

THULE AB	GL	
Latitude = 76.53 N		WMO No. 042020
Longitude = 68.50 W		Elevation = 194 feet
Period of Record = 1967 to 1996		Average Pressure = 29.53 inches Hg

Design Criteria Data

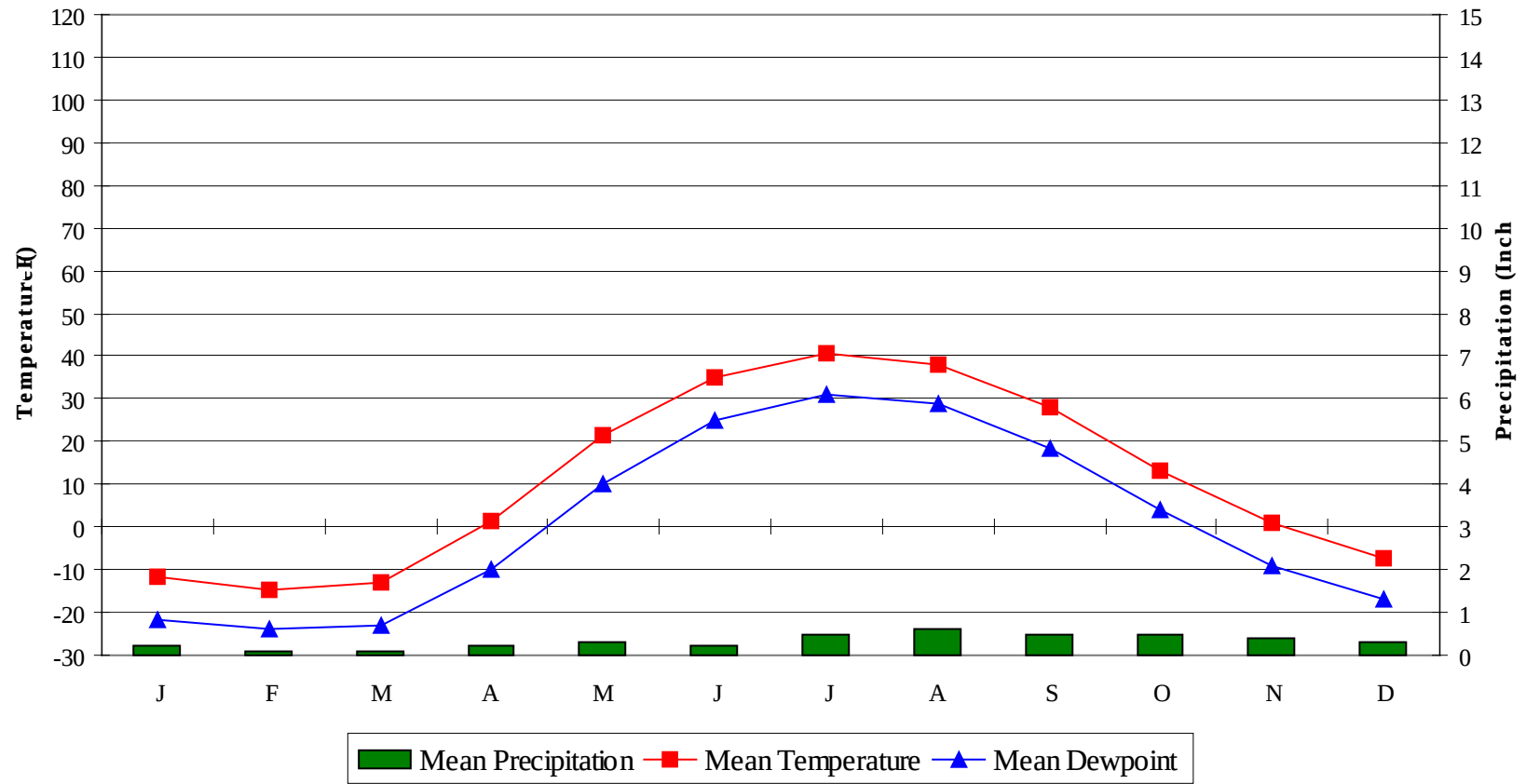
	Design Value	Mean Coincident (Average) Values			
		Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Dry Bulb Temperature (T)	(°F)				
Median of Extreme Highs	57	45	26	10.4	E
0.4% Occurrence	52	43	28	7.6	E
1.0% Occurrence	50	43	29	6.3	W
2.0% Occurrence	46	40	28	6.9	W
Mean Daily Range	11	-	-	-	-
97.5% Occurrence	-27	-28	1	6.9	E
99.0% Occurrence	-31	-31	1	6.9	E
99.6% Occurrence	-35	-35	1	6.9	E
Median of Extreme Lows	-37	-36	1	6.8	E
	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	46	54	34	8.0	E
0.4% Occurrence	44	51	32	7.0	E
1.0% Occurrence	43	50	30	5.9	W
2.0% Occurrence	41	46	30	6.2	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	38	47	0.26	5.0	W
0.4% Occurrence	36	46	0.24	4.5	WNW
1.0% Occurrence	33	44	0.22	3.6	W
2.0% Occurrence	31	43	0.21	4.6	W
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		0	0	0	0

