UBON/RATCHATHANI TH	
Latitude = 15.25 N	WMO No. 484070
Longitude =104.87 E	Elevation = 417 feet
Period of Record = 1973 to 1996	Average Pressure = 29.36 inches Hg

Design Criteria Data

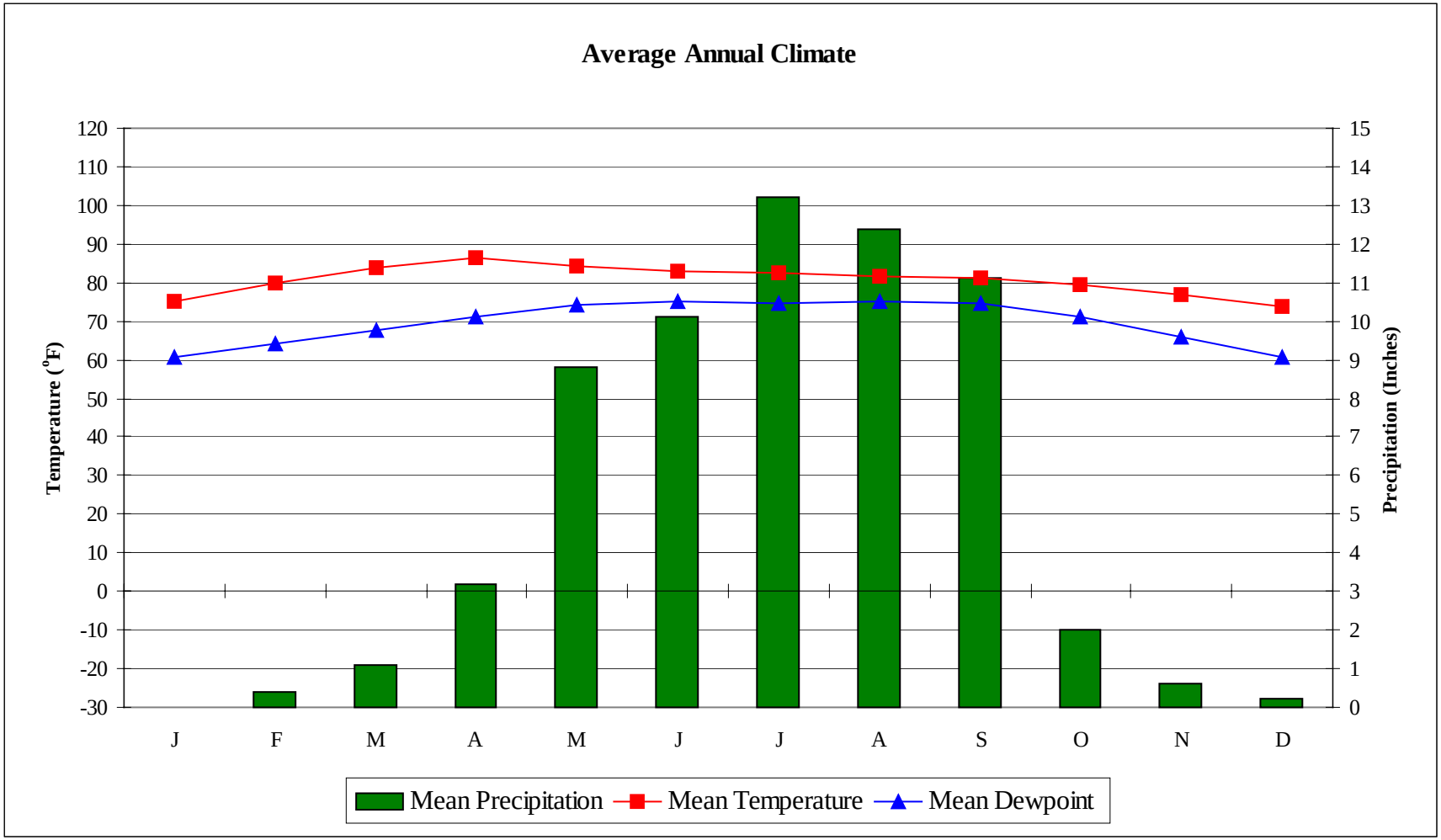
		Mean Coincident (Average) Values			
Dry Bulb Temperature (T)	**Design Value (^oF)**	Wet Bulb Temperature (^oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	102	78	106	6.3	S
0.4% Occurrence	100	78	110	5.9	S
1.0% Occurrence	99	78	111	5.7	S
2.0% Occurrence	97	77	112	4.8	S
Mean Daily Range	16	-	-	-	-
97.5% Occurrence	63	59	70	5.4	NNE
99.0% Occurrence	61	57	65	5.3	NNE
99.6% Occurrence	57	53	55	5.9	NNE
Median of Extreme Lows	55	51	50	5.6	NNE
		Mean Coincident (Average) Values			
Wet Bulb Temperature (T_{wb})	**Design Value (^oF)**	Dry Bulb Temperature (^oF)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	85	95	166	6.1	SW
0.4% Occurrence	81	90	144	4.7	S
1.0% Occurrence	81	90	144	4.7	S
2.0% Occurrence	80	89	140	4.5	S
		Mean Coincident (Average) Values			
Humidity Ratio (HR)	**Design Value (gr/lb)**	Dry Bulb Temperature (^oF)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Median of Extreme Highs	168	89	1.08	5.4	SE
0.4% Occurrence	153	84	0.99	3.1	S
1.0% Occurrence	153	84	0.99	3.1	S
2.0% Occurrence	148	84	0.96	3.2	S
Air Conditioning/		$T \geq 93^oF$	$T \geq 80^oF$	$T_{wb} \geq 73^oF$	$T_{wb} \geq 67^oF$
Humid Area Criteria	# of Hours	549	4816	5618	7297

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^oF-RH 60% Latent + Sensible
10	N/A	N/A	6.7 + 5.3
Ground Water Temperature (^oF) 50 Foot Depth *	**Frost Depth 50 Year Recurrence (in.)**	**Ground Snow Load 50 Year Recurrence (lb/ft^2)**	**Average Annual Freeze-Thaw Cycles (#)**
83.2	N/A	N/A	0

