

TOWNSVILLE AU

Latitude = 19.20 S

Longitude = 146.75 E

Period of Record = 1973 to 1996

WMO No. 942940

Elevation = 20 feet

Average Pressure = 29.88 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	99	71	81	10.1	N
0.4% Occurrence	92	76	114	9.5	N
1.0% Occurrence	91	77	117	10.0	NE
2.0% Occurrence	90	77	117	10.2	NE
Mean Daily Range	14	-	-	-	-
97.5% Occurrence	57	53	55	1.6	S
99.0% Occurrence	52	49	45	1.0	S
99.6% Occurrence	48	45	40	0.6	WNW
Median of Extreme Lows	44	41	33	0.6	S
	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	84	91	162	9.6	NE
0.4% Occurrence	81	87	147	7.2	N
1.0% Occurrence	80	86	142	7.5	N
2.0% Occurrence	79	85	139	6.9	N
	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	162	87	1.06	6.6	NE
0.4% Occurrence	151	85	0.99	5.6	N
1.0% Occurrence	147	84	0.97	5.0	N
2.0% Occurrence	142	83	0.94	5.5	N
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		34	2921	2770	5617

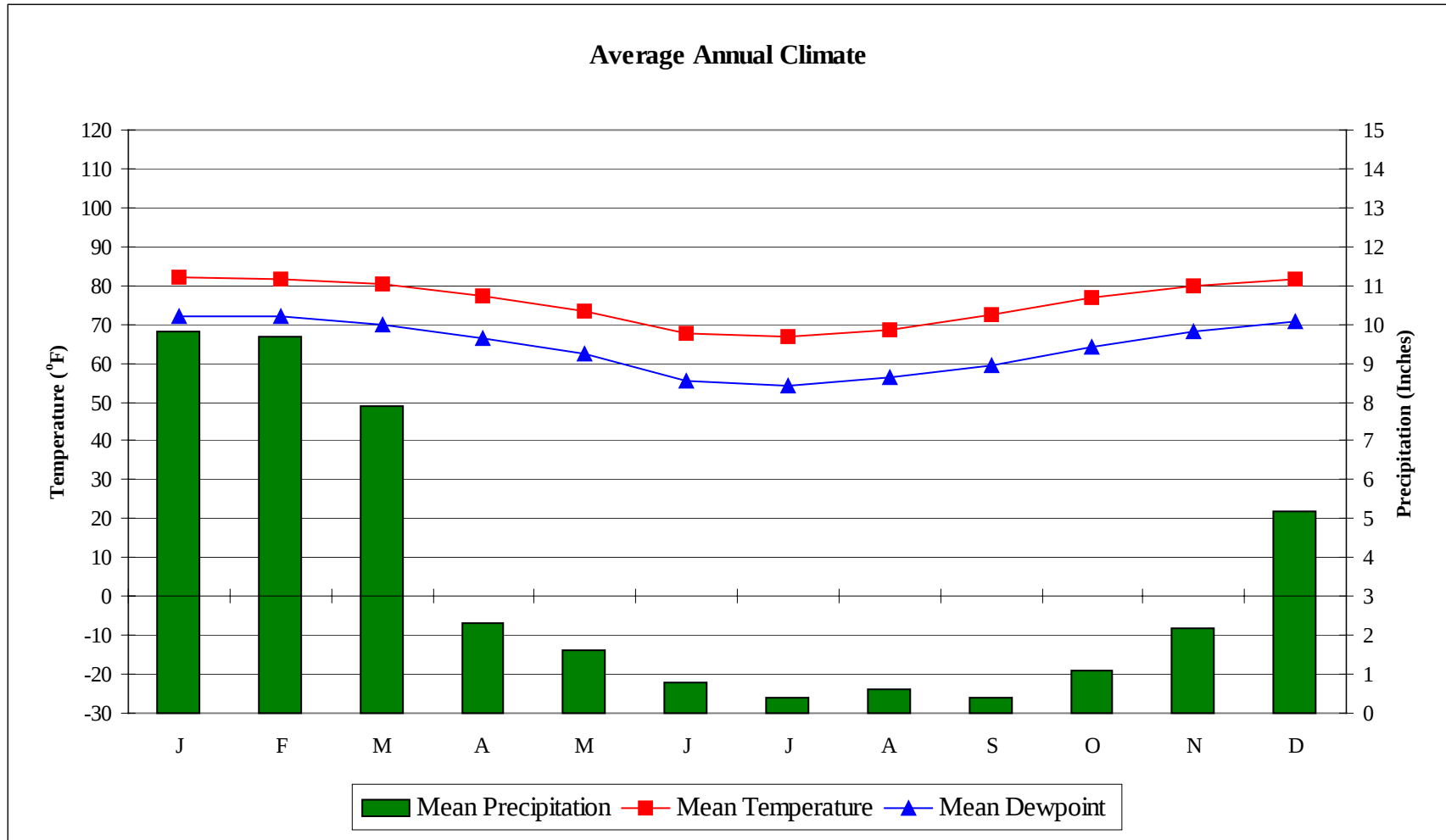
Other Site Data

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	6.7 + 2.6
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 (#)
78.2	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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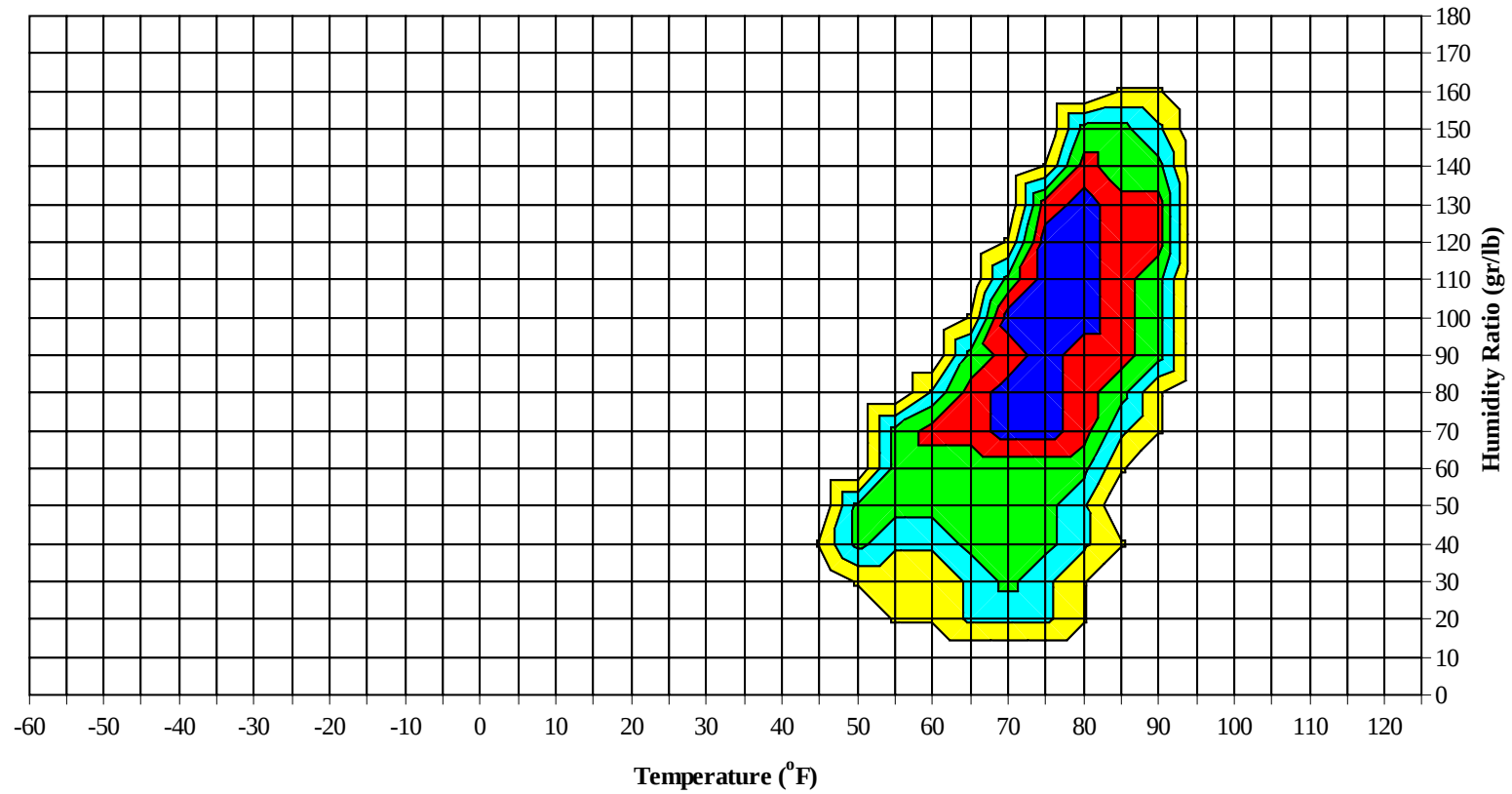
WMO No. 942940