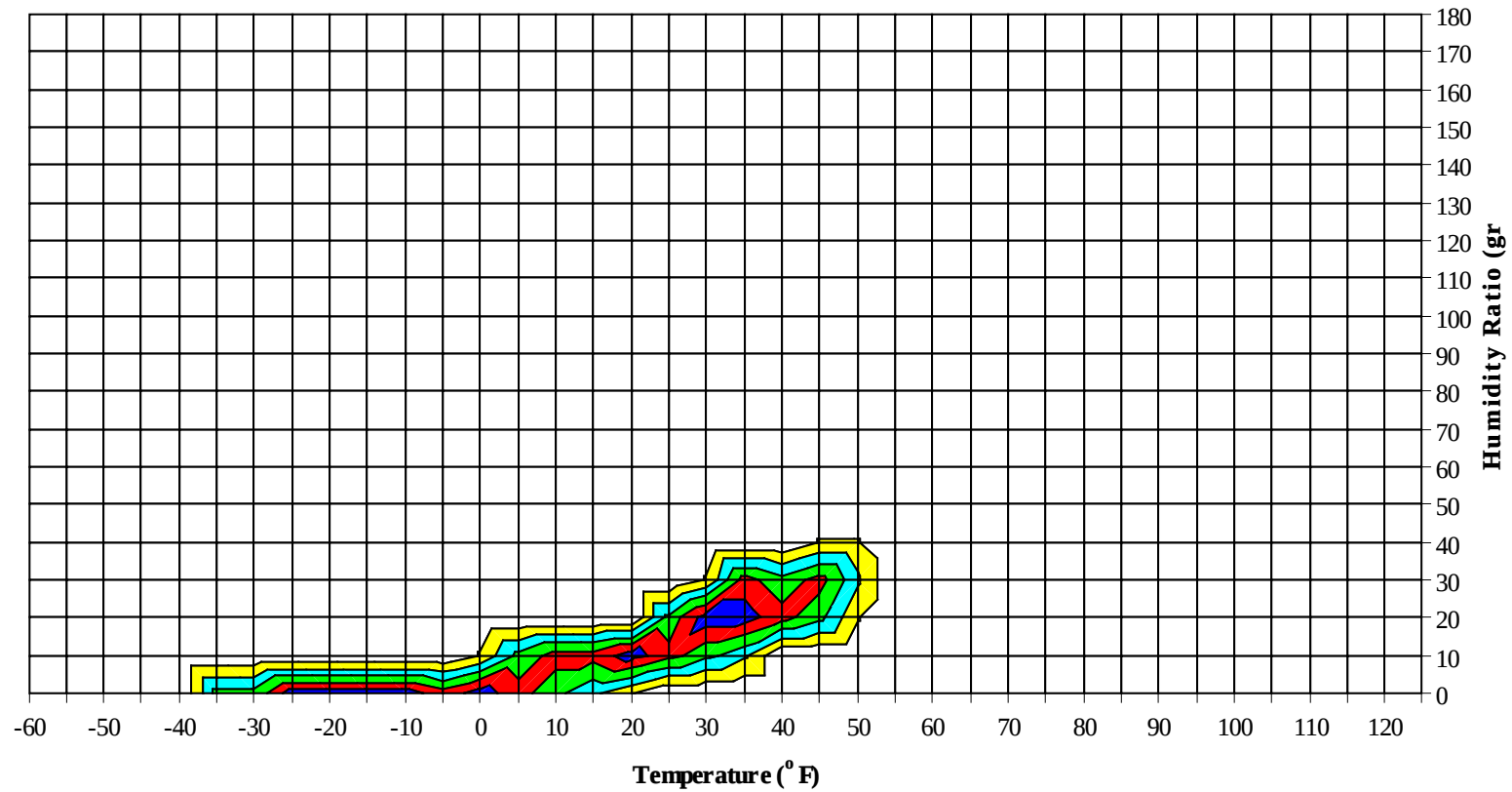
Other Site Data

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
1	N/A	N/A	0.0 + 0.0
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 (#)
13.6	N/A	N/A	40

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

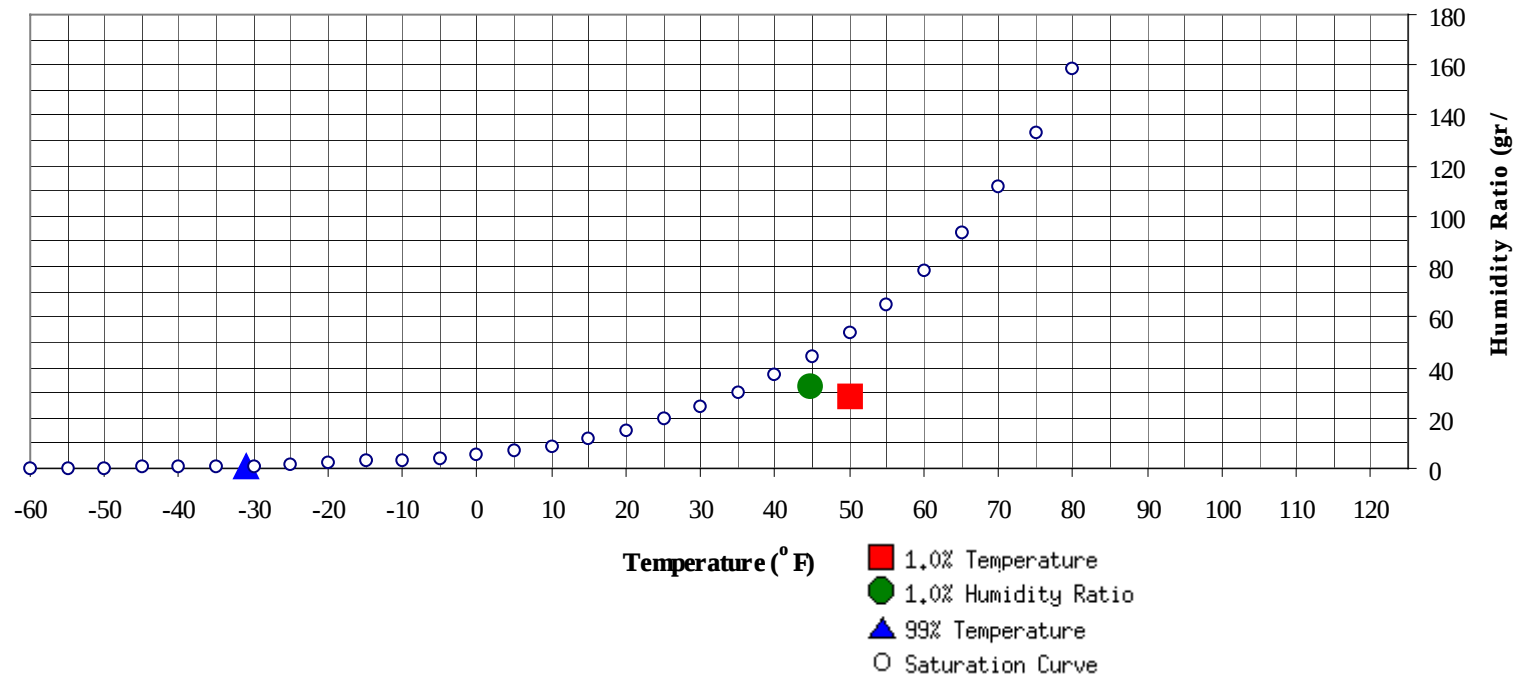
Average Annual Climate



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



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
99% Dry Bulb	-31	0.7	-7.3		32.9	44.6	41	37.3	15.8

