

OSAKA/ITAMI JP

Latitude = 34.78 N

Longitude = 135.45 E

Period of Record = 1973 to 1996

WMO No. 477710

Elevation = 49 feet

Average Pressure = 29.87 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	97	78	114	8.6	VARIABLE
0.4% Occurrence	93	77	116	8.6	SW
1.0% Occurrence	91	77	116	8.7	SW
2.0% Occurrence	90	77	116	8.7	SW
Mean Daily Range	15	-	-	-	-
97.5% Occurrence	32	29	19	4.6	NW
99.0% Occurrence	30	28	17	4.5	NW
99.6% Occurrence	28	25	15	4.5	NNW
Median of Extreme Lows	25	23	14	4.7	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	82	92	144	7.0	SW
0.4% Occurrence	79	88	132	7.6	SW
1.0% Occurrence	78	87	129	7.5	SW
2.0% Occurrence	78	87	129	7.5	SW
	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	152	84	0.99	7.1	SW
0.4% Occurrence	141	84	0.94	5.7	VARIABLE
1.0% Occurrence	134	83	0.88	6.3	SW
2.0% Occurrence	133	83	0.88	5.9	SW
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		63	1150	1240	2245

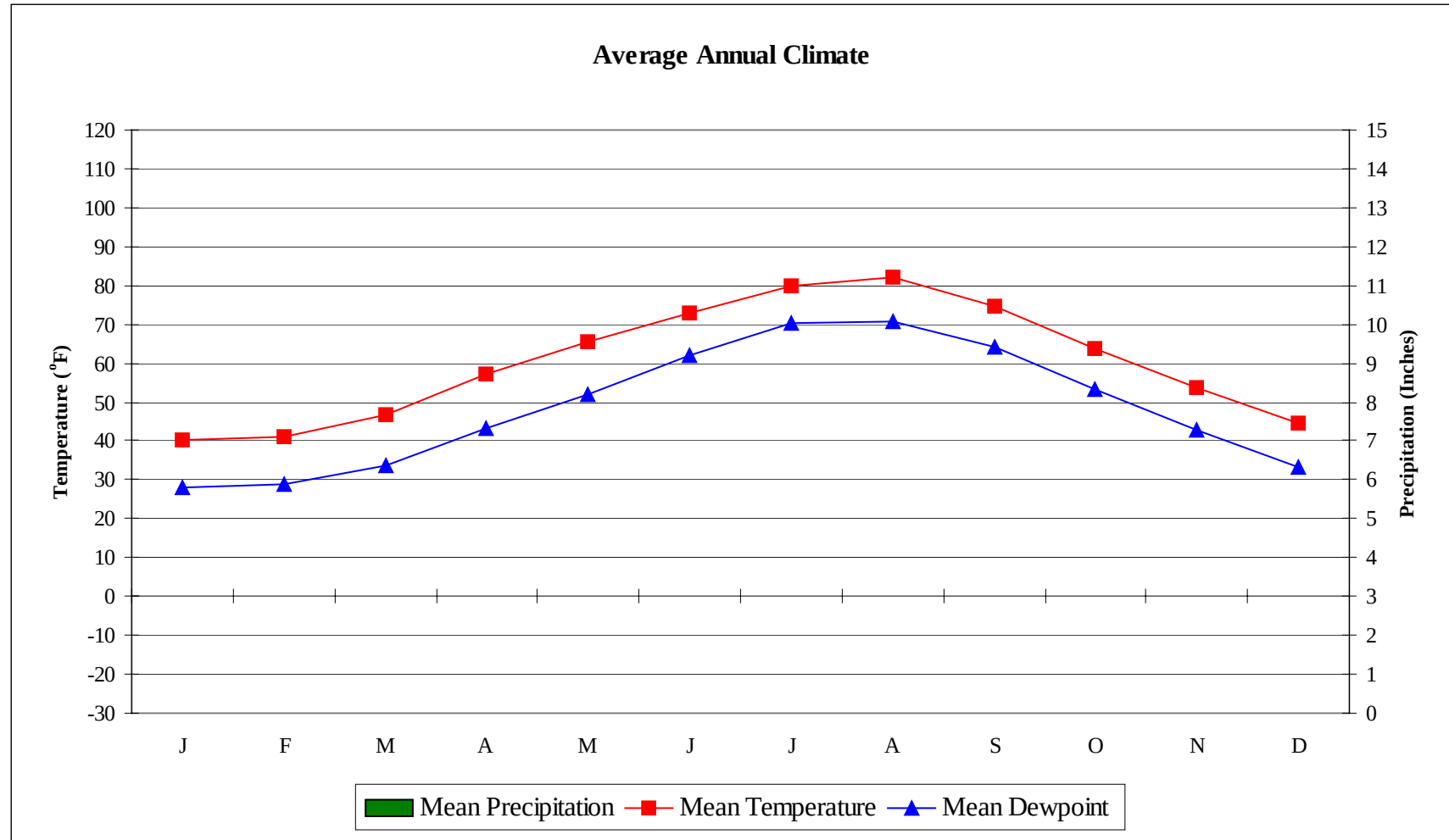
Other Site Data

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
8	N/A	N/A	3.9 + 1.2
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 (#)
62.8	N/A	N/A	26