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WMO No. 942940

Long Term Psychrometric Summary

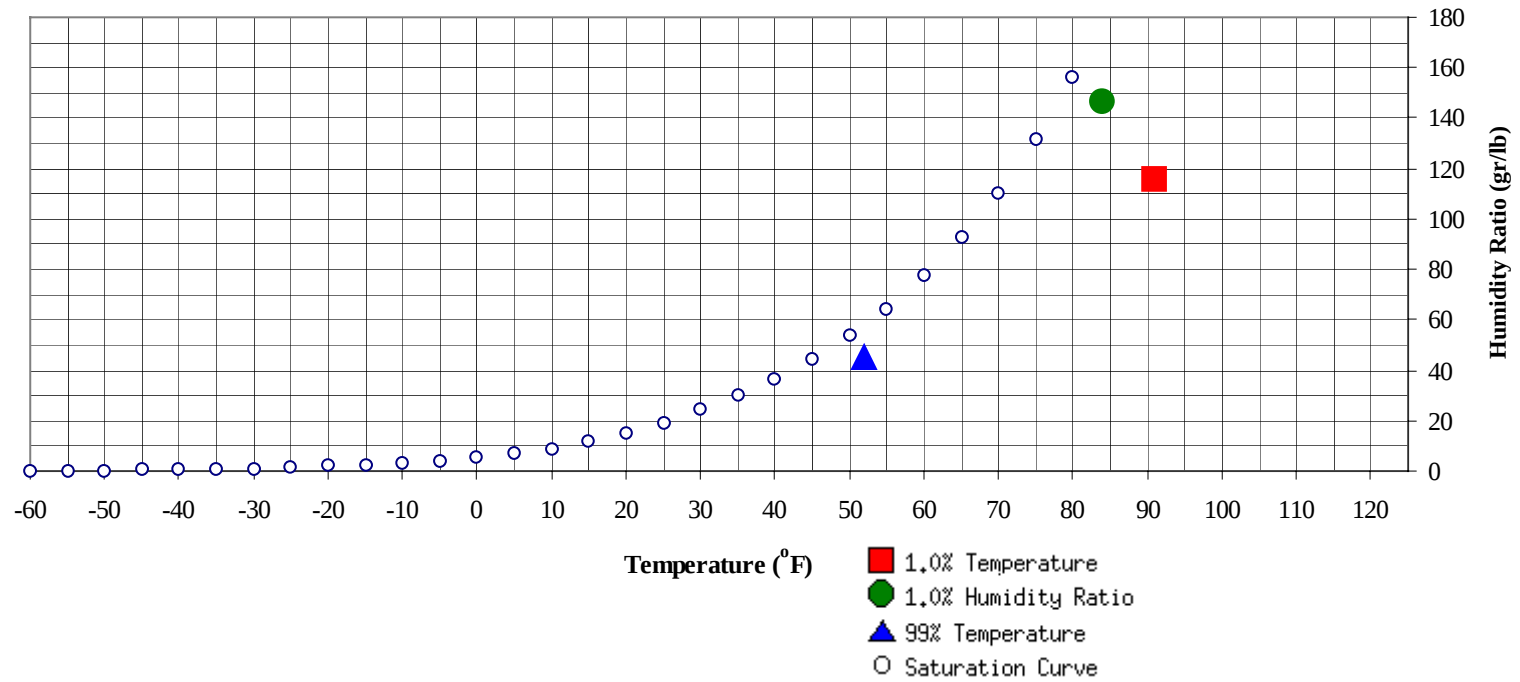


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

TOWNSVILLE AU

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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)
	52	45.5	19.5		147	83.8	79.6	78	43.2

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	91	115.5	76.5	40.0

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WMO No. 942940

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		1	0	1	77.9		0		0	65.4					
95 / 99	0	3	0	3	77.5		3	1	4	70.8		3	0	3	74.6
90 / 94	0	49	4	54	77.8	0	32	2	34	77.4	0	16	1	17	75.8
85 / 89	4	109	32	145	76.2	2	97	22	122	76.5	1	107	11	118	75.0
80 / 84	90	64	157	312	75.3	62	71	138	271	75.6	30	103	128	260	74.1
75 / 79	134	20	48	201	73.3	139	20	56	215	73.5	156	18	102	276	72.3
70 / 74	20	2	6	29	70.3	21	1	4	26	70.2	58	2	6	66	69.1
65 / 69	0			0	66.0	0	0		0	66.0	3	0	0	3	65.5
60 / 64							0		0		0			0	62.0
55 / 59															
50 / 54															
45 / 49															
40 / 44															
35 / 39															
30 / 34															

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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WMO No. 942940

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															
100 / 104															
95 / 99		0		0	76.2										
90 / 94	0	3	0	3	72.4		0		0	69.0					
85 / 89	0	48	1	49	73.0	0	2	0	2	70.1					
80 / 84	6	133	51	190	71.9	0	104	4	108	69.7		0	17	0	65.0
75 / 79	82	48	139	269	70.7	18	105	100	223	68.7	1	110	15	126	65.2
70 / 74	109	8	44	161	67.6	103	31	111	245	66.4	29	75	96	200	63.3
65 / 69	32	1	4	37	64.1	66	4	21	91	63.1	47	27	66	140	61.1
60 / 64	10		0	10	60.2	44	2	10	55	59.2	71	10	39	121	57.8
55 / 59	1		0	1	53.6	15	0	2	17	54.9	56	1	18	75	53.2
50 / 54	0			0	50.5	2	0	0	2	49.8	25		5	31	49.1
45 / 49							0		0	48.0	9		1	10	44.7
40 / 44											1		0	1	39.4
35 / 39															
30 / 34															

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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															
95 / 99												0		0	61.0
90 / 94												2	0	2	60.3
85 / 89		0		0	62.3		1	0	1	61.4	0	8	0	8	65.4
80 / 84		7	0	7	66.2	0	17	0	17	65.8	0	75	3	78	67.8
75 / 79	0	96	6	103	64.4	1	127	13	140	65.1	14	130	53	196	66.6
70 / 74	20	98	85	203	62.8	35	80	112	227	63.7	82	23	140	245	65.2
65 / 69	49	32	77	158	61.0	66	18	79	163	61.5	69	2	35	106	62.1
60 / 64	64	12	48	124	57.3	70	5	30	105	57.8	46	1	7	55	58.8
55 / 59	62	3	21	86	53.3	49	1	12	61	53.9	23	0	2	25	54.5
50 / 54	35	0	8	44	48.9	21	0	2	23	49.1	5		0	5	49.8
45 / 49	17	0	2	19	44.4	6		0	6	44.7	0			0	45.0
40 / 44	2	0		2	39.6	0			0	39.5					
35 / 39	0	0		0	35.2										
30 / 34		0		0											

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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													0		0 74.0
100 / 104							1		1	71.2		1	0	1	75.2
95 / 99		0		0	59.0	0	2	0	2	71.7	0	3	0	3	72.4
90 / 94		3		3	67.7	0	15	1	16	73.5	0	36	2	38	77.1
85 / 89		32	1	33	71.9	1	79	4	85	74.1	3	120	20	143	75.6
80 / 84	8	156	24	188	70.4	38	129	85	251	73.0	86	73	150	309	74.8
75 / 79	84	53	138	275	69.5	135	13	138	286	71.4	129	12	71	212	72.4
70 / 74	111	4	78	192	66.5	62	1	12	75	67.8	30	3	5	38	69.1
65 / 69	30	0	6	36	63.1	3	0	0	3	64.3	0		0	0	63.9
60 / 64	13	0	1	14	58.6	1			1	58.8					
55 / 59	3			3	54.6	0			0	54.0					
50 / 54															
45 / 49															
40 / 44															
35 / 39															
30 / 34															