	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
1.0% Dry Bulb	50	28.9	42.5	16.5

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Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)**Period of Record = 1967 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		
65 / 69															
60 / 64															
55 / 59															
50 / 54															
45 / 49															
40 / 44			0	0	37.0										
35 / 39	0	0	0	1	34.7						0	0		0	30.5
30 / 34	1	1	0	2	27.5	0	0	0	1	27.9	0	0	0	1	27.6
25 / 29	3	3	3	9	22.9	1	1	1	3	23.0	1	1	1	2	24.2
20 / 24	2	2	2	6	18.6	0	1	1	3	19.4	1	1	1	2	18.6
15 / 19	5	6	5	16	14.6	2	2	2	6	14.9	2	4	3	9	14.5
10 / 14	7	8	8	23	9.6	5	4	4	13	9.7	5	6	6	17	9.6
5 / 9	11	10	11	31	4.8	10	8	8	25	4.8	8	10	10	28	4.9
0 / 4	19	19	19	56	0.0	16	17	16	49	0.1	16	20	16	51	-0.2
-5 / -1	18	16	15	49	-4.0	15	14	16	44	-4.0	16	18	19	52	-4.0
-10 / -6	33	32	33	98	-8.5	26	30	29	85	-8.5	31	38	33	102	-8.5
-15 / -11	27	29	29	85	-12.5	21	20	19	61	-12.5	28	32	31	92	-12.6
-20 / -16	43	45	43	131	-17.1	36	39	36	112	-17.2	51	53	49	153	-17.1
-25 / -21	41	42	42	125	-22.2	38	38	40	116	-22.3	44	34	41	119	-22.1
-30 / -26	30	28	30	88	-27.3	32	30	31	93	-27.4	29	22	28	80	-27.4
-35 / -31	6	6	5	17	-31.8	12	12	12	36	-31.9	12	6	9	27	-31.8
-40 / -36	2	2	2	6	-35.9	7	7	7	21	-35.6	4	1	2	8	-35.5
-45 / -41	0	0		0	-40.2	2	1	2	4	-40.9	0	0		0	-40.7
-50 / -46						0	0	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 = 1967 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		
65 / 69												0		0	47.0
60 / 64												1	0	1	45.9
55 / 59											1	1	1	3	43.0
50 / 54							0	0	1	40.8	2	5	3	10	41.3
45 / 49						0	2	1	3	38.4	11	16	15	43	38.5
40 / 44			0	0	33.0	2	4	4	10	35.3	19	27	25	71	36.1
35 / 39	0	1	1	2	30.9	10	19	15	44	31.9	66	75	72	214	32.8
30 / 34	2	3	2	8	27.3	22	32	33	88	28.3	81	82	87	250	29.3
25 / 29	4	8	7	20	23.2	46	62	59	167	23.3	53	31	35	119	25.4
20 / 24	6	7	7	19	19.3	37	44	44	126	19.1	6	2	2	10	19.7
15 / 19	11	18	14	44	14.7	57	44	46	146	15.4	0	0	0	1	16.6
10 / 14	18	32	27	77	9.8	33	25	27	84	10.0					
5 / 9	24	38	35	98	5.1	18	11	11	41	5.6					
0 / 4	37	48	43	128	0.2	13	3	6	22	0.4					
-5 / -1	29	29	30	89	-3.9	5	1	2	7	-3.5					
-10 / -6	43	36	38	117	-8.3	3	0	1	4	-7.8					
-15 / -11	28	11	18	57	-12.4	0		0	0	-10.3					
-20 / -16	28	7	13	48	-16.7										
-25 / -21	8	1	4	13	-21.6										
-30 / -26	1	0	0	1	-26.8										
-35 / -31															
-40 / -36															
-45 / -41															
-50 / -46															

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WMO No. 42020

Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)**Period of Record = 1967 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		
65 / 69		0	0	0	47.8										
60 / 64	0	1	1	2	47.1		0	0	0	46.6					
55 / 59	2	4	3	9	45.0	0	2	1	3	45.4					
50 / 54	10	19	16	46	43.4	3	8	5	16	43.1	0		0	0	38.5
45 / 49	49	61	55	165	40.3	22	38	30	89	40.2	0	1	0	1	38.6
40 / 44	51	51	57	159	37.6	35	50	45	130	37.4	3	7	4	14	36.1
35 / 39	92	85	86	264	34.4	105	110	112	327	33.9	24	47	35	106	32.4
30 / 34	36	24	26	85	30.9	69	36	49	154	30.1	67	80	78	225	28.7
25 / 29	6	3	4	13	27.0	14	5	5	24	26.4	71	64	63	198	24.0
20 / 24						1			1	21.2	30	19	24	73	19.6
15 / 19						0			0	18.0	28	16	23	68	15.6
10 / 14											14	5	10	29	10.5
5 / 9											4	1	2	7	6.2
0 / 4											0		0	0	1.5
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															
-30 / -26															
-35 / -31															
-40 / -36															
-45 / -41															
-50 / -46															