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

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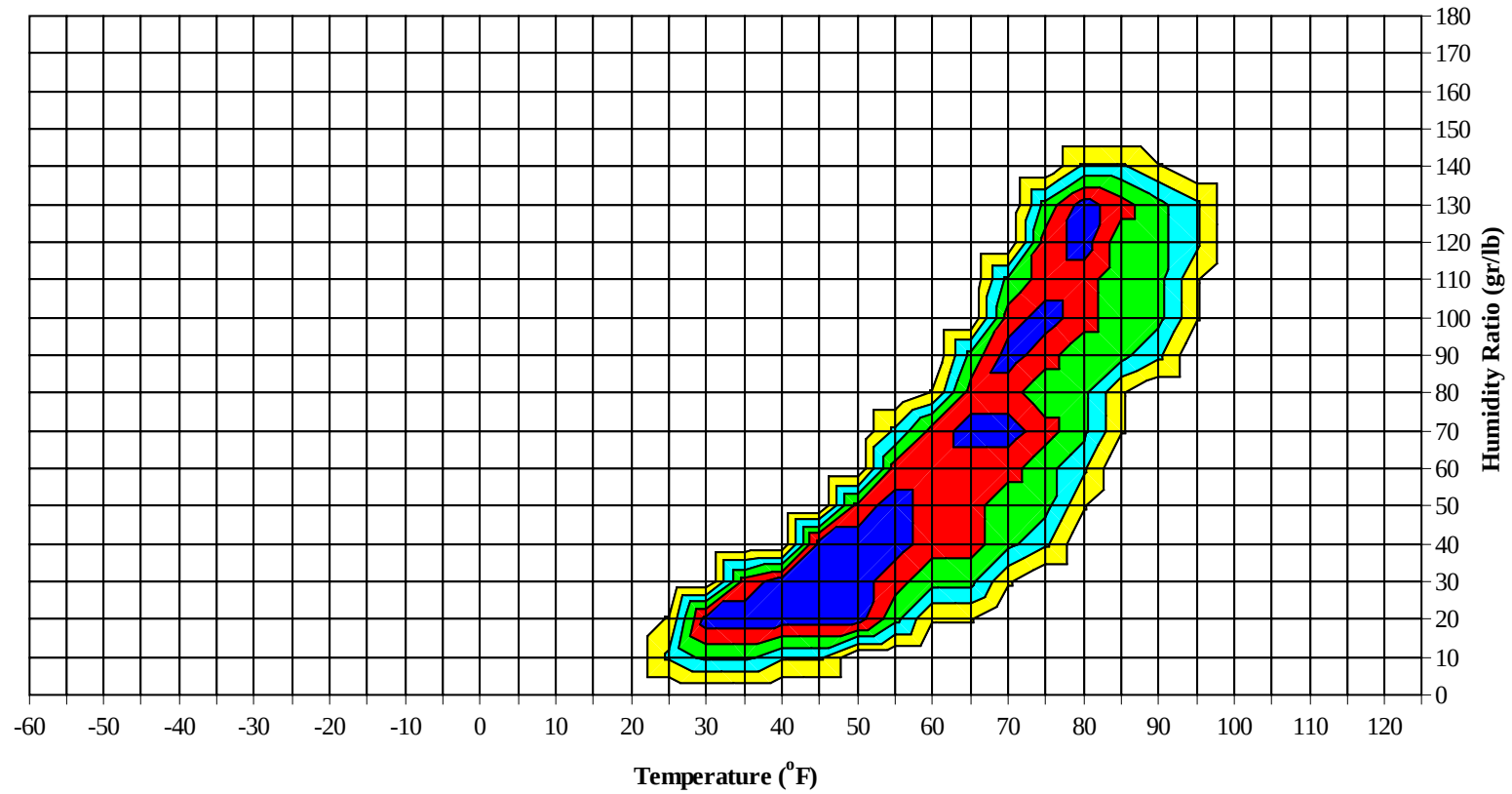


No Precipitation Data Available

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Long Term Psychrometric Summary

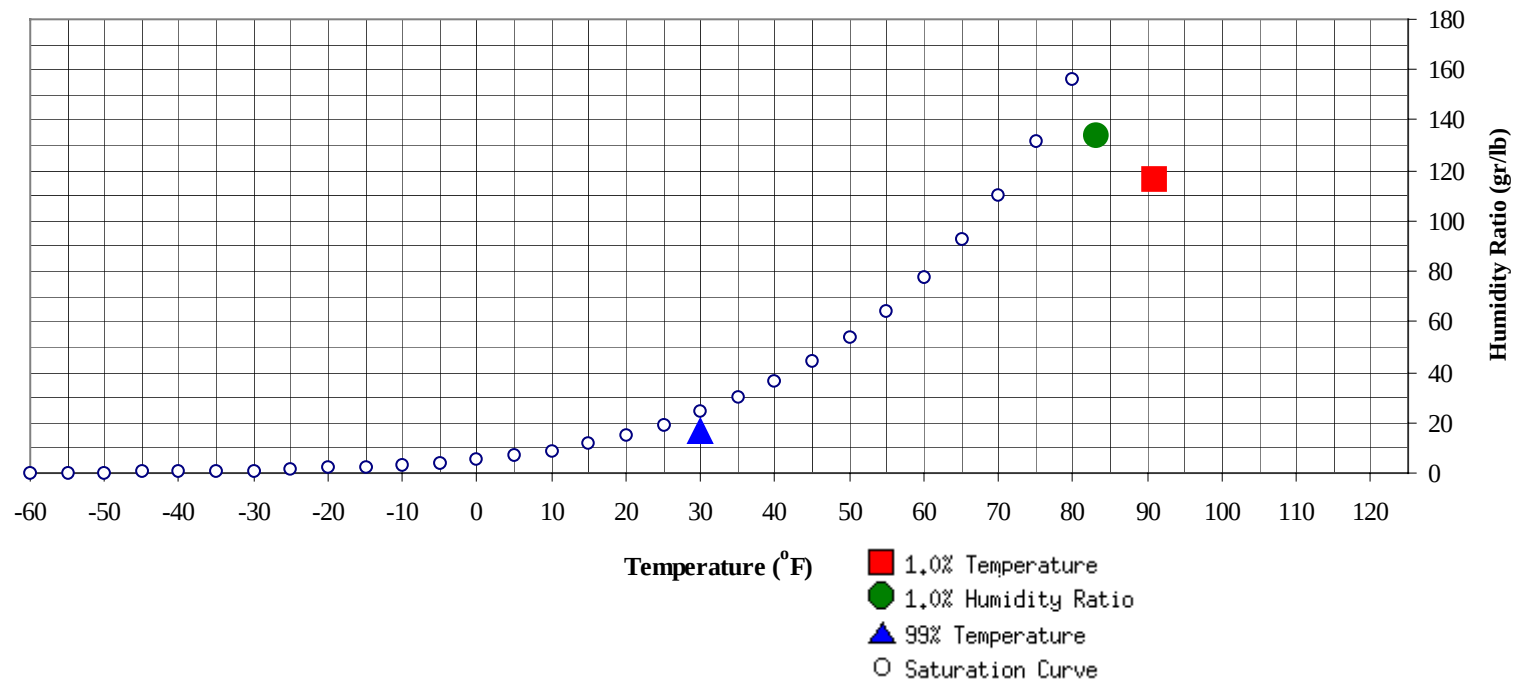


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

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Psychrometric Summary of Peak Design Values