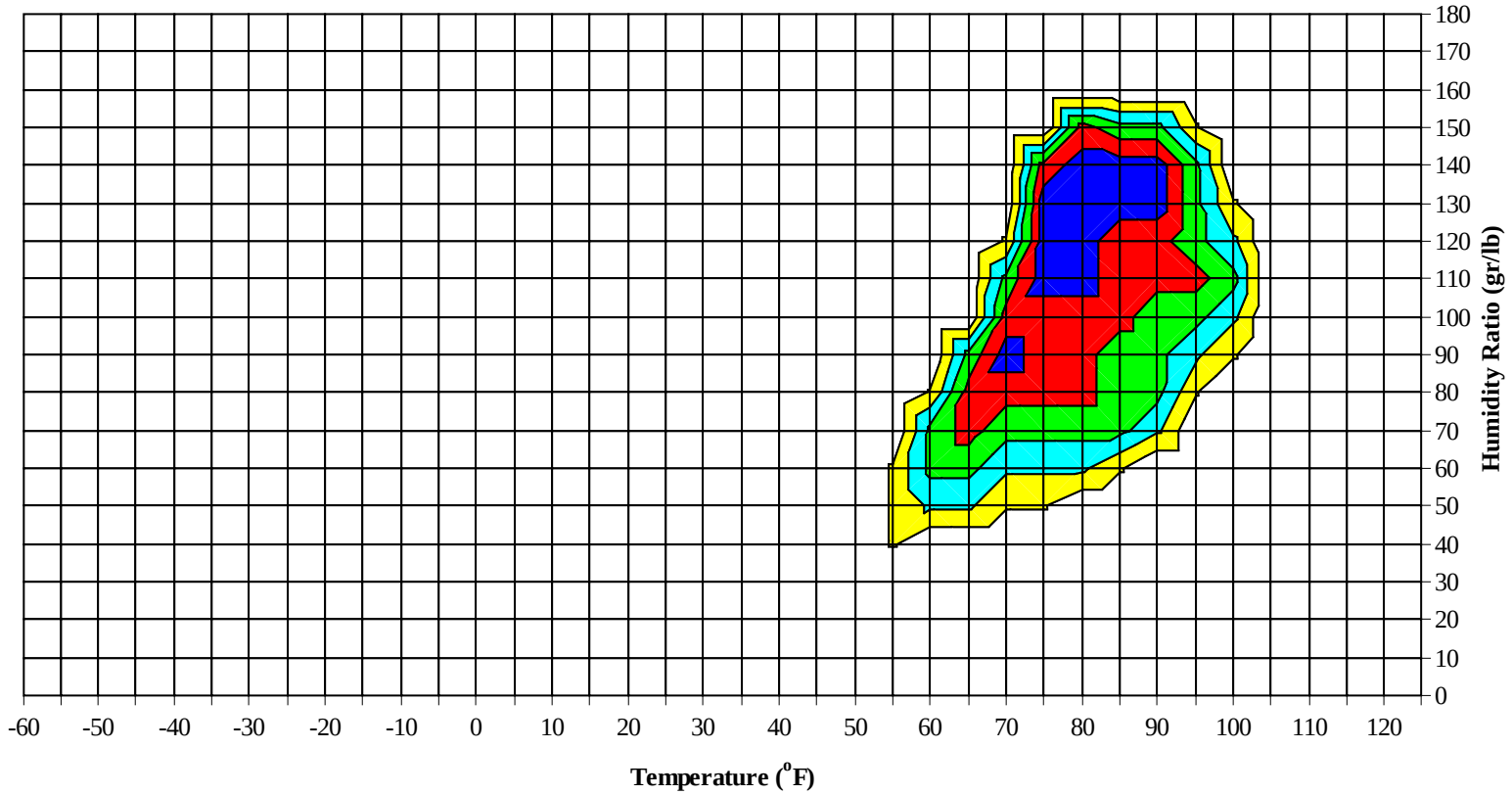
*Note: Temperatures at greater depths can be estimated by adding 1.5^oF per 100 feet additional depth.

UBON/RATCHATHANI TH WMO No. 484070



UBON/RATCHATHANI TH WMO No. 484070

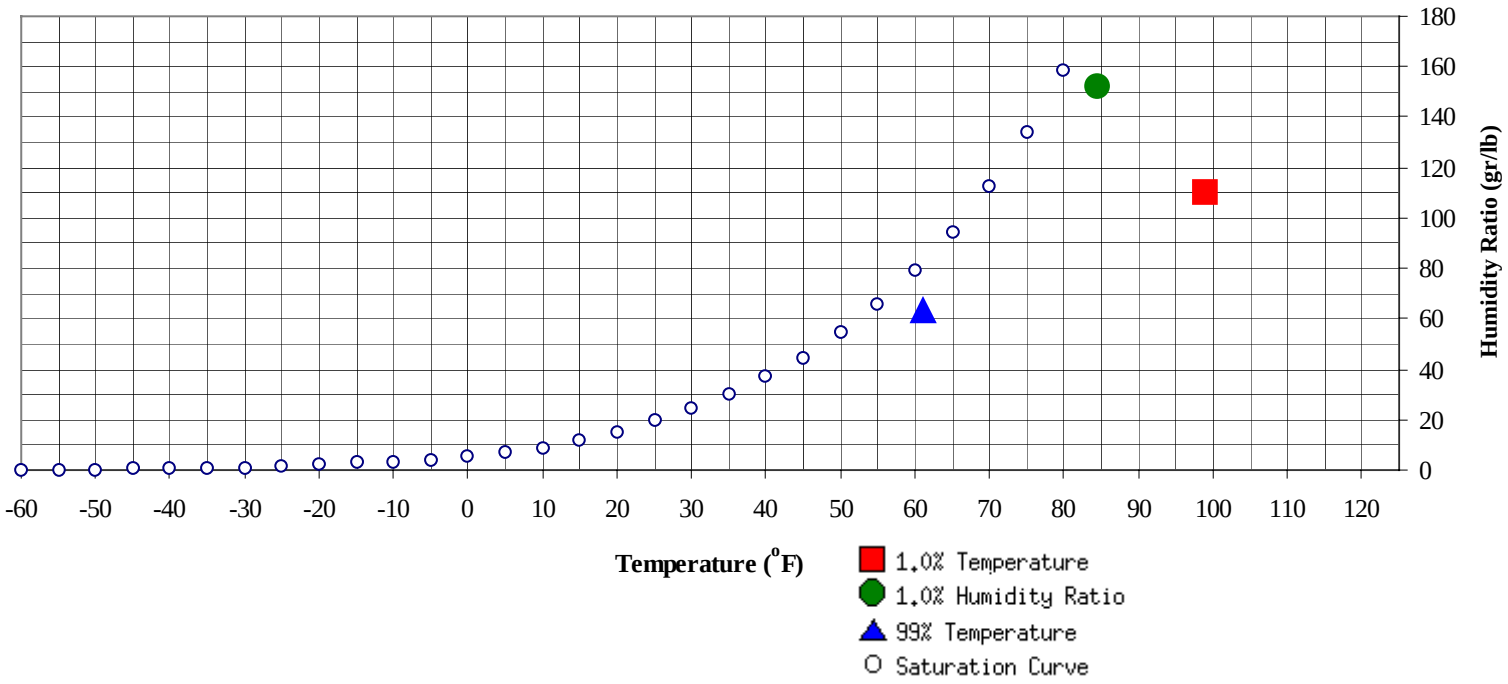
Long Term Psychrometric Summary



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

UBON/RATCHATHANI TH WMO No. 484070

Psychrometric Summary of Peak Design Values



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)
99% Dry Bulb	61	63.4	24.5

	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
1.0% Humidity Ratio	152.6	84.4	80.2	78.7	44.2

	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
1.0% Dry Bulb	99	110.5	77.6	41.2

UBON/RATCHATHANI TH WMO No. 484070

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

Period of Record = 1973 to 1996

Temperature Range (°F)	January Hour Group (LST) 01 To 08	January 09 To 16	January 17 To 00	January Total Obs	January MCWB (°F)	February Hour Group (LST) 01 To 08	February 09 To 16	February 17 To 00	February Total Obs	February MCWB (°F)	March Hour Group (LST) 01 To 08	March 09 To 16	March 17 To 00	March Total Obs	March MCWB (°F)
105 / 109															
100 / 104							0		0	77.0		14		14	76.5
95 / 99		2		2	73.0		27	2	29	75.1	0	69	11	80	76.2
90 / 94		39	3	42	71.9	0	69	19	88	73.7	0	74	56	129	75.4
85 / 89	0	66	13	78	69.9	0	48	42	91	72.5	4	46	59	109	74.3
80 / 84	1	66	57	124	69.1	13	44	74	131	71.1	66	26	80	173	73.1
75 / 79	8	47	78	132	67.2	60	23	51	134	69.3	104	12	30	145	71.0
70 / 74	66	22	65	153	65.3	72	10	25	107	66.3	45	5	8	59	66.6
65 / 69	79	5	22	106	62.6	40	3	6	49	62.6	17	1	4	22	61.9
60 / 64	71	2	9	82	59.2	32	1	5	38	58.6	10	1	1	12	58.4
55 / 59	22		1	24	54.1	7		0	7	54.2	2		0	2	53.4
50 / 54	1			1	50.2	0			0	52.0	0			0	50.0
45 / 49															

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.