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Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)**Period of Record = 1967 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		
65 / 69															
60 / 64															
55 / 59															
50 / 54															
45 / 49															
40 / 44	0	0		0	37.2	0			0	34.0					
35 / 39	2	3	2	8	31.3	1	1	1	2	30.8	0	0	0	1	31.2
30 / 34	16	18	16	49	27.9	3	3	3	8	28.1	1	1	2	5	29.5
25 / 29	30	31	30	91	23.7	6	7	6	19	23.2	3	3	3	9	23.4
20 / 24	22	24	23	70	19.7	8	7	7	22	19.3	2	3	3	9	19.7
15 / 19	43	41	40	124	15.4	18	19	20	57	15.1	8	7	7	22	15.0
10 / 14	39	42	43	124	10.2	28	27	28	83	10.0	10	11	11	31	10.1
5 / 9	38	34	33	105	5.5	30	30	29	89	5.3	20	19	20	59	5.3
0 / 4	31	28	32	91	0.5	35	35	35	105	0.3	28	27	26	81	0.1
-5 / -1	13	13	14	40	-3.6	25	25	24	74	-3.8	21	20	22	64	-3.9
-10 / -6	10	8	9	27	-7.6	35	35	36	106	-8.2	39	40	39	118	-8.4
-15 / -11	2	2	1	5	-12.1	20	19	20	59	-12.4	30	28	29	87	-12.4
-20 / -16	2	3	2	7	-17.0	23	22	21	67	-17.0	39	41	40	120	-17.1
-25 / -21	0	1	1	2	-21.3	8	8	9	26	-21.5	30	31	30	91	-22.0
-30 / -26						1	1	1	4	-26.7	14	14	14	42	-27.2
-35 / -31											2	2	2	7	-32.0
-40 / -36											0	1	1	1	-35.3
-45 / -41															
-50 / -46															

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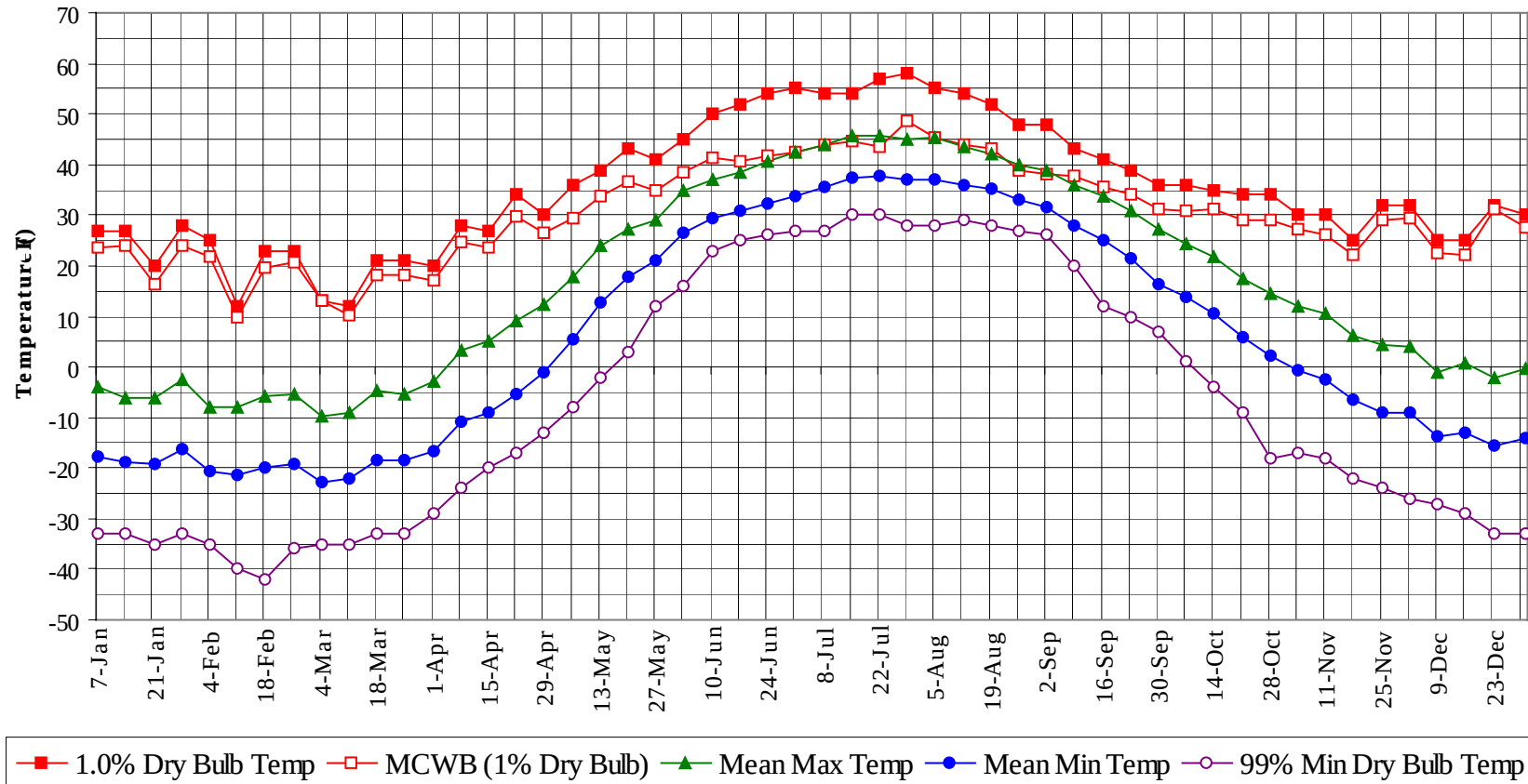
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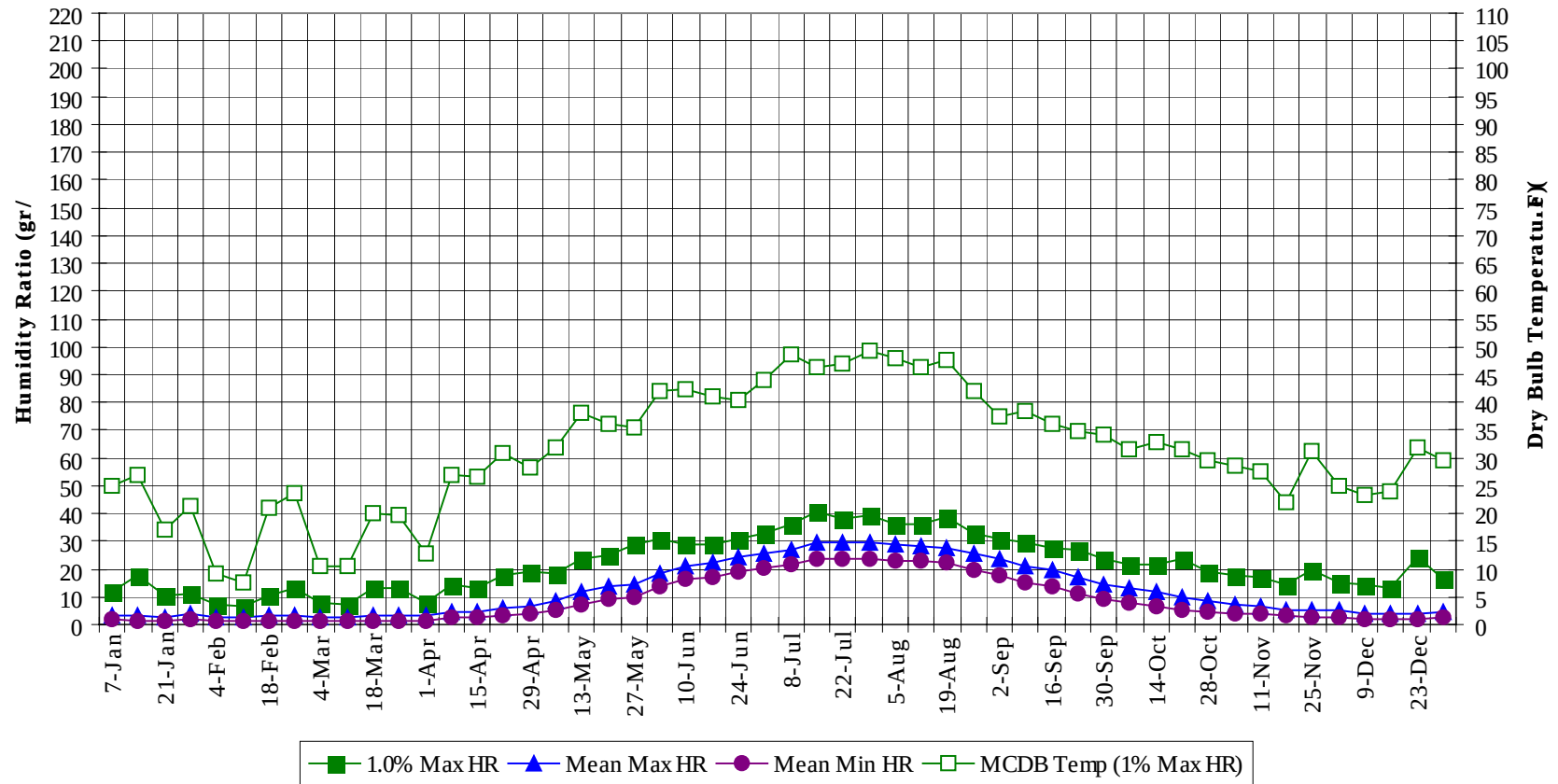
Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)**Period of Record = 1967 to 1996**