	(°F)	MCHR	Enthalpy	1.0% Humidity Ratio	(gr/lb)	MCDB	MCWB	MC Dewpt	Enthalpy
		(gr/lb)	(btu/lb)			(°F)	(°F)	(°F)	(btu/lb)
99% Dry Bulb	30	16.9	9.8		133.7	83.2	77.4	75.2	40.9

1.0% Dry Bulb	(°F)	MCHR	MCWB	Enthalpy
		(gr/lb)	(°F)	(btu/lb)
	91	116.2	76.8	40.1

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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		
100 / 104															
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74												1	0	1	59.4
65 / 69							0	0	0	55.7	0	4	1	5	55.3
60 / 64		1	0	1	53.6	1	4	2	7	54.0	1	24	8	33	52.6
55 / 59	1	11	4	16	50.1	2	13	7	22	50.0	11	50	30	91	49.2
50 / 54	7	39	16	62	45.1	10	40	20	70	45.0	31	76	53	160	45.3
45 / 49	19	84	47	150	40.2	18	69	45	132	40.2	50	63	71	183	40.8
40 / 44	24	60	50	134	36.4	24	52	44	120	36.4	42	23	43	108	37.1
35 / 39	78	46	87	211	33.0	64	37	68	168	33.1	67	7	34	109	33.8
30 / 34	92	7	41	140	29.2	80	8	34	122	29.2	43	1	7	51	30.0
25 / 29	28	0	2	30	25.4	25	1	3	29	24.9	4	0	0	4	25.5
20 / 24	0			0	21.3	1		0	1	19.6	0			0	21.0
15 / 19						0			0	16.9					

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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WMO No. 477710

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		
100 / 104															
95 / 99												0		0	74.0
90 / 94												3	0	3	74.0
85 / 89							1	0	1	66.5		15	2	17	71.1
80 / 84		0	0	0	62.2		16	2	18	65.4		2	65	21	88 69.4
75 / 79		10	1	11	61.0		59	14	74	62.8	26	88	69	183	68.5
70 / 74	1	39	10	50	58.7	15	80	61	157	61.5	87	52	98	238	66.0
65 / 69	3	40	25	68	57.1	32	42	57	131	59.8	69	14	36	119	62.9
60 / 64	30	63	63	155	54.8	79	39	68	186	57.2	46	2	12	60	58.9
55 / 59	60	57	65	181	51.2	73	9	35	117	52.7	9	0	1	10	53.8
50 / 54	60	24	43	127	46.6	38	1	9	48	47.9	1	0	0	1	48.3
45 / 49	48	7	24	79	41.5	10		1	11	43.8					
40 / 44	21	0	7	28	37.8	1			1	39.7					
35 / 39	17		2	19	34.1	0			0	37.0					
30 / 34	2			2	31.0										
25 / 29															
20 / 24															
15 / 19															

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 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		
100 / 104						0			0	78.3					
95 / 99		9	1	10	78.0		16	1	17	77.7		0		0	77.7
90 / 94		55	10	65	77.1	0	91	13	105	76.7	0	15	1	16	76.1
85 / 89	2	58	24	85	75.9	4	65	34	103	75.8	0	31	6	37	73.7
80 / 84	45	69	96	210	74.7	68	55	126	249	74.8	11	74	40	125	72.0
75 / 79	118	42	83	243	72.5	135	17	64	216	72.5	50	68	70	188	69.8
70 / 74	67	14	29	110	68.3	36	3	10	49	68.5	87	40	78	206	66.5
65 / 69	14	0	4	18	64.0	4		0	4	63.8	49	10	29	89	63.2
60 / 64	2		0	2	59.8	1			1	60.5	32	2	13	47	59.3
55 / 59											9	0	2	11	54.7
50 / 54											2			2	50.1
45 / 49															
40 / 44															
35 / 39															
30 / 34															
25 / 29															
20 / 24															
15 / 19															

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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		
100 / 104															
95 / 99															
90 / 94															
85 / 89		0		0	70.9										
80 / 84		8	0	8	68.5		0		0	69.0					
75 / 79	1	44	9	54	65.3		2	0	2	64.5					
70 / 74	14	83	38	135	62.6	0	16	3	19	61.3					
65 / 69	27	50	53	130	60.5	3	25	8	36	58.8		1		1	56.9
60 / 64	71	46	78	196	57.4	18	70	37	125	55.4	1	12	2	15	53.6
55 / 59	73	14	47	134	53.1	40	63	62	164	51.1	5	37	15	57	49.8
50 / 54	44	2	18	64	48.8	52	46	62	160	46.8	17	77	39	133	45.2
45 / 49	16	0	4	20	44.1	58	15	46	120	42.4	35	75	74	184	41.1
40 / 44	3			3	40.3	38	2	17	57	38.8	45	29	53	128	37.7
35 / 39	0			0	37.0	29	0	5	34	35.4	86	14	52	152	34.1
30 / 34						3		0	3	31.6	54	2	11	67	30.1
25 / 29											5	0	1	6	25.4
20 / 24															
15 / 19															