UBON/RATCHATHANI TH WMO No. 484070

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

Period of Record = 1973 to 1996

Temperature Range (°F)	April Hour Group (LST) 01 To 08	April 09 To 16	April 17 To 00	April Total Obs	April MCWB (°F)	May Hour Group (LST) 01 To 08	May 09 To 16	May 17 To 00	May Total Obs	May MCWB (°F)	June Hour Group (LST) 01 To 08	June 09 To 16	June 17 To 00	June Total Obs	June MCWB (°F)
105 / 109		3		3	77.9										
100 / 104		31	4	34	78.0		5	0	5	79.1					
95 / 99	0	67	19	85	78.0		38	6	44	78.9		11	0	11	79.7
90 / 94	3	80	61	144	77.1	0	96	31	127	78.6	0	76	18	94	79.2
85 / 89	20	33	64	117	76.2	8	64	57	129	78.0	1	89	51	141	78.4
80 / 84	116	17	64	196	75.1	104	33	107	244	76.7	88	53	105	247	77.1
75 / 79	80	8	25	113	73.3	128	10	45	183	75.0	147	12	65	224	75.3
70 / 74	18	2	5	25	68.9	8	1	2	11	71.8	4		1	5	72.5
65 / 69	3	0	0	3	62.3										
60 / 64															
55 / 59															
50 / 54															
45 / 49															

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.

UBON/RATCHATHANI TH WMO No. 484070

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

Period of Record = 1973 to 1996

	July					August					September				
Temperature Range (°F)	Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)	Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
105 / 109															
100 / 104			0	0	83.0										
95 / 99	0	2	0	2	81.0		0		0	78.3		1		1	81.0
90 / 94	0	63	12	76	79.1	0	37	5	42	78.9		34	2	37	78.5
85 / 89	1	102	51	154	78.2	0	103	35	138	78.3	0	101	24	125	77.9
80 / 84	75	66	120	261	77.1	52	85	125	261	77.2	30	83	115	228	77.2
75 / 79	162	14	61	238	75.2	185	22	78	286	75.3	195	19	92	306	75.3
70 / 74	10	1	4	14	72.4	11	1	5	17	72.7	16	2	6	24	72.3
65 / 69															
60 / 64															
55 / 59															
50 / 54															
45 / 49															

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.

UBON/RATCHATHANI TH WMO No. 484070

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)				MCWB	Hour Group (LST)				MCWB	Hour Group (LST)				MCWB
	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)	01 To 08	09 To 16	17 To 00	Total Obs	(°F)
105 / 109															
100 / 104															
95 / 99							0		0	76.0					
90 / 94		24	0	24	77.6	0	18	0	18	76.0		15	1	16	73.6
85 / 89	0	95	8	104	76.4	0	70	2	73	74.5	0	55	2	57	71.7
80 / 84	9	95	92	196	75.0	1	96	54	151	72.2	1	81	34	115	69.9
75 / 79	140	27	117	285	73.5	37	44	98	179	70.2	9	59	75	143	67.4
70 / 74	88	6	29	122	69.2	121	11	67	199	67.3	59	30	78	167	65.1
65 / 69	11	0	1	12	64.4	53	1	14	68	63.2	86	5	35	126	62.6
60 / 64	1			1	59.6	25		5	30	58.6	70	3	18	91	58.3
55 / 59						3			3	54.2	21	0	5	26	52.7
50 / 54											3			3	49.3
45 / 49											0			0	45.0

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.

UBON/RATCHATHANI TH WMO No. 484070

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

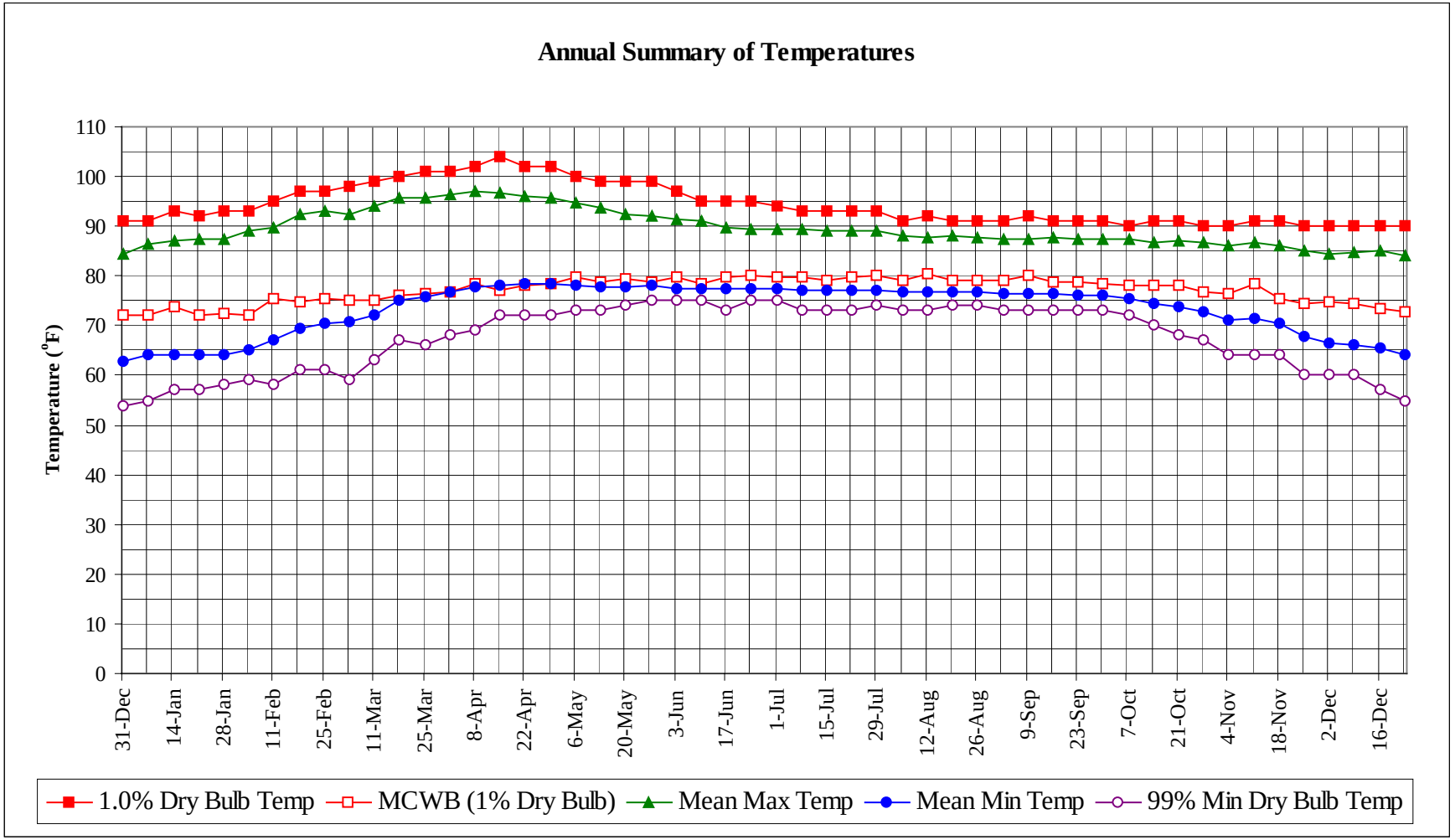
Period of Record = 1973 to 1996

Annual Totals

Temperature Range (°F)	Hour Group (LST) 01 To 08	09 To 16	17 To 00	Total Obs	MCWB (°F)
105 / 109		3		3	77.9
100 / 104		51	5	56	77.7
95 / 99	0	221	41	261	77.3
90 / 94	4	627	214	845	76.9
85 / 89	36	867	413	1316	76.1
80 / 84	558	743	1015	2316	74.9
75 / 79	1237	297	808	2341	73.0
70 / 74	521	89	298	908	67.0
65 / 69	292	16	84	392	62.7
60 / 64	212	5	38	255	58.7
55 / 59	56	0	5	61	53.5
50 / 54	5			5	49.7
45 / 49	0			0	45.0

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.