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

Period of Record = 1973 to 1996

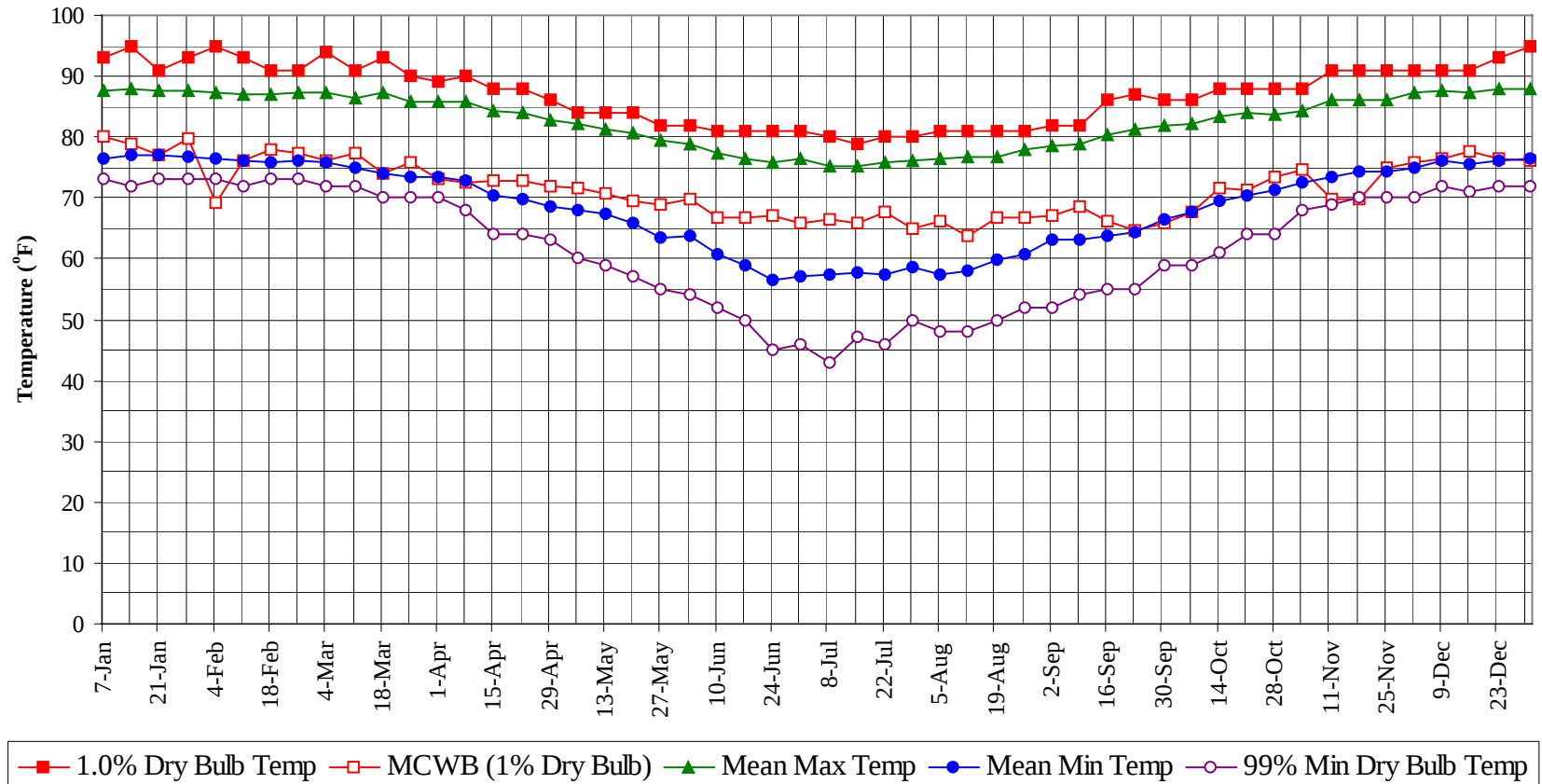
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
105 / 109		0		0	74.0
100 / 104		3	0	3	73.9
95 / 99	0	13	2	15	73.3
90 / 94	1	155	10	166	76.5
85 / 89	11	602	90	703	75.1
80 / 84	318	946	737	2000	73.2
75 / 79	892	752	878	2522	70.0
70 / 74	682	329	703	1714	65.5
65 / 69	367	84	291	742	61.8
60 / 64	318	30	135	483	58.0
55 / 59	208	5	55	267	53.7
50 / 54	88	0	17	105	49.1
45 / 49	32	0	3	35	44.6
40 / 44	4	0	0	4	39.5
35 / 39	0	0		0	35.2
30 / 34		0		0	