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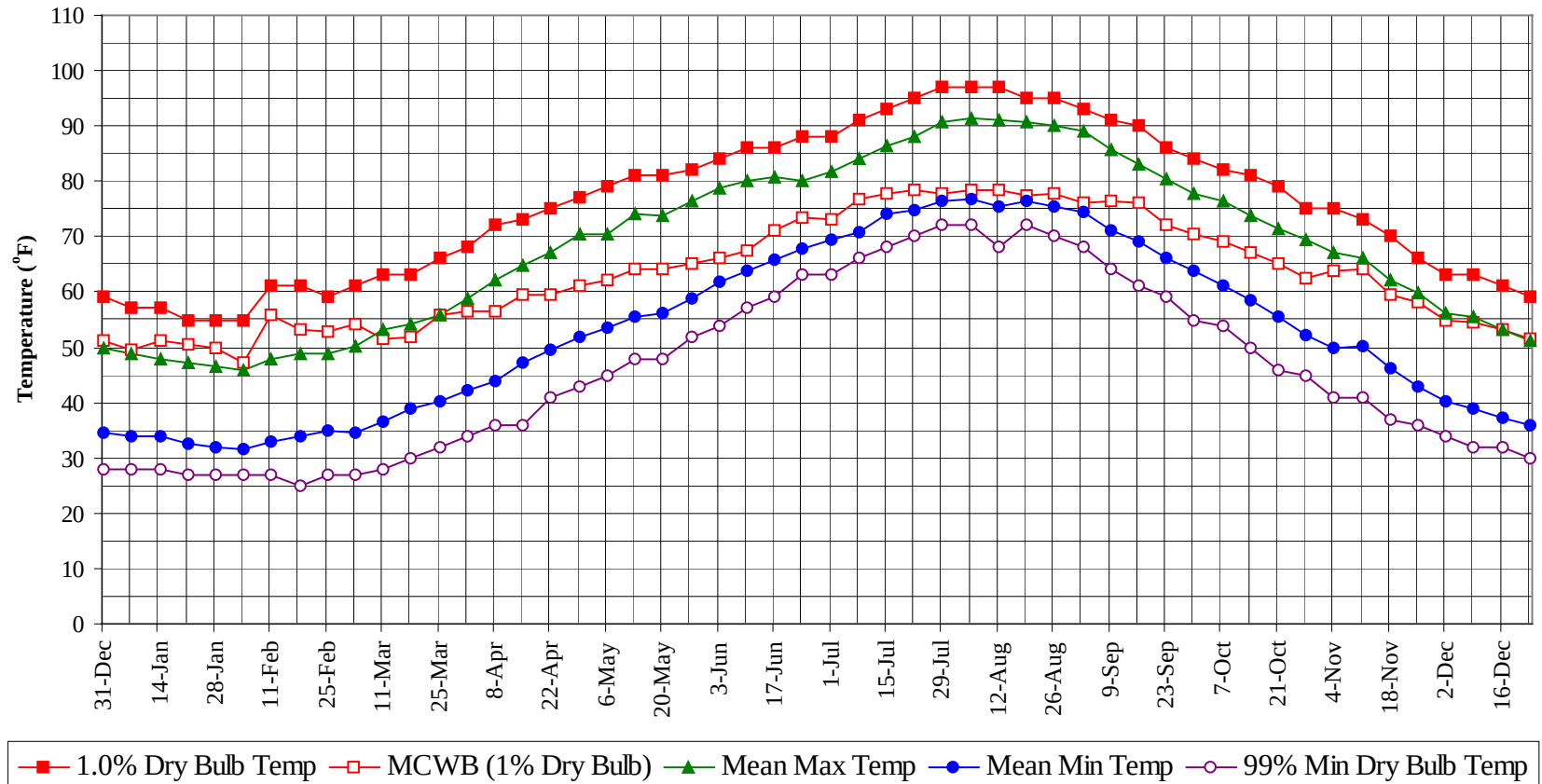
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)

Period of Record = 1973 to 1996

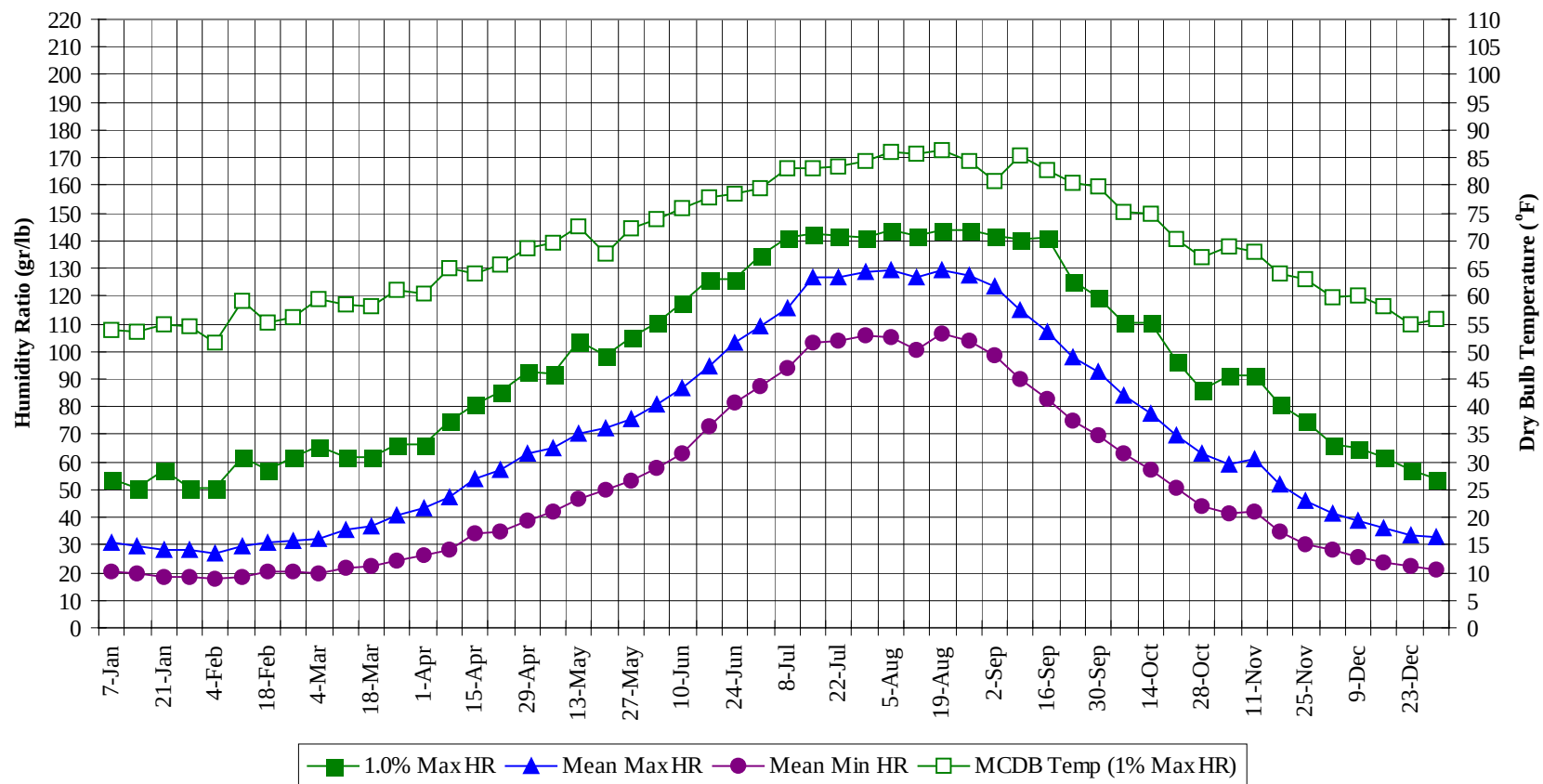
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
100 / 104		0		0	78.3
95 / 99		25	2	27	77.8
90 / 94	0	163	24	188	76.8
85 / 89	5	171	66	242	75.1
80 / 84	127	287	285	699	73.3
75 / 79	331	328	311	969	70.0
70 / 74	305	328	330	962	64.8
65 / 69	200	189	214	602	60.8
60 / 64	281	263	283	827	56.5
55 / 59	281	256	267	804	51.4
50 / 54	260	305	261	826	46.2
45 / 49	253	314	314	881	41.1
40 / 44	198	167	217	582	37.2
35 / 39	341	105	248	695	33.6
30 / 34	274	18	93	385	29.5
25 / 29	61	1	6	68	25.2
20 / 24	2		0	2	20.0
15 / 19	0			0	16.9