UBON/RATCHATHANI TH WMO No. 484070



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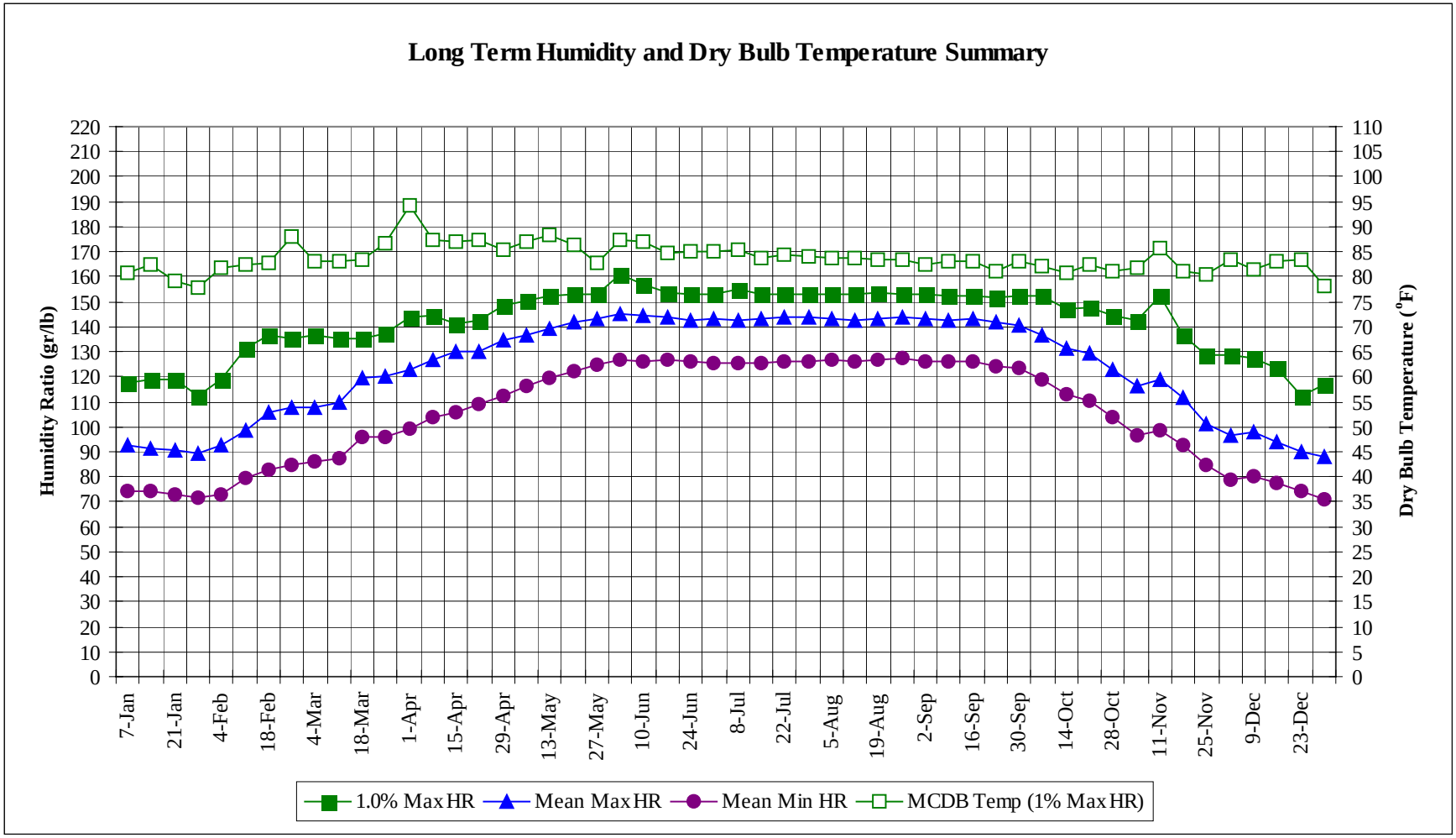
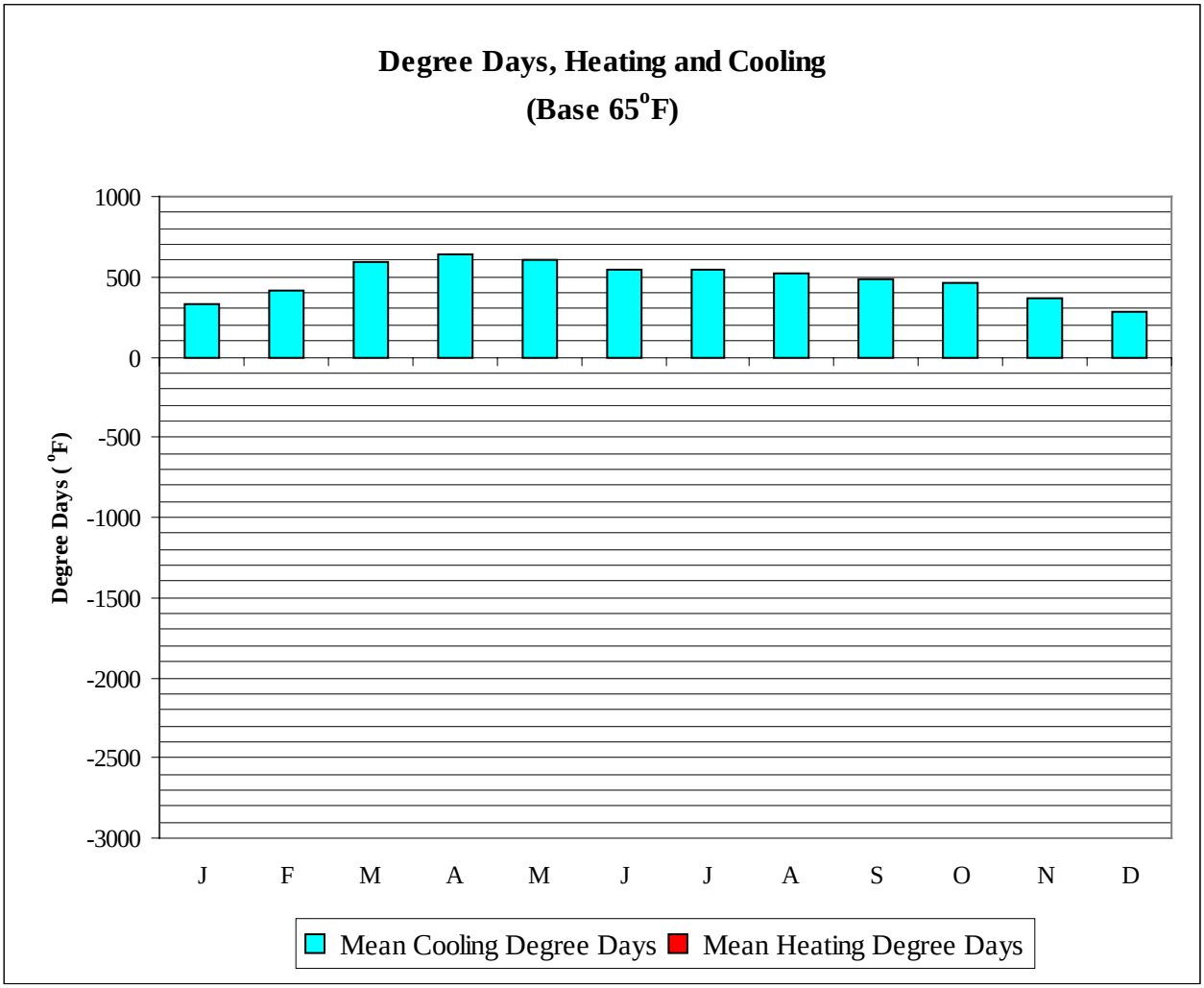