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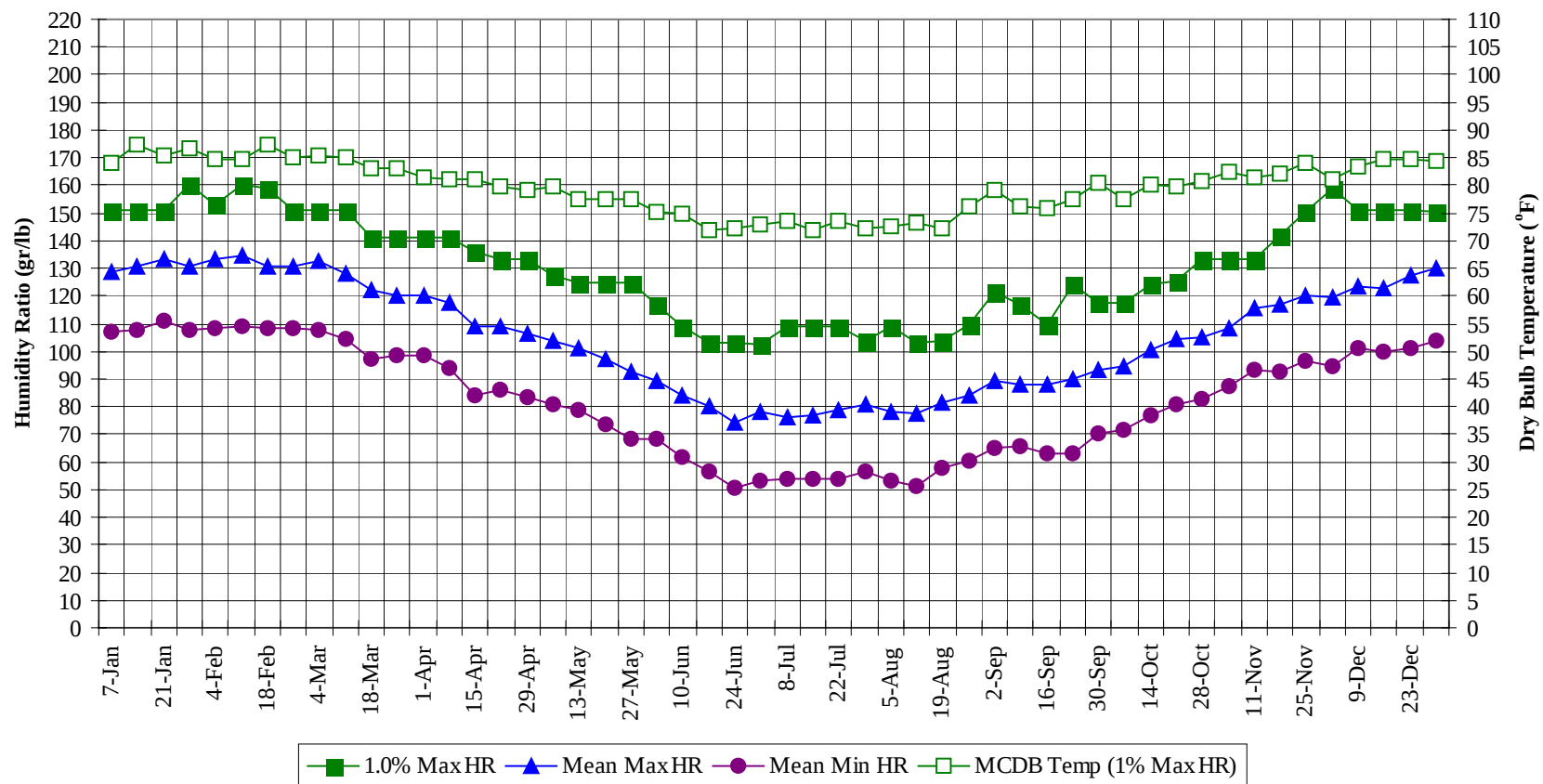
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Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary



