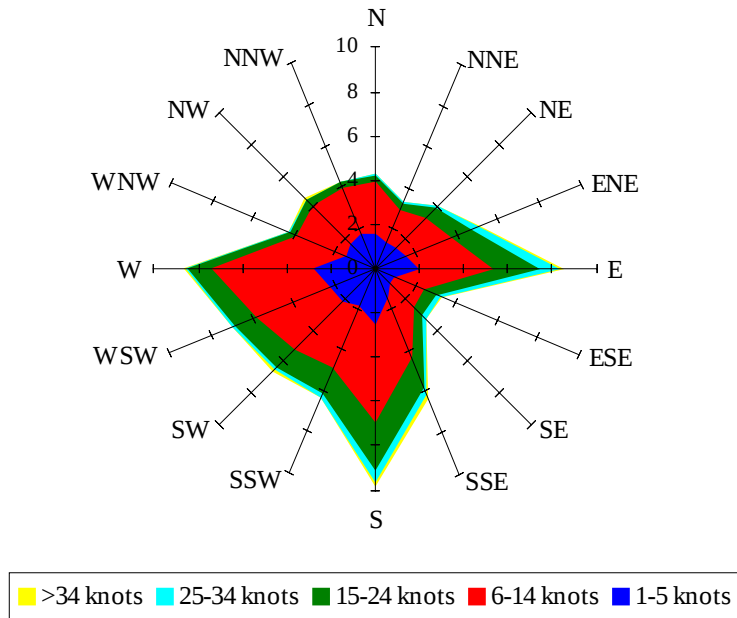
Labels of Percent Frequency on North Axis



Percent Calm = 8.09

Wind Summary - June, July, and August

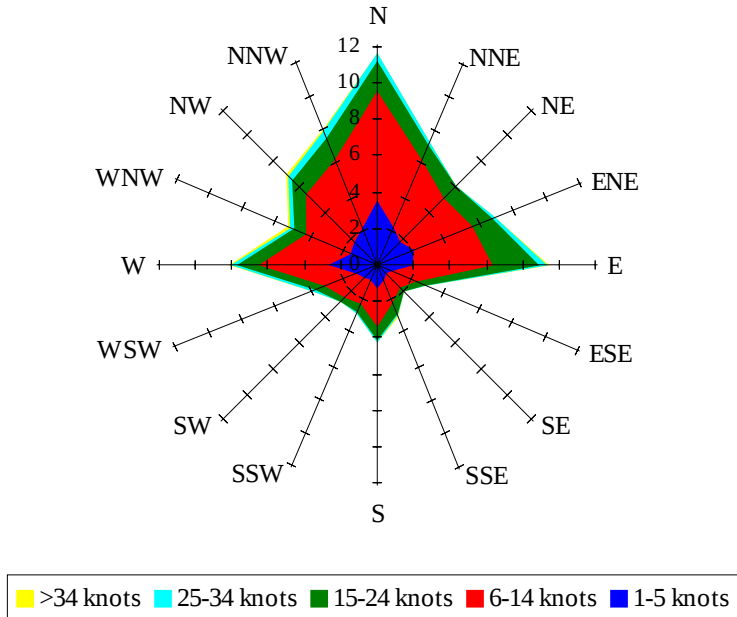
Labels of Percent Frequency on North Axis



Percent Calm = 11.62

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 9.61