UBON/RATCHATHANI TH WMO No. 484070

Long Term Dry Bulb Temperature and Humidity Summary

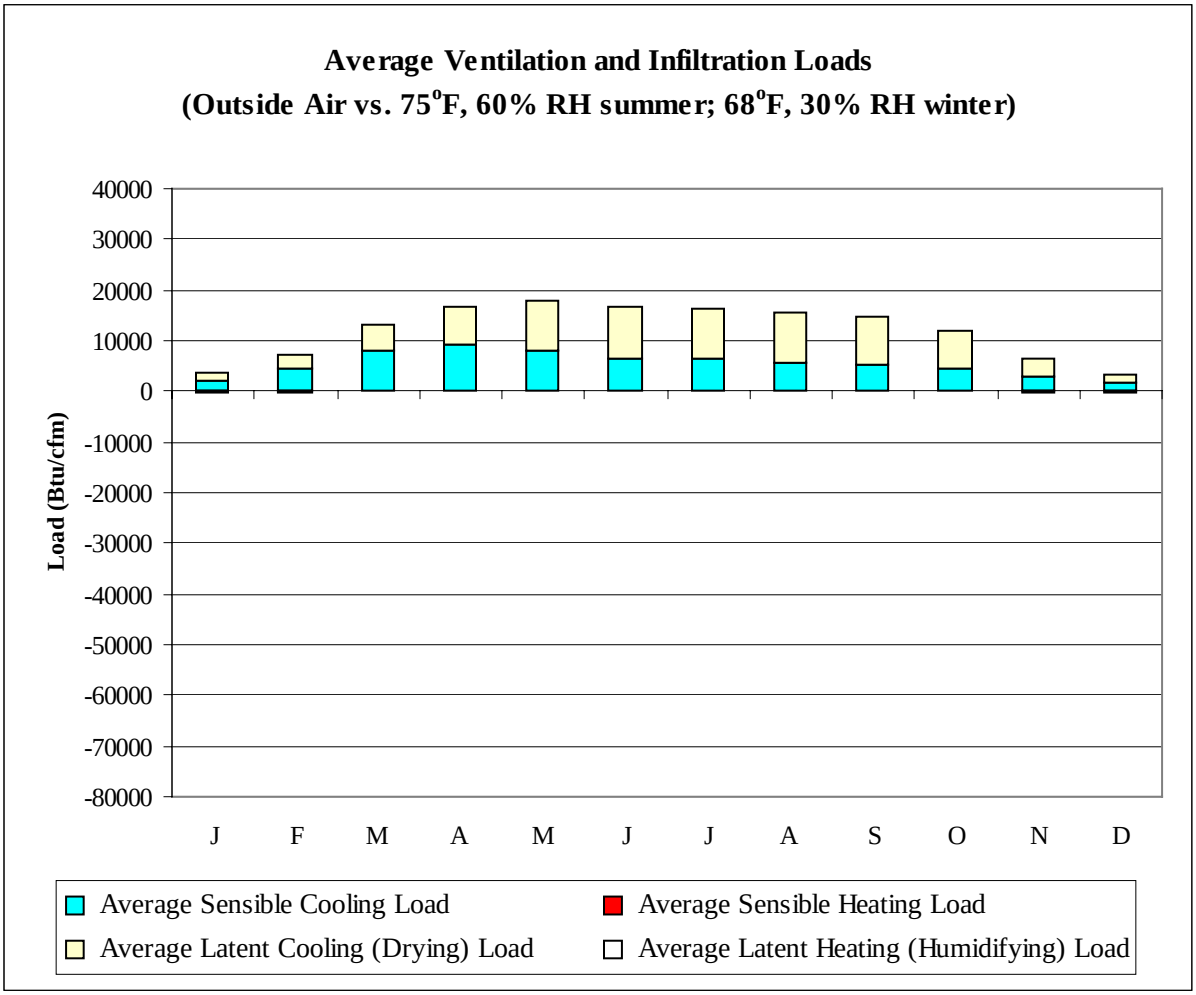
Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	91.0	72.3	86.2	64.3	55.0	117.6	80.9	92.5	74.3
14-Jan	93.0	73.8	87.0	64.2	57.0	119.0	82.3	91.6	74.1
21-Jan	92.0	72.1	87.3	64.0	57.0	119.0	79.1	90.6	73.2
28-Jan	93.0	72.3	87.4	64.2	58.0	112.0	77.7	89.3	71.3
4-Feb	93.0	72.3	88.9	65.2	59.0	119.0	81.6	92.8	72.7
11-Feb	95.0	75.3	89.6	67.1	58.0	131.6	82.4	98.6	79.7
18-Feb	97.0	74.7	92.3	69.6	61.0	136.5	82.8	105.7	82.8
25-Feb	97.0	75.5	93.0	70.4	61.0	135.1	88.1	107.4	84.7
4-Mar	98.0	75.2	92.3	70.7	59.0	136.5	83.0	107.8	85.8
11-Mar	99.0	75.1	94.1	72.2	63.0	135.1	83.2	109.9	87.3
18-Mar	100.0	76.2	95.8	75.3	67.0	135.1	83.5	119.8	95.7
25-Mar	101.0	76.4	95.8	75.6	66.0	137.2	86.7	120.0	96.0
1-Apr	101.0	76.8	96.3	76.8	68.0	143.5	94.1	122.7	99.2
8-Apr	102.0	78.5	96.9	77.8	69.0	144.2	87.5	126.7	103.9
15-Apr	104.0	77.2	96.6	78.0	72.0	141.4	86.9	130.3	105.8
22-Apr	102.0	78.2	96.2	78.5	72.0	142.8	87.3	130.1	109.0
29-Apr	102.0	78.4	95.6	78.3	72.0	148.4	85.3	134.9	112.1
6-May	100.0	79.7	94.7	78.1	73.0	150.5	87.0	136.8	116.4
13-May	99.0	78.8	93.7	77.9	73.0	152.6	88.4	139.0	119.3
20-May	99.0	79.3	92.4	77.6	74.0	153.3	86.4	141.9	122.3
27-May	99.0	78.9	92.1	78.1	75.0	153.3	82.9	143.0	124.6
3-Jun	97.0	79.9	91.2	77.5	75.0	161.0	87.5	145.0	126.7
10-Jun	95.0	78.5	90.9	77.5	75.0	156.8	87.0	144.3	126.4
17-Jun	95.0	79.9	89.8	77.5	73.0	154.0	84.6	143.8	126.8
24-Jun	95.0	79.9	89.4	77.6	75.0	153.3	84.9	142.7	126.3
1-Jul	94.0	79.7	89.3	77.5	75.0	153.3	85.0	143.2	125.5
8-Jul	93.0	79.9	89.3	77.0	73.0	154.7	85.3	142.7	125.6
15-Jul	93.0	79.2	89.0	77.1	73.0	153.3	83.8	143.0	125.6
22-Jul	93.0	79.9	88.9	77.0	73.0	153.3	84.3	143.7	125.8
29-Jul	93.0	80.2	89.0	77.2	74.0	153.3	84.2	143.6	126.1
5-Aug	91.0	79.1	88.0	76.8	73.0	153.3	83.6	143.1	126.4
12-Aug	92.0	80.5	87.7	76.7	73.0	153.3	83.8	142.7	126.3
19-Aug	91.0	79.2	88.0	76.9	74.0	154.0	83.5	143.1	126.7
26-Aug	91.0	79.0	87.6	76.8	74.0	153.3	83.5	143.9	127.5
2-Sep	91.0	79.1	87.4	76.3	73.0	153.3	82.5	142.9	126.3
9-Sep	92.0	80.0	87.3	76.3	73.0	152.6	83.1	142.7	126.3
16-Sep	91.0	78.7	87.7	76.3	73.0	152.6	83.1	142.9	125.8
23-Sep	91.0	78.7	87.4	76.1	73.0	151.9	81.3	141.7	124.3
30-Sep	91.0	78.4	87.5	76.0	73.0	152.6	83.0	140.3	123.2
7-Oct	90.0	78.0	87.3	75.3	72.0	152.6	82.0	136.6	119.0
14-Oct	91.0	78.1	86.8	74.5	70.0	147.0	80.9	131.1	113.1
21-Oct	91.0	78.1	87.1	73.9	68.0	147.7	82.4	129.6	110.4
28-Oct	90.0	76.8	86.8	72.8	67.0	144.2	81.1	122.8	104.0
4-Nov	90.0	76.3	86.0	71.1	64.0	142.8	81.6	116.2	96.9
11-Nov	91.0	78.4	86.9	71.4	64.0	152.6	85.7	118.9	98.2
18-Nov	91.0	75.4	86.2	70.3	64.0	136.5	81.1	111.5	92.5
25-Nov	90.0	74.6	85.1	67.9	60.0	128.8	80.5	101.0	84.9
2-Dec	90.0	74.8	84.4	66.6	60.0	128.8	83.3	96.4	79.1
9-Dec	90.0	74.6	84.7	66.0	60.0	127.4	81.3	98.1	79.9
16-Dec	90.0	73.3	85.0	65.4	57.0	123.2	83.0	94.1	77.4
23-Dec	90.0	72.9	84.2	64.2	55.0	112.0	83.3	90.3	74.2
31-Dec	91.0	72.1	84.4	62.9	54.0	116.9	78.0	88.1	71.2