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Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary



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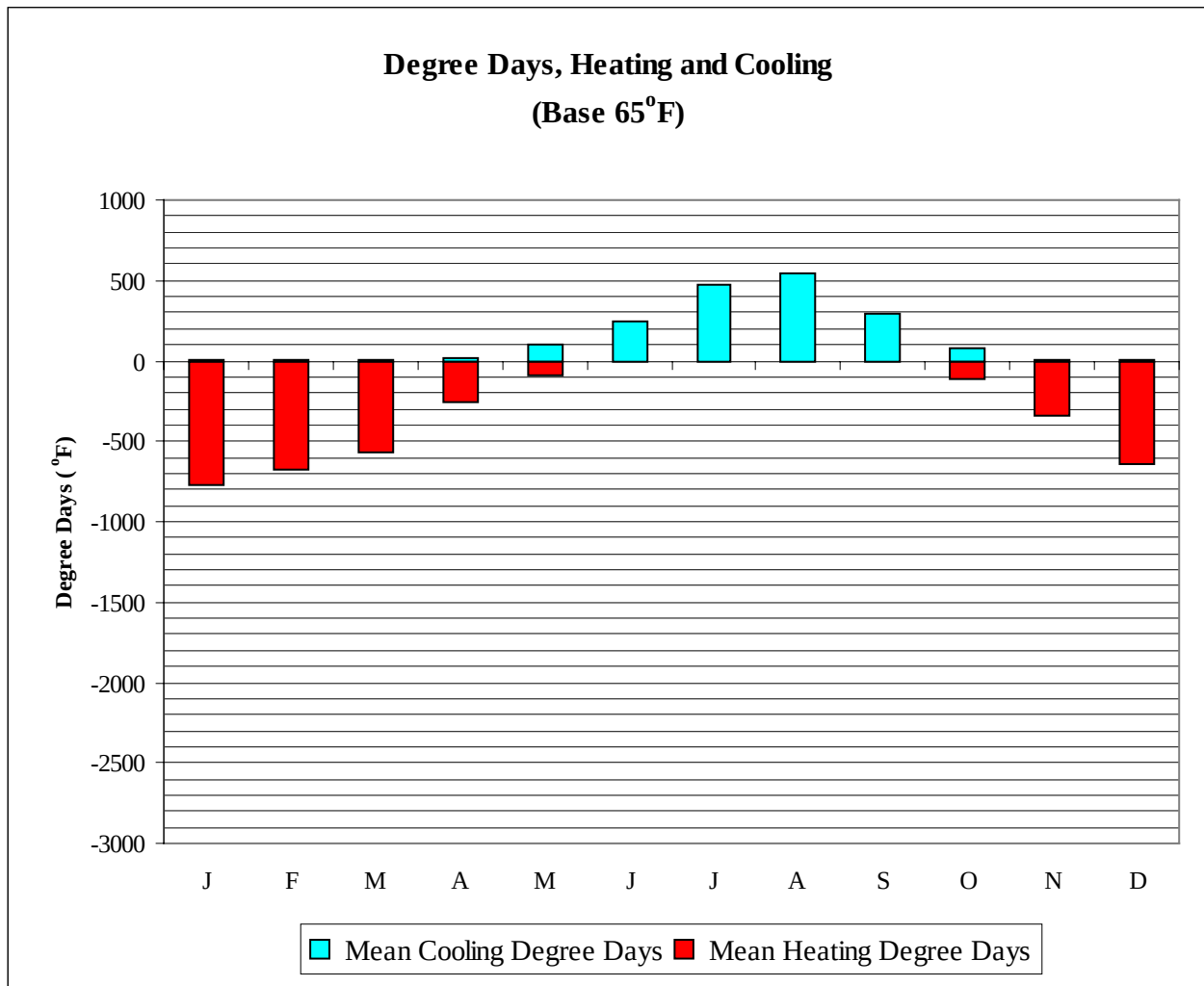
Long Term Dry Bulb Temperature and Humidity Summary