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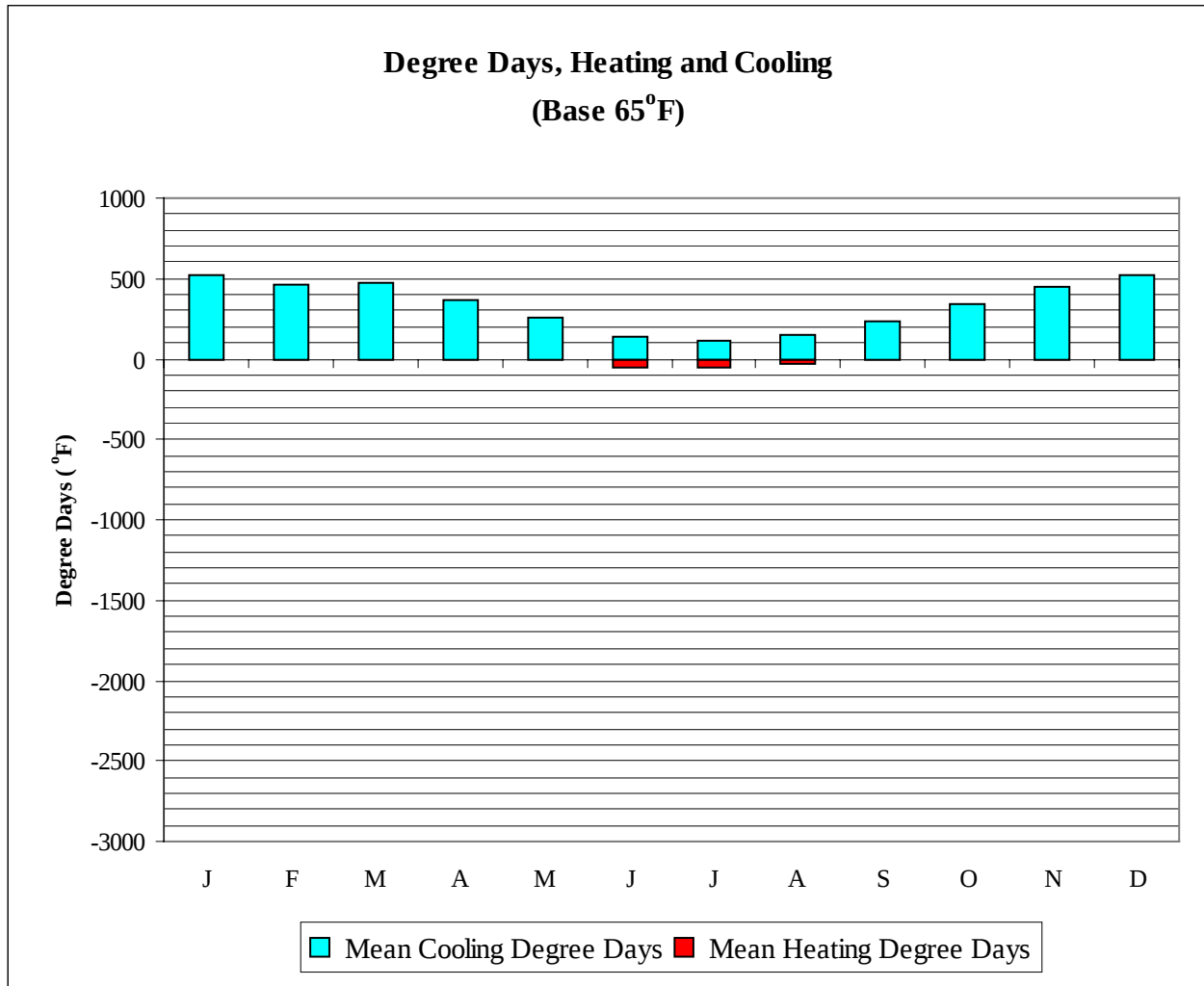
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Long Term Dry Bulb Temperature and Humidity Summary

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	93.0	79.9	87.5	76.5	73.0	151.2	84.0	128.8	106.9
14-Jan	95.0	79.0	88.1	76.9	72.0	151.2	87.5	130.9	107.9
21-Jan	91.0	77.2	87.7	77.0	73.0	151.2	85.4	133.2	110.7
28-Jan	93.0	79.7	87.6	76.7	73.0	160.3	86.8	130.5	107.5
4-Feb	95.0	69.3	87.2	76.3	73.0	153.3	84.9	133.0	108.2
11-Feb	93.0	76.2	87.1	76.1	72.0	160.3	84.6	134.6	109.1
18-Feb	91.0	77.9	87.0	76.0	73.0	158.9	87.5	130.8	108.5
25-Feb	91.0	77.4	87.3	76.2	73.0	151.2	85.1	130.5	108.6
4-Mar	94.0	76.0	87.4	75.8	72.0	151.2	85.3	133.0	107.7
11-Mar	91.0	77.5	86.5	74.9	72.0	151.2	84.9	128.0	104.4
18-Mar	93.0	73.9	87.4	74.1	70.0	141.4	83.2	121.9	97.5
25-Mar	90.0	75.8	85.9	73.5	70.0	141.4	82.9	120.2	98.2
1-Apr	89.0	73.2	85.9	73.4	70.0	141.4	81.6	120.4	98.2
8-Apr	90.0	72.6	85.7	72.7	68.0	141.4	81.0	117.7	93.6
15-Apr	88.0	72.7	84.2	70.4	64.0	135.8	81.2	108.9	84.2
22-Apr	88.0	72.9	84.0	69.8	64.0	133.0	79.8	108.9	85.9
29-Apr	86.0	71.8	82.7	68.6	63.0	133.0	79.2	106.5	83.3
6-May	84.0	71.5	82.1	67.9	60.0	127.4	79.9	103.6	80.7
13-May	84.0	70.8	81.4	67.2	59.0	124.6	77.5	101.3	78.9
20-May	84.0	69.4	80.8	66.0	57.0	124.6	77.6	97.0	73.7
27-May	82.0	69.0	79.3	63.4	55.0	124.6	77.4	92.8	68.5
3-Jun	82.0	69.6	78.9	63.7	54.0	116.9	75.2	89.6	68.2
10-Jun	81.0	66.8	77.4	60.8	52.0	109.2	74.8	84.1	61.8
17-Jun	81.0	66.7	76.5	58.9	50.0	102.9	71.9	80.1	56.7