UBON/RATCHATHANI TH WMO No. 484070



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	328	7
FEB	415	2
MAR	595	1
APR	645	0
MAY	603	0
JUN	542	0
JUL	540	0
AUG	516	0
SEP	486	0
OCT	457	0
NOV	361	1
DEC	287	7
ANN	5776	18

UBON/RATCHATHANI TH WMO No. 484070

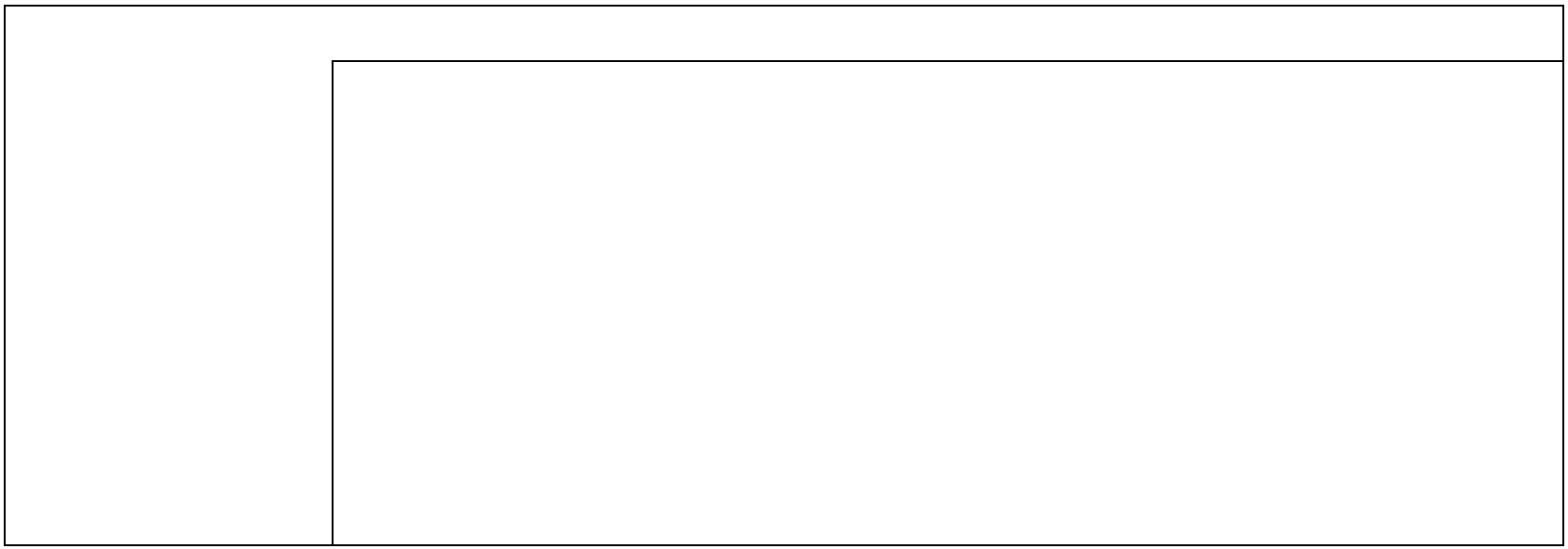


	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	2243	-397	1452	0
FEB	4325	-148	2941	0
MAR	7919	-54	5293	0
APR	9298	-1	7598	0
MAY	8035	0	9938	0
JUN	6604	0	9967	0
JUL	6288	0	10211	0
AUG	5633	0	10078	0
SEP	5165	0	9582	0
OCT	4333	-4	7498	0
NOV	2713	-103	3780	0
DEC	1583	-427	1666	0
ANN	64139	-1134	80004	0