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	57.0	49.5	48.9	34.0	28.0	53.9	53.8	30.8	20.4
14-Jan	57.0	51.1	47.9	34.0	28.0	50.4	53.6	29.6	19.5
21-Jan	55.0	50.6	47.1	32.7	27.0	57.4	55.0	28.2	18.4
28-Jan	55.0	49.9	46.5	31.9	27.0	50.4	54.5	28.1	18.1
4-Feb	55.0	47.1	45.8	31.6	27.0	50.4	51.7	26.9	17.5
11-Feb	61.0	55.8	47.8	33.0	27.0	61.6	59.2	29.3	18.5
18-Feb	61.0	53.2	48.9	34.0	25.0	57.4	55.1	31.0	20.1
25-Feb	59.0	52.9	48.8	34.7	27.0	61.6	56.0	31.8	20.2
4-Mar	61.0	54.1	50.2	34.5	27.0	65.8	59.4	32.2	19.8
11-Mar	63.0	51.4	53.1	36.7	28.0	61.6	58.4	35.5	21.5
18-Mar	63.0	51.9	54.1	38.8	30.0	61.6	58.1	36.7	22.7
25-Mar	66.0	55.7	56.0	40.1	32.0	66.5	61.0	40.9	24.2
1-Apr	68.0	56.5	58.8	42.2	34.0	66.5	60.6	43.1	26.1
8-Apr	72.0	56.6	62.1	44.0	36.0	74.9	64.9	47.3	28.1
15-Apr	73.0	59.6	64.8	47.3	36.0	80.5	64.1	53.8	34.0
22-Apr	75.0	59.4	67.1	49.5	41.0	85.4	65.8	57.4	35.0
29-Apr	77.0	61.2	70.4	51.9	43.0	92.4	68.6	63.1	39.0
6-May	79.0	62.2	70.6	53.7	45.0	91.7	69.7	65.3	42.0
13-May	81.0	64.2	74.0	55.6	48.0	103.6	72.6	70.3	46.8
20-May	81.0	64.1	73.6	56.2	48.0	98.7	67.7	72.0	49.7
27-May	82.0	65.2	76.5	58.8	52.0	105.0	72.4	75.4	53.2
3-Jun	84.0	66.1	78.7	61.8	54.0	110.6	73.9	80.6	58.0
10-Jun	86.0	67.3	80.0	63.9	57.0	117.6	76.0	86.7	63.3
17-Jun	86.0	71.3	80.6	65.8	59.0	126.0	77.9	94.8	72.6
24-Jun	88.0	73.5	80.2	67.8	63.0	126.0	78.6	103.1	81.7
1-Jul	88.0	73.2	81.7	69.4	63.0	134.4	79.6	109.1	87.7
8-Jul	91.0	76.9	84.0	70.9	66.0	141.4	83.0	115.7	94.0
15-Jul	93.0	77.6	86.4	74.1	68.0	142.8	83.1	126.7	103.4
22-Jul	95.0	78.4	88.1	74.7	70.0	142.1	83.3	126.6	103.7
29-Jul	97.0	77.8	90.8	76.3	72.0	141.4	84.5	128.9	105.5
5-Aug	97.0	78.6	91.2	76.8	72.0	143.5	85.9	129.5	105.4
12-Aug	97.0	78.3	91.0	75.4	68.0	142.1	85.6	126.6	100.2
19-Aug	95.0	77.3	90.7	76.5	72.0	143.5	86.3	129.3	106.2
26-Aug	95.0	77.7	89.9	75.6	70.0	143.5	84.4	127.6	103.7
2-Sep	93.0	76.3	88.9	74.6	68.0	142.1	80.9	123.2	98.5
9-Sep	91.0	76.4	85.8	71.2	64.0	140.7	85.5	115.2	89.9
16-Sep	90.0	76.1	83.1	69.2	61.0	141.4	82.8	107.3	82.9
23-Sep	86.0	72.2	80.6	66.1	59.0	125.3	80.4	98.0	74.6
30-Sep	84.0	70.5	77.6	63.8	55.0	119.7	79.8	92.7	69.5
7-Oct	82.0	69.2	76.4	61.0	54.0	110.6	75.0	83.8	63.3
14-Oct	81.0	67.3	73.8	58.4	50.0	110.6	75.0	77.2	57.0
21-Oct	79.0	65.0	71.5	55.6	46.0	96.6	70.2	69.5	50.5
28-Oct	75.0	62.6	69.4	52.0	45.0	86.1	67.1	62.9	43.9
4-Nov	75.0	63.9	67.3	49.9	41.0	91.0	69.1	59.2	41.5
11-Nov	73.0	64.1	66.1	50.3	41.0	91.0	68.0	61.1	42.1
18-Nov	70.0	59.5	62.1	46.3	37.0	80.5	64.1	51.6	35.1
25-Nov	66.0	58.1	59.9	42.9	36.0	74.9	63.2	45.8	30.3
2-Dec	63.0	54.8	56.2	40.4	34.0	66.5	59.9	41.5	27.9
9-Dec	63.0	54.7	55.5	38.7	32.0	65.1	60.0	38.6	25.8
16-Dec	61.0	53.0	53.1	37.2	32.0	61.6	58.1	36.3	23.5
23-Dec	59.0	51.4	51.3	35.7	30.0	57.4	54.9	33.7	22.3
31-Dec	59.0	51.3	49.9	34.7	28.0	53.9	55.7	32.6	21.3