Temperature Range (°F)	Annual Totals				
	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
65 / 69		0	0	0	47.6
60 / 64	0	2	1	3	46.8
55 / 59	3	7	5	15	44.7
50 / 54	16	32	25	73	43.0
45 / 49	83	118	102	303	40.0
40 / 44	111	138	135	384	37.1
35 / 39	302	342	324	969	33.5
30 / 34	299	280	295	874	29.2
25 / 29	238	218	216	672	24.1
20 / 24	115	110	115	339	19.4
15 / 19	174	157	160	491	15.3
10 / 14	158	159	163	481	10.0
5 / 9	162	161	158	481	5.3
0 / 4	194	196	193	582	0.2
-5 / -1	141	136	141	419	-3.9
-10 / -6	220	220	218	657	-8.4
-15 / -11	158	142	147	447	-12.4
-20 / -16	224	210	205	639	-17.1
-25 / -21	171	154	167	492	-22.1
-30 / -26	108	95	106	309	-27.3
-35 / -31	33	26	29	87	-31.9
-40 / -36	14	11	12	37	-35.6
-45 / -41	2	2	2	5	-40.6
-50 / -46	0	0	0	0	

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Annual Summary of Temperatures



Long Term Humidity and Dry Bulb Temperature Summary

THULE AB

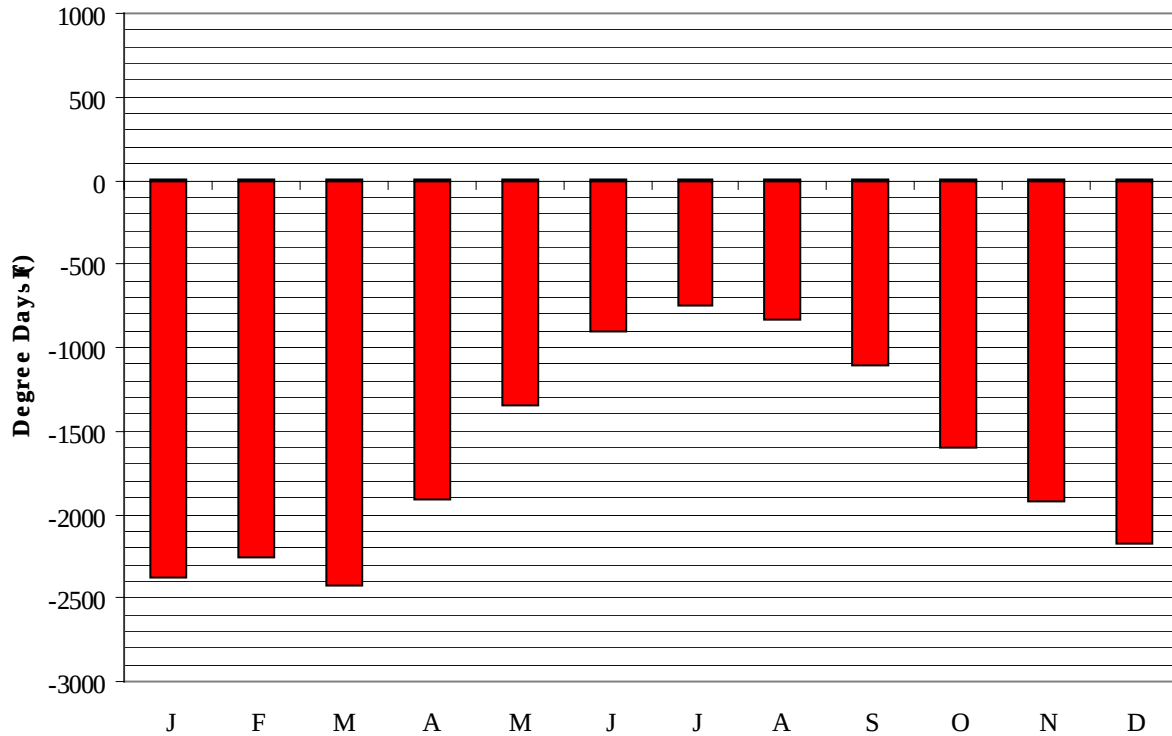
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Long Term Dry Bulb Temperature and Humidity Summary