24-Jun	81.0	67.0	75.9	56.6	45.0	102.9	72.2	74.0	50.7
1-Jul	81.0	66.0	76.4	57.1	46.0	102.2	73.0	78.5	53.1
8-Jul	80.0	66.5	75.3	57.4	43.0	109.2	73.6	76.2	53.8
15-Jul	79.0	66.0	75.3	57.6	47.0	109.2	72.0	76.7	54.0
22-Jul	80.0	67.7	75.9	57.3	46.0	109.2	73.5	78.5	54.0
29-Jul	80.0	64.9	76.2	58.5	50.0	103.6	72.4	80.5	56.7
5-Aug	81.0	66.1	76.3	57.6	48.0	109.2	72.6	78.2	53.0
12-Aug	81.0	63.7	76.6	57.9	48.0	102.9	73.3	77.6	51.1
19-Aug	81.0	66.8	76.8	59.8	50.0	103.6	72.4	81.2	57.5
26-Aug	81.0	66.8	77.8	60.6	52.0	109.9	76.1	84.2	60.5
2-Sep	82.0	67.0	78.7	63.2	52.0	121.8	79.3	89.1	64.9
9-Sep	82.0	68.7	78.9	63.2	54.0	116.9	76.2	88.0	65.5
16-Sep	86.0	66.1	80.5	63.9	55.0	109.9	75.8	87.8	63.1
23-Sep	87.0	64.8	81.3	64.3	55.0	123.9	77.4	90.0	63.0
30-Sep	86.0	65.9	81.8	66.4	59.0	117.6	80.3	93.1	70.3
7-Oct	86.0	67.8	82.1	67.7	59.0	117.6	77.4	94.8	71.7
14-Oct	88.0	71.5	83.3	69.4	61.0	123.9	80.3	100.6	77.0
21-Oct	88.0	71.2	84.1	70.5	64.0	125.3	79.7	104.5	81.0
28-Oct	88.0	73.3	83.7	71.2	64.0	133.0	80.7	105.2	82.8
4-Nov	88.0	74.8	84.4	72.5	68.0	133.0	82.4	108.5	87.7
11-Nov	91.0	69.7	86.2	73.5	69.0	133.0	81.5	115.7	93.1
18-Nov	91.0	69.9	86.2	74.2	70.0	142.1	81.9	116.8	92.6
25-Nov	91.0	75.0	86.2	74.4	70.0	150.5	84.0	120.2	96.6
2-Dec	91.0	76.0	87.3	74.8	70.0	158.9	81.0	119.2	94.8
9-Dec	91.0	76.4	87.5	76.2	72.0	151.2	83.6	123.7	101.1
16-Dec	91.0	77.6	87.4	75.6	71.0	151.2	84.8	123.1	99.9
23-Dec	93.0	76.6	88.0	76.2	72.0	151.2	84.7	127.4	101.3
31-Dec	95.0	76.2	88.0	76.4	72.0	150.5	84.4	130.2	103.9