Average Annual Solar Radiation – Nearest Available Site

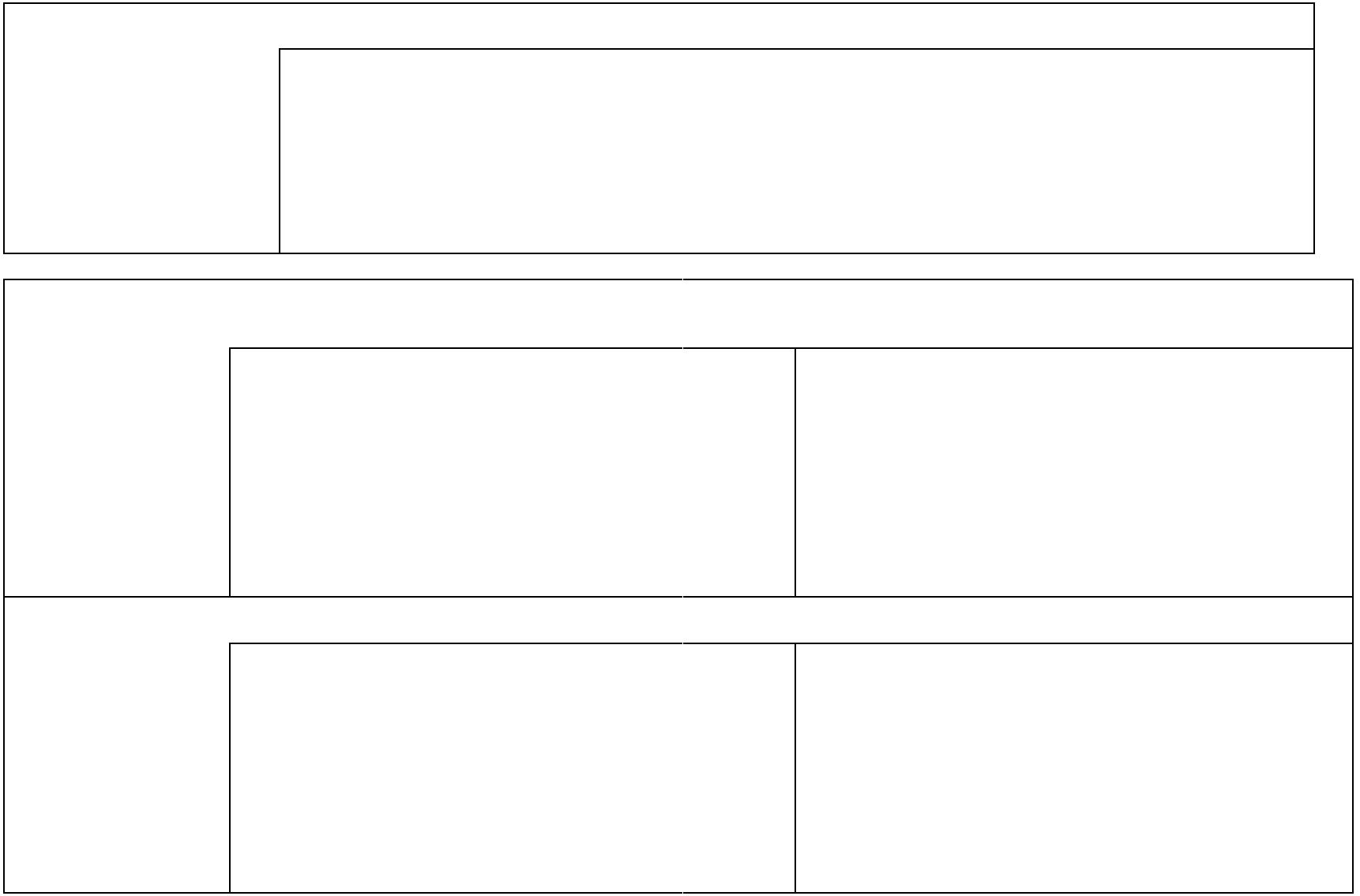
(Source: National Renewable Energy Laboratory, Golden CO, 1995)