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	27.0	23.6	-4.0	-17.7	-33.0	11.9	25.1	3.5	1.8
14-Jan	27.0	23.9	-6.0	-18.9	-33.0	17.5	27.0	3.1	1.6
21-Jan	20.0	16.4	-6.2	-19.2	-35.0	10.5	17.0	2.9	1.5
28-Jan	28.0	23.8	-2.5	-16.2	-33.0	11.2	21.5	3.8	1.8
4-Feb	25.0	21.8	-8.0	-20.7	-35.0	7.0	9.2	2.5	1.3
11-Feb	12.0	9.9	-8.0	-21.5	-40.0	6.3	7.7	2.6	1.3
18-Feb	23.0	19.7	-5.8	-19.8	-42.0	10.5	21.0	3.2	1.5
25-Feb	23.0	20.8	-5.4	-19.1	-36.0	13.3	23.6	3.4	1.6
4-Mar	13.0	13.0	-9.9	-22.9	-35.0	7.7	10.6	2.5	1.2
11-Mar	12.0	10.2	-9.1	-22.0	-35.0	7.0	10.4	2.4	1.2
18-Mar	21.0	18.2	-4.6	-18.4	-33.0	13.3	19.9	3.2	1.4
25-Mar	21.0	18.3	-5.3	-18.4	-33.0	13.3	19.8	3.0	1.5
1-Apr	20.0	17.0	-3.0	-16.8	-29.0	7.7	12.7	3.0	1.5
8-Apr	28.0	24.6	3.3	-10.8	-24.0	14.7	26.8	4.3	2.3
15-Apr	27.0	23.5	5.1	-9.2	-20.0	13.3	26.5	4.5	2.5
22-Apr	34.0	29.6	8.9	-5.3	-17.0	17.5	30.9	5.7	3.0
29-Apr	30.0	26.5	12.5	-1.1	-13.0	18.9	28.3	6.8	3.8
6-May	36.0	29.4	17.9	5.4	-8.0	18.2	31.8	8.4	5.1
13-May	39.0	33.7	24.1	12.9	-2.0	23.8	38.1	11.7	7.1
20-May	43.0	36.6	27.3	17.8	3.0	25.2	36.3	13.6	9.1
27-May	41.0	34.7	29.2	20.9	12.0	28.7	35.6	14.6	10.1
3-Jun	45.0	38.4	34.7	26.7	16.0	30.8	42.0	18.7	13.9
10-Jun	50.0	41.4	37.1	29.2	23.0	28.7	42.5	21.2	16.4
17-Jun	52.0	40.8	38.5	31.0	25.0	28.7	41.2	22.2	17.1
24-Jun	54.0	41.9	40.5	32.3	26.0	30.8	40.5	24.0	18.8
1-Jul	55.0	42.4	42.3	33.7	27.0	32.9	44.0	25.3	20.6
8-Jul	54.0	44.0	43.9	35.5	27.0	36.4	48.8	27.0	22.0
15-Jul	54.0	44.5	45.7	37.5	30.0	40.6	46.4	29.3	23.5
22-Jul	57.0	43.4	45.7	37.6	30.0	37.8	46.8	29.8	23.9
29-Jul	58.0	48.5	44.9	36.9	28.0	39.2	49.1	29.4	23.8
5-Aug	55.0	45.5	45.2	36.9	28.0	36.4	47.8	28.6	22.8
12-Aug	54.0	43.9	43.6	36.0	29.0	36.4	46.3	28.1	22.8
19-Aug	52.0	43.2	42.3	35.2	28.0	38.5	47.6	27.6	22.3
26-Aug	48.0	39.0	40.1	32.9	27.0	32.9	41.9	25.4	19.9
2-Sep	48.0	38.2	38.8	31.8	26.0	30.8	37.6	23.6	18.0
9-Sep	43.0	37.6	35.8	27.9	20.0	29.4	38.5	21.0	15.0
16-Sep	41.0	35.7	33.9	25.2	12.0	27.3	36.2	19.9	13.7
23-Sep	39.0	33.9	30.8	21.5	10.0	26.6	34.8	17.0	11.3
30-Sep	36.0	31.0	27.1	16.5	7.0	23.8	34.2	14.5	8.9
7-Oct	36.0	30.9	24.4	13.9	1.0	21.7	31.7	13.1	8.0
14-Oct	35.0	31.3	21.9	10.5	-4.0	21.7	33.0	11.8	6.9
21-Oct	34.0	29.1	17.6	5.7	-9.0	23.8	31.6	9.5	5.5
28-Oct	34.0	28.9	14.5	2.1	-18.0	18.9	29.6	8.4	4.7
4-Nov	30.0	27.4	11.9	-0.8	-17.0	17.5	28.5	7.3	4.0
11-Nov	30.0	26.2	10.5	-2.3	-18.0	16.8	27.5	6.8	3.6
18-Nov	25.0	22.2	6.3	-6.5	-22.0	14.7	21.9	5.6	3.0
25-Nov	32.0	28.9	4.2	-9.2	-24.0	19.6	31.2	5.5	2.7
2-Dec	32.0	29.3	4.1	-9.2	-26.0	15.4	24.9	5.3	2.6
9-Dec	25.0	22.3	-1.1	-13.8	-27.0	14.7	23.3	4.0	2.0
16-Dec	25.0	22.1	0.6	-12.9	-29.0	13.3	23.9	4.1	2.0
23-Dec	32.0	31.1	-2.3	-15.6	-33.0	24.5	32.0	4.1	2.0
31-Dec	30.0	27.5	-0.5	-14.2	-33.0	16.1	29.5	4.7	2.4