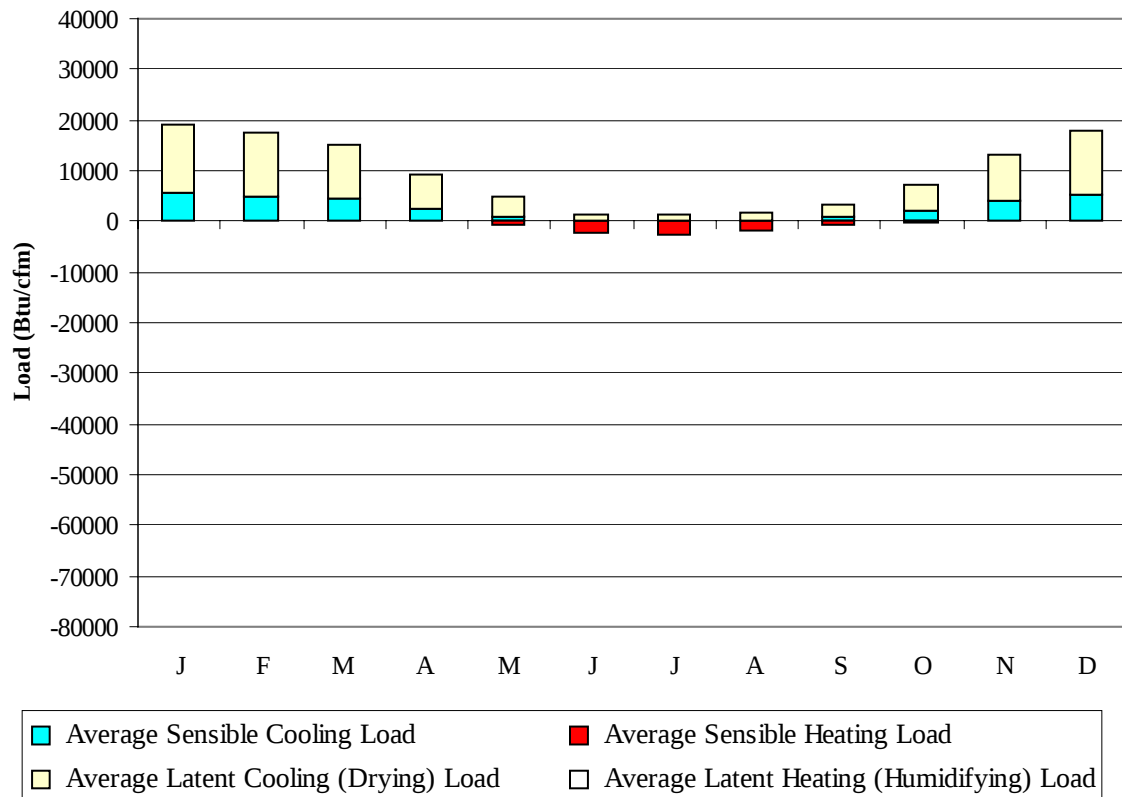
TOWNSVILLE AU

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	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	524	0
FEB	465	0
MAR	473	0
APR	366	1
MAY	260	8
JUN	132	48
JUL	113	59
AUG	148	35
SEP	238	11
OCT	347	1
NOV	448	0
DEC	516	0
ANN	4030	163

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	5674	0	13286	0
FEB	4782	0	12788	-1
MAR	4363	-1	10917	0
APR	2392	-59	6900	-5
MAY	984	-467	3997	-15
JUN	257	-2114	1119	-88
JUL	144	-2578	1024	-184
AUG	277	-1705	1317	-122
SEP	907	-587	2370	-105
OCT	2108	-88	5121	-20
NOV	4007	-6	9199	-13
DEC	5460	0	12561	0
ANN	31355	-7605	80599	-553