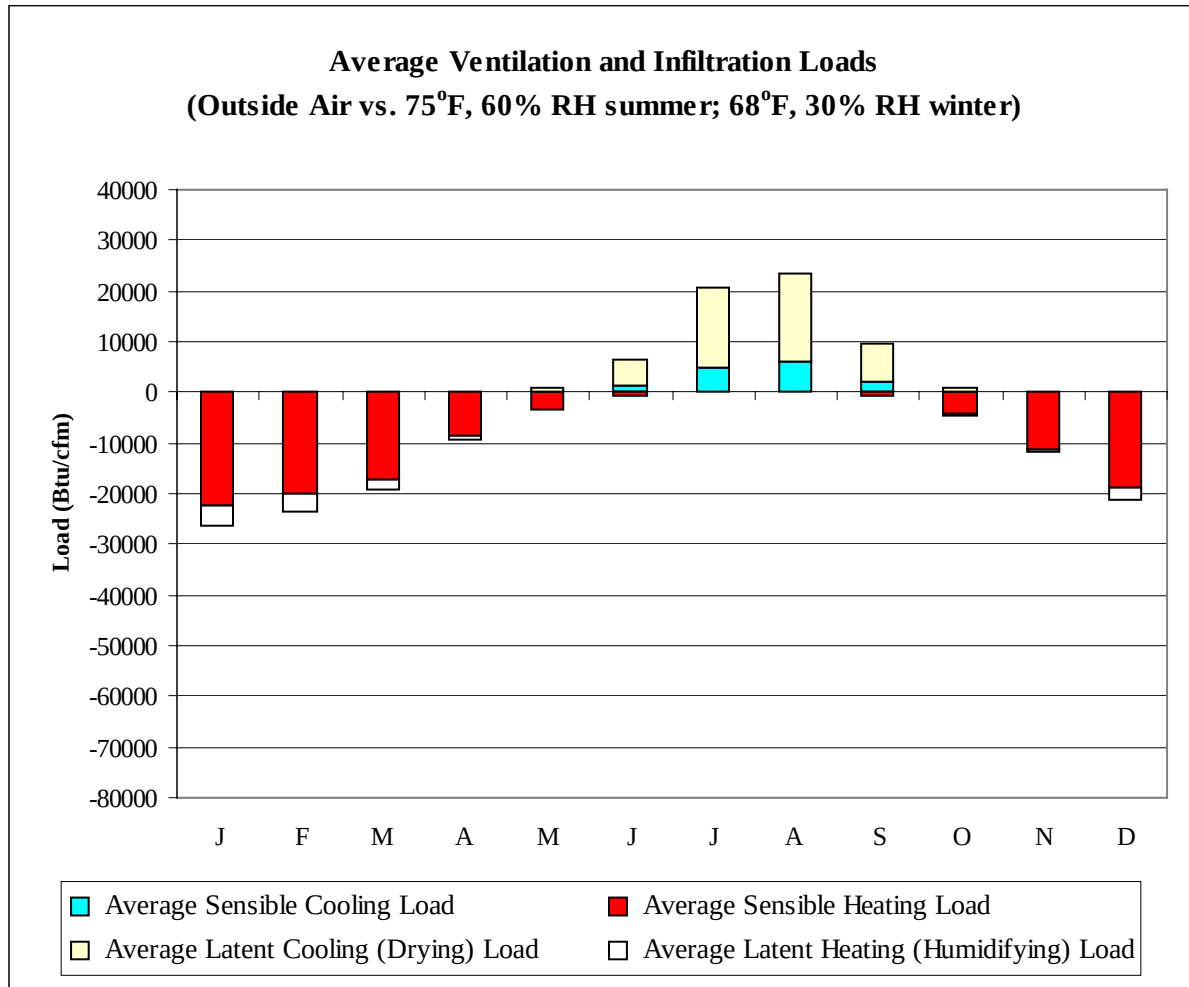
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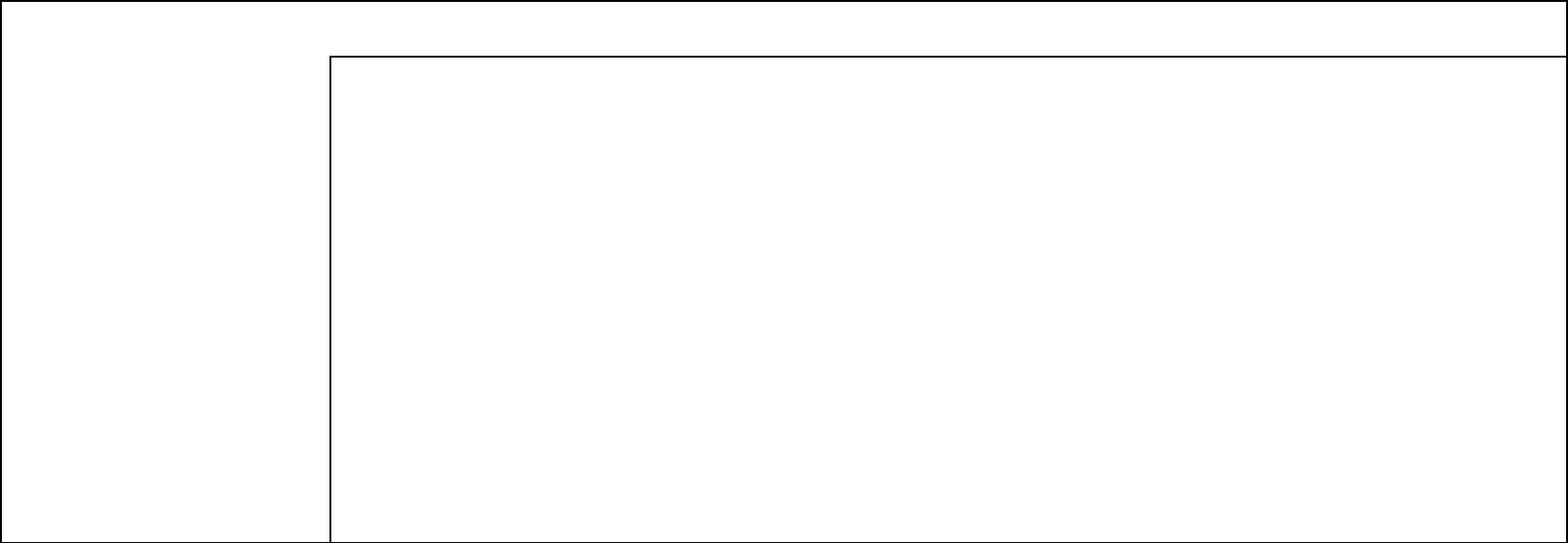
	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	769
FEB	0	682
MAR	0	568
APR	23	255
MAY	102	87
JUN	247	8
JUL	471	0
AUG	539	0
SEP	298	7
OCT	78	112
NOV	8	344
DEC	0	638
ANN	1767	3470