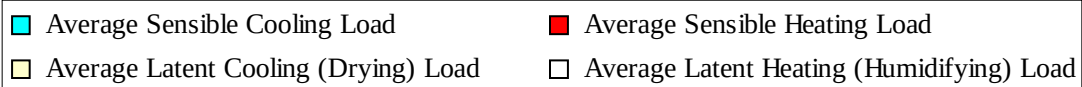
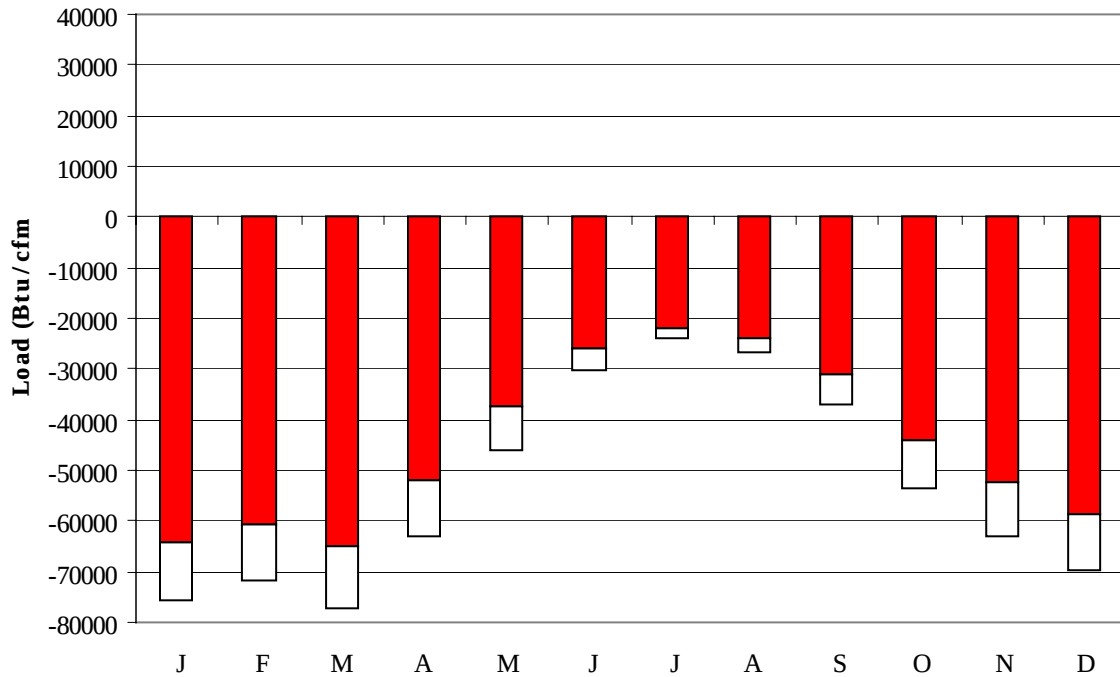
Degree Days, Heating and Cooling
(Base 65°F)



■ Mean Cooling Degree Days
 ■ Mean Heating Degree Days

	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	2378
FEB	0	2252
MAR	0	2421
APR	0	1912
MAY	0	1346
JUN	0	906
JUL	0	750
AUG	0	830
SEP	0	1107
OCT	0	1604
NOV	0	1928
DEC	0	2174
ANN	0	19608

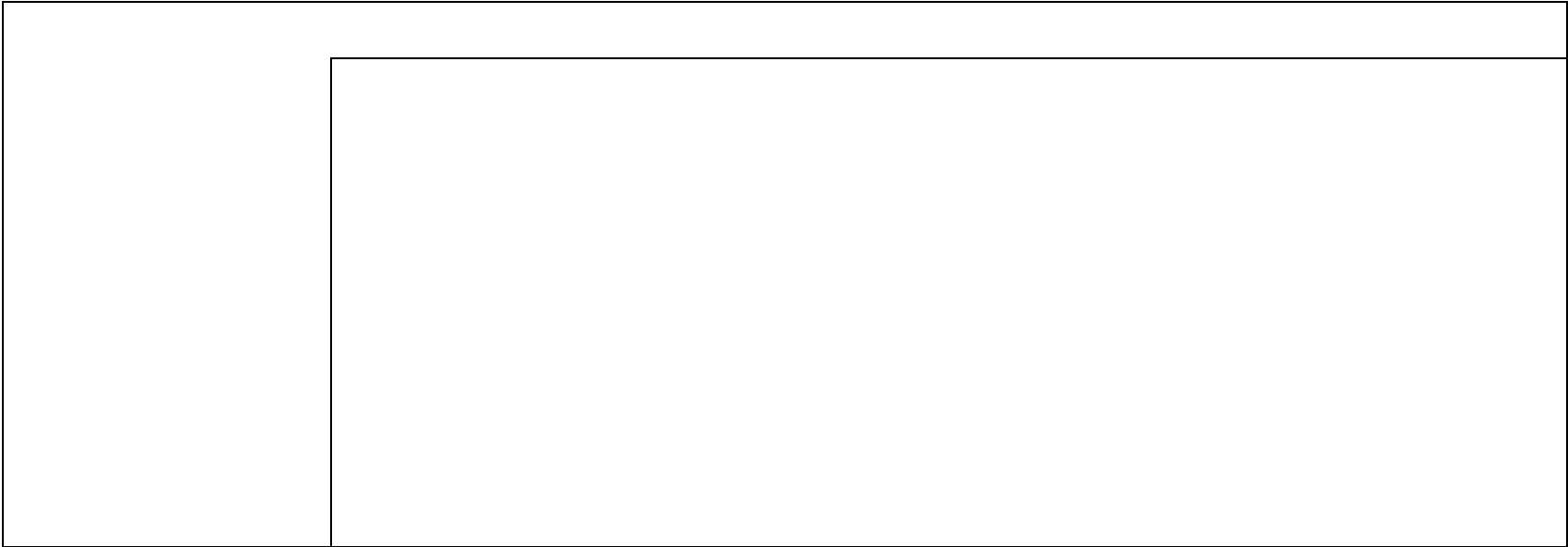
Average Ventilation and Infiltration Loads
(Outside Air vs. 75°F, 60% RH summer; 68°F, 30% RH winter)