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

No Solar Radiation
Data Available

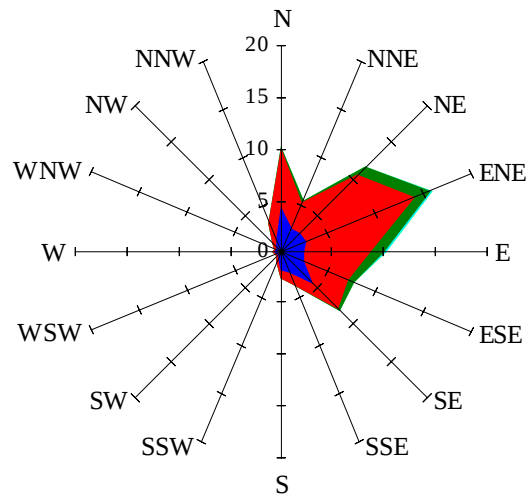


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

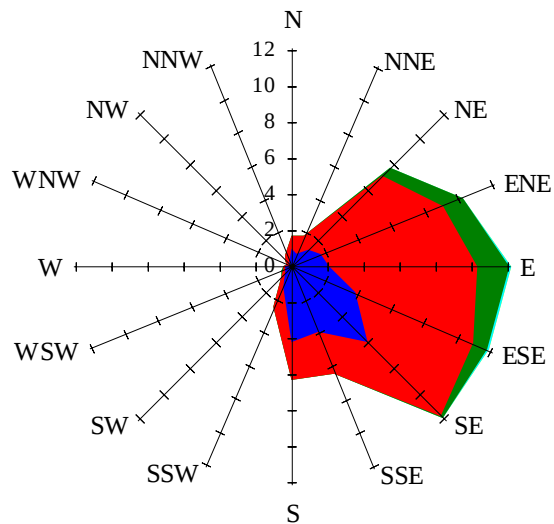
Labels of Percent Frequency on North Axis



Percent Calm = 18.62

Wind Summary - March, April, and May

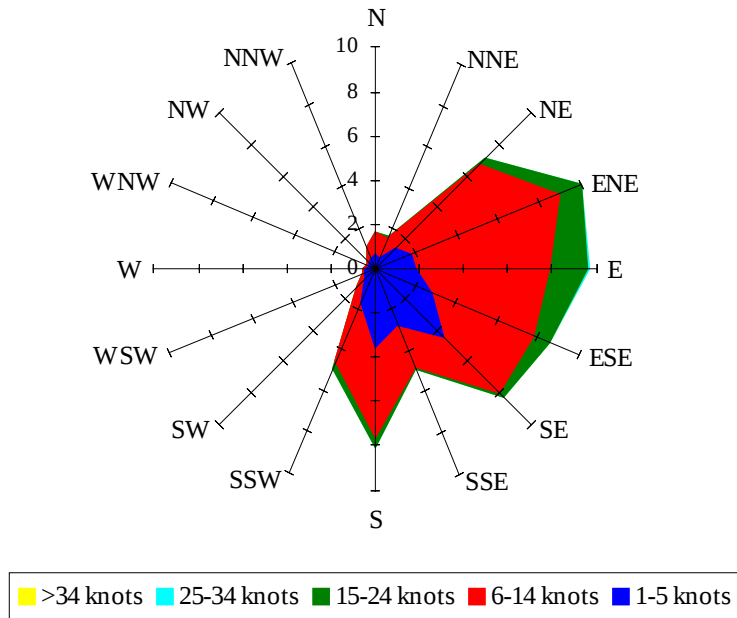
Labels of Percent Frequency on North Axis



Percent Calm = 25.55

Wind Summary - June, July, and August

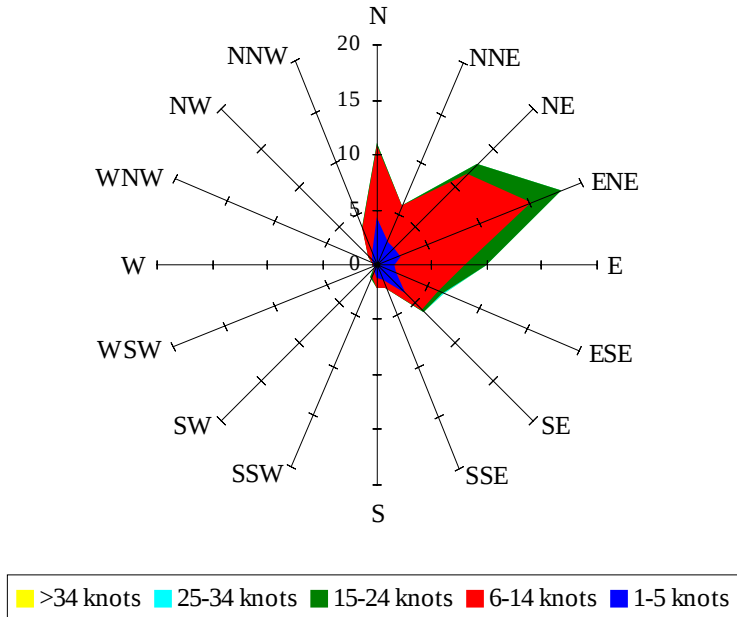
Labels of Percent Frequency on North Axis



Percent Calm = 31.58

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 19.18