	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	-22341	0	-3949
FEB	0	-19862	0	-3501
MAR	0	-17132	3	-2275
APR	16	-8613	77	-681
MAY	270	-3566	575	-46
JUN	1248	-533	5045	0
JUL	4676	-23	16085	0
AUG	6100	-5	17185	0
SEP	2063	-463	7465	0
OCT	144	-4394	755	-16
NOV	2	-11127	73	-476
DEC	0	-18945	0	-2308
ANN	14519	-107004	47263	-13252

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

No Solar Radiation
Data Available

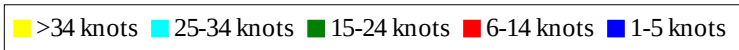
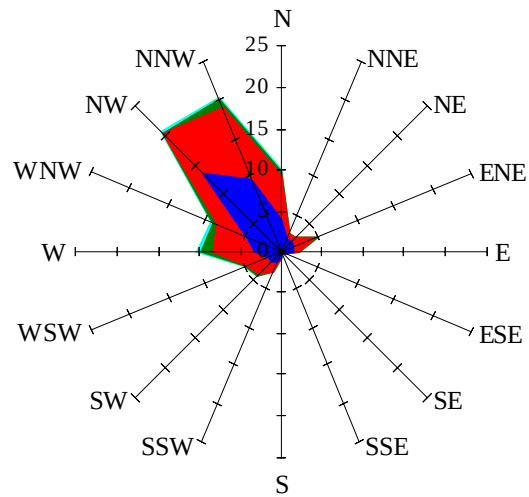


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

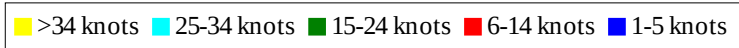
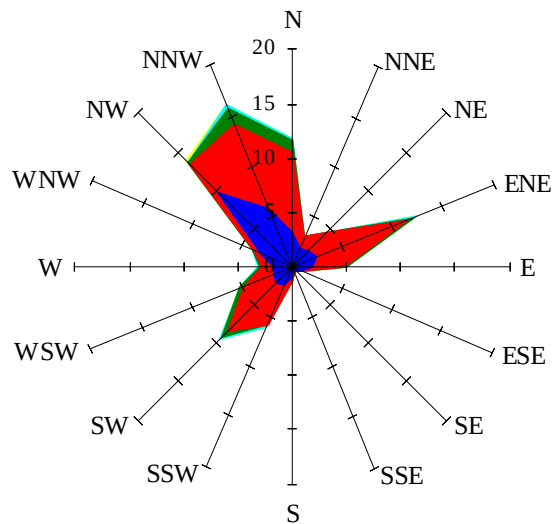
Labels of Percent Frequency on North Axis



Percent Calm = 4.78

Wind Summary - March, April, and May

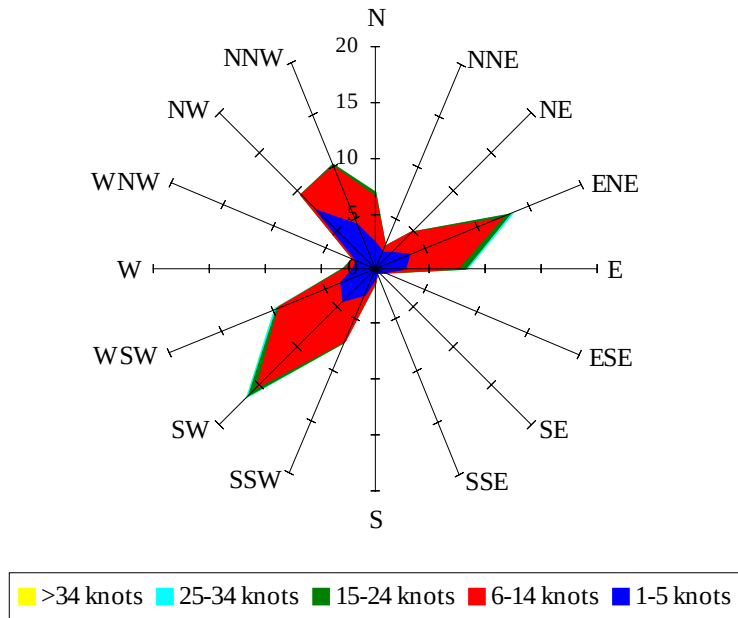
Labels of Percent Frequency on North Axis



Percent Calm = 3.27

Wind Summary - June, July, and August

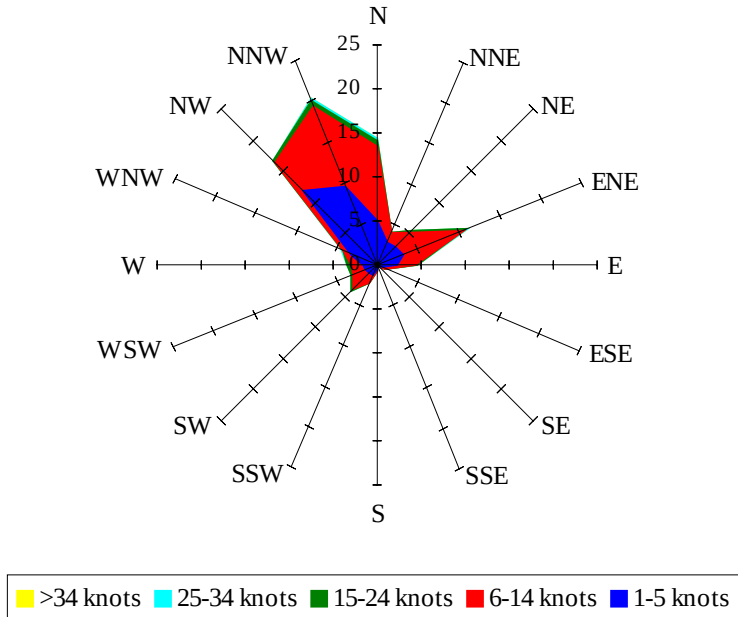
Labels of Percent Frequency on North Axis



Percent Calm = 3.59

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 4.44