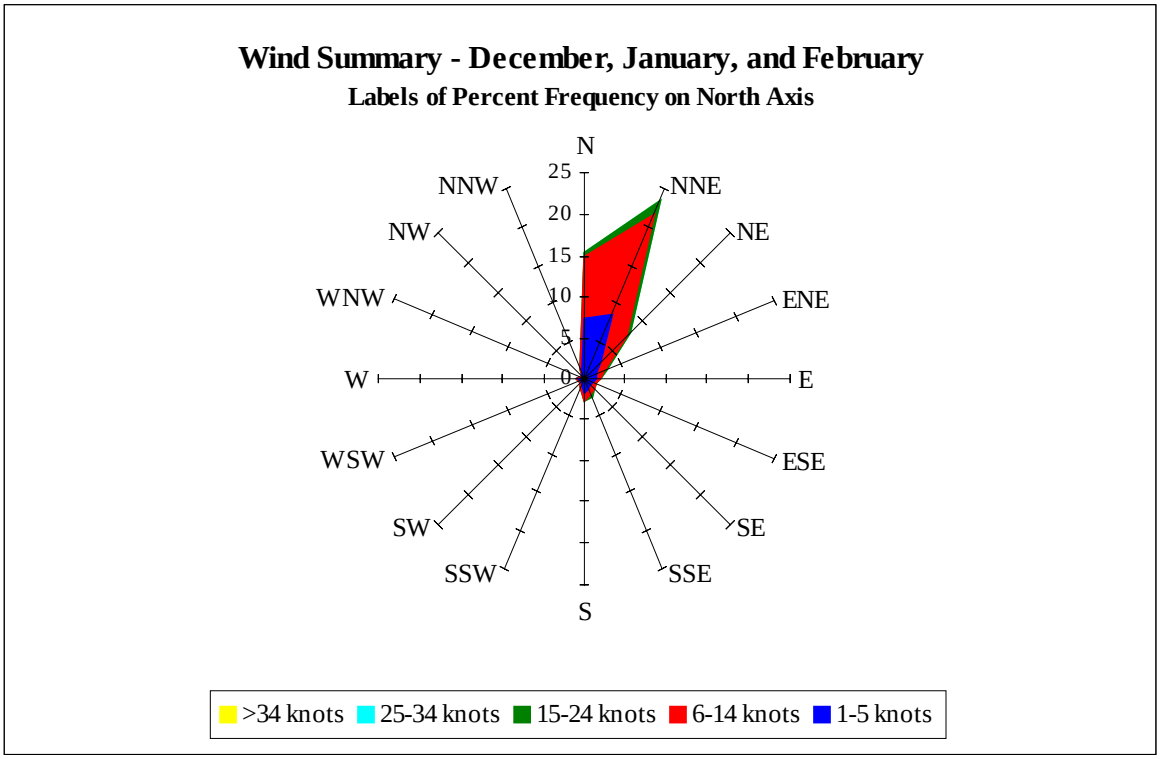
No Solar Radiation
Data Available



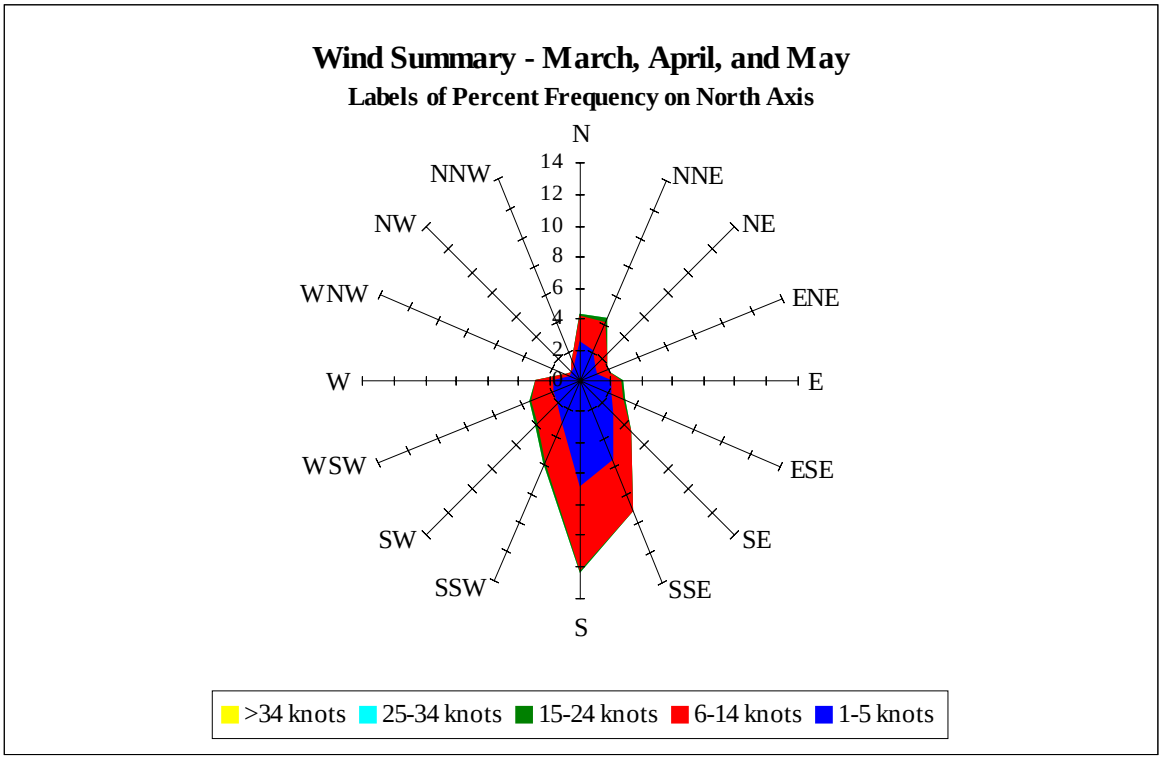
Average Annual Solar Heat and Illumination – Nearest Available Site

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

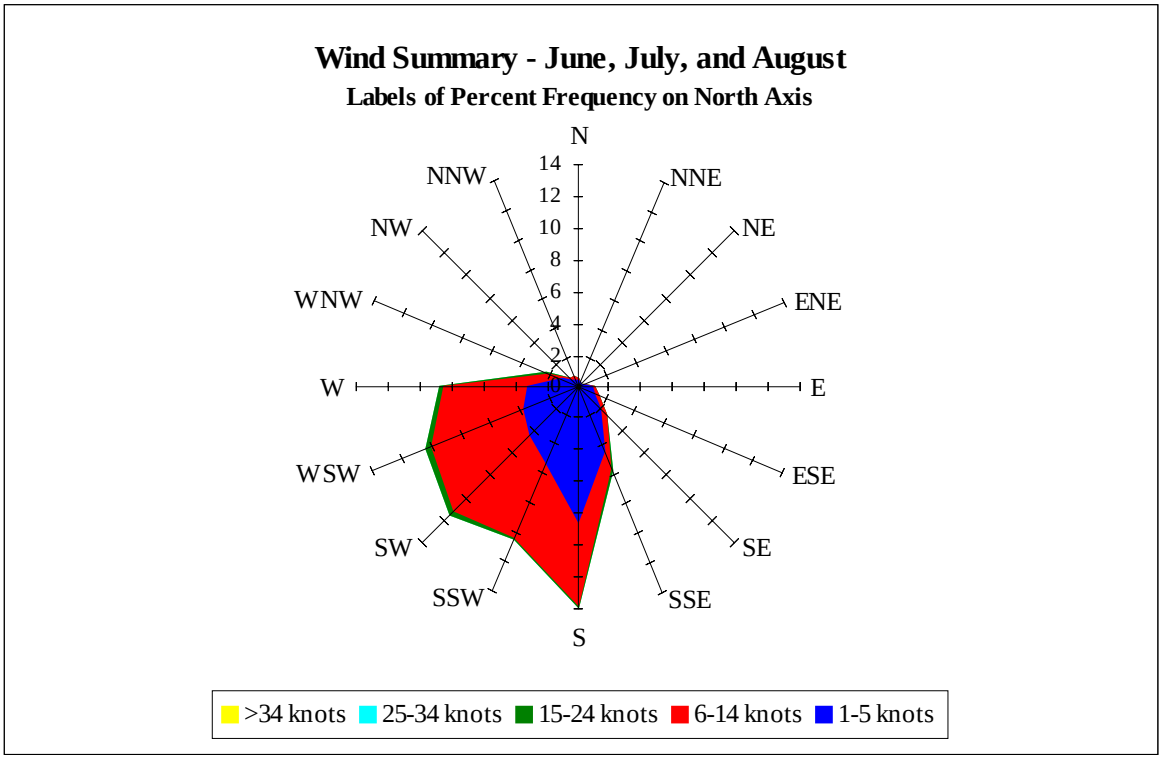




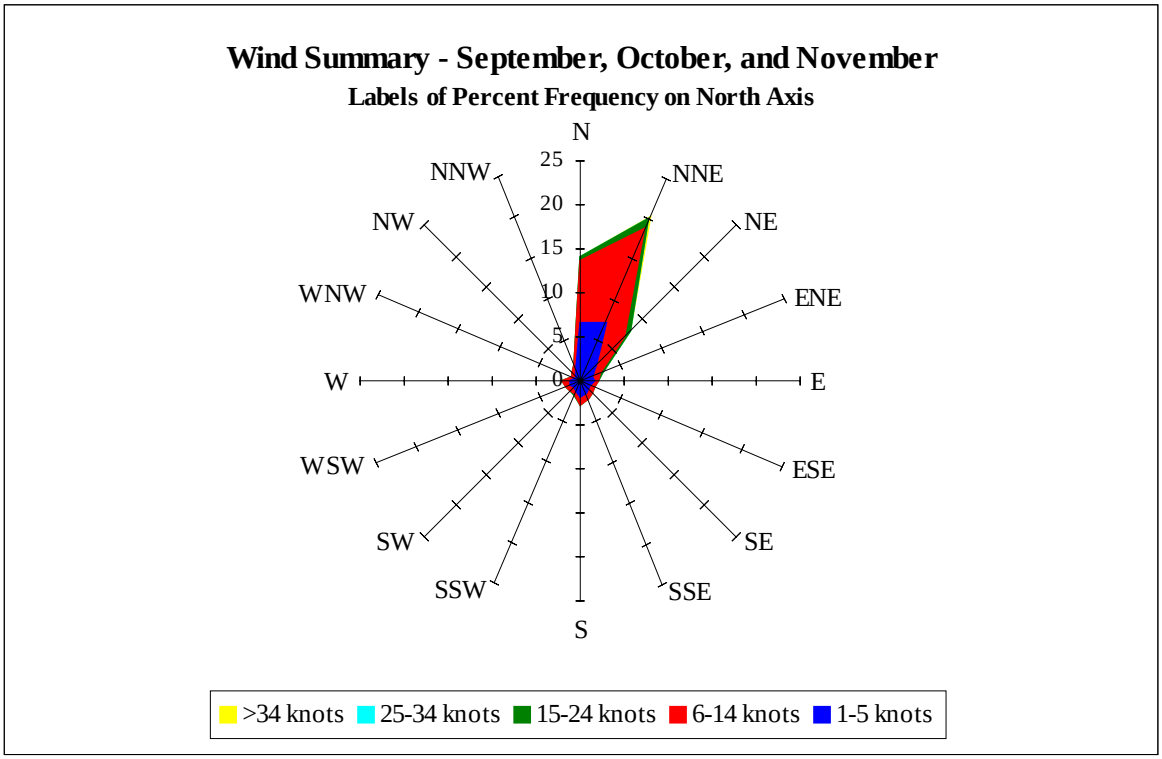
Percent Calm = 34.62



Percent Calm = 36.75



Percent Calm = 29.78



Percent Calm = 33.36