	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	0	-64040	0	-11705
FEB	0	-60567	0	-11145
MAR	0	-65171	0	-12249
APR	0	-51898	0	-11044
MAY	0	-37294	0	-8664
JUN	0	-25826	0	-4401
JUL	0	-21859	0	-2101
AUG	0	-23932	0	-2862
SEP	0	-31020	0	-5956
OCT	0	-43999	0	-9484
NOV	0	-52256	0	-10751
DEC	0	-58688	0	-10880
ANN	0	-536550	0	-101242

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

No Solar Radiation
Data Available

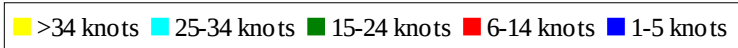
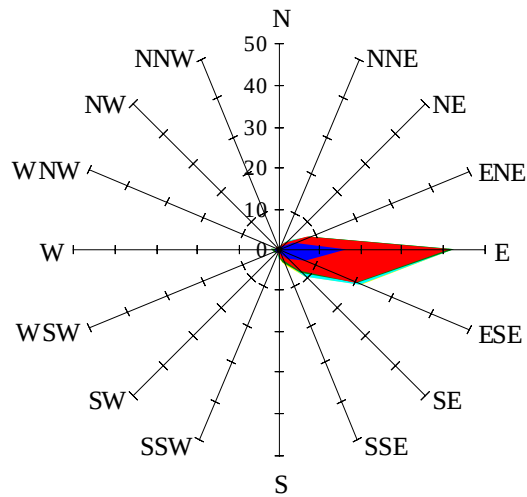


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

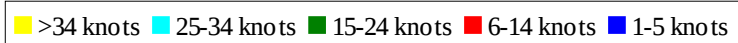
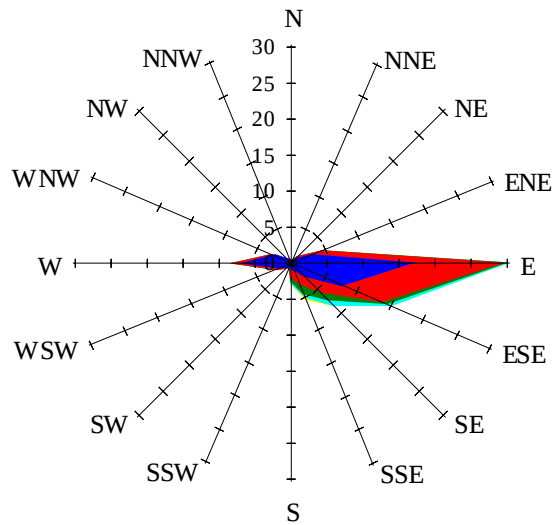
Labels of Percent Frequency on North Axis



Percent Calm = 7.73

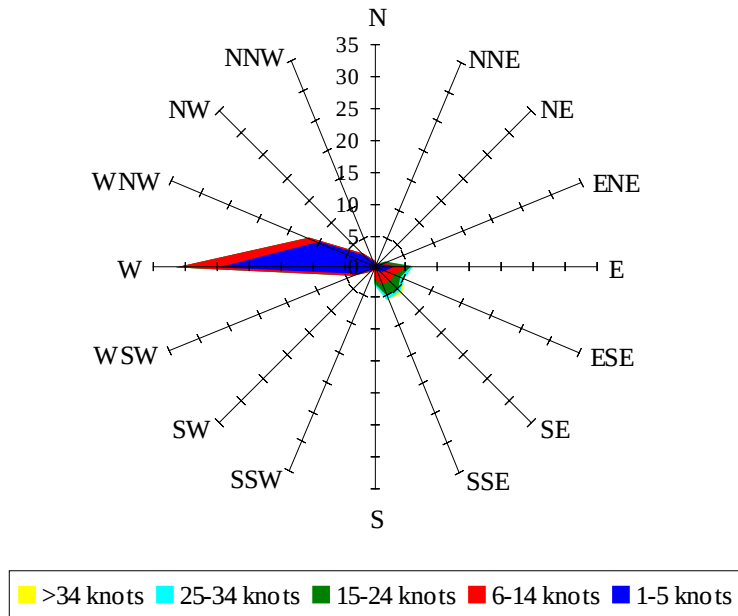
Wind Summary - March, April, and May

Labels of Percent Frequency on North Axis



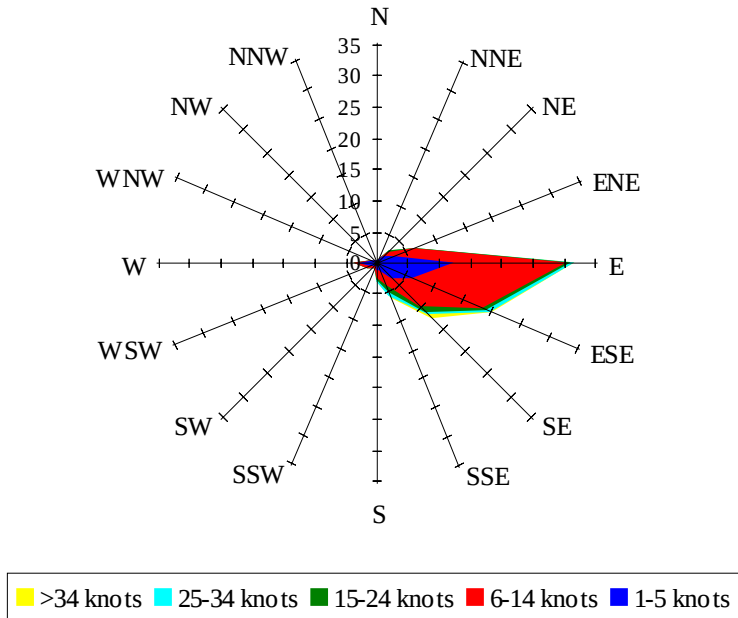
Percent Calm = 17.34

Wind Summary - June, July, and August **Labels of Percent Frequency on North Axis**



Percent Calm = 22.08

Wind Summary - September, October, and November **Labels of Percent Frequency on North Axis**



Percent Calm = 11.02