

# Climatography of the United States No. 20

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, North Carolina 28801  
www.ncdc.noaa.gov

Station: **PENWELL, TX**

**1971-2000**

**COOP ID: 416932**

Climate Division: **TX 5**

NWS Call Sign:

Elevation: **2,940 Feet** Lat: **31°44N**

Lon: **102°35W**

Temperature (°F)																					
Mean (1)				Extremes										Degree Days (1) Base Temp 65		Mean Number of Days (3)					
Month	Daily Max	Daily Min	Mean	Highest Daily(2)	Year	Day	Highest Month(1) Mean	Year	Lowest Daily(2)	Year	Day	Lowest Month(1) Mean	Year	Heating	Cooling	Max >= 100	Max >= 90	Max >= 50	Max <= 32	Min <= 32	Min <= 0
Jan	58.7	28.7	43.7	90	1971	29	49.9	1971	0	1979	2	37.6	1979	661	0	.0	@	23.4	1.4	21.8	@
Feb	64.3	33.3	48.8	90	1986	20	55.4	2000	-12	1985	2	42.0	1978	453	0	.0	@	24.4	.7	13.0	@
Mar	72.5	39.9	56.2	96	1967	29	62.6	1974	8+	1989	5	50.5	1987	284	10	.0	.5	29.9	.1	5.0	.0
Apr	80.4	48.6	64.5	101	1989	22	70.3	1986	23	1973	9	58.4	1997	105	91	.1	4.7	29.7	.0	.8	.0
May	88.6	58.3	73.5	110	2000	25	81.0	1996	34	1970	3	68.0	1976	23	286	2.2	14.1	31.0	.0	.0	.0
Jun	94.2	66.5	80.4	116	1994	28	87.0	1990	46	1964	1	76.4	1987	0	460	5.6	22.5	30.0	.0	.0	.0
Jul	96.0	69.6	82.8	111+	1998	13	87.4	1998	56	1985	24	77.4	1976	0	551	6.5	26.7	31.0	.0	.0	.0
Aug	95.0	68.3	81.7	108	1969	18	86.7	1977	57+	1997	8	77.3	1971	0	515	4.4	25.2	31.0	.0	.0	.0
Sep	88.5	61.7	75.1	105	2000	7	82.4	1977	38	1996	28	67.6	1974	13	315	1.2	14.3	30.0	.0	.0	.0
Oct	80.1	51.0	65.6	102	2000	3	69.6	1983	22	1993	31	58.0	1976	79	96	.1	3.7	30.6	.0	.7	.0
Nov	68.7	38.9	53.8	91	1988	5	60.0	1983	8	1976	29	47.6	1972	352	16	.0	@	27.8	.1	7.4	.0
Dec	59.9	30.2	45.1	82	1995	14	49.6	1981	1	1989	23	38.6	1989	619	0	.0	.0	24.8	.8	19.7	.0
Ann	78.9	49.6	64.3	116	Jun 1994	28	87.4	Jul 1998	-12	Feb 1985	2	37.6	Jan 1979	2589	2340	20.1	111.7	343.6	3.1	68.4	.0

+ Also occurred on an earlier date(s)

@ Denotes mean number of days greater than 0 but less than .05

Complete documentation available from: [www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)

Issue Date: February 2004

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1955-2001

(3) Derived from 1971-2000 serially complete daily data

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**Station: PENWELL, TX**

**COOP ID: 416932**

**Climate Division: TX 5**

**NWS Call Sign:**

**Elevation: 2,940 Feet Lat: 31°44N**

**Lon: 102°35W**

Precipitation (inches)																								
	Precipitation Totals									Mean Number of Days (3)				Precipitation Probabilities (1) Probability that the monthly/annual precipitation will be equal to or less than the indicated amount										
	Means/ Medians(1)		Extremes							Daily Precipitation				Monthly/Annual Precipitation vs Probability Levels These values were determined from the incomplete gamma distribution										
Month	Mean	Med-ian	Highest Daily(2)	Year	Day	Highest Monthly(1)	Year	Lowest Monthly(1)	Year	>= 0.01	>= 0.10	>= 0.50	>= 1.00	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95
Jan	.42	.28	1.01	1994	21	1.55	1991	.00+	2000	1.9	1.1	.2	@	.00	.00	.00	.11	.20	.29	.40	.54	.73	1.04	1.33
Feb	.58	.29	1.78	1997	20	2.19	1992	.00+	2000	2.7	1.6	.3	.1	.00	.00	.00	.09	.20	.33	.49	.70	1.00	1.52	2.04
Mar	.42	.21	1.35	1968	20	1.67	1999	.00+	1994	1.8	1.1	.3	.0	.00	.00	.00	.00	.08	.21	.35	.52	.77	1.18	1.58
Apr	.61	.29	4.53	1969	12	2.52	1981	.00+	1998	2.1	1.1	.4	.2	.00	.00	.00	.04	.13	.27	.45	.69	1.06	1.71	2.39
May	2.11	1.34	2.97	1987	26	7.75	1987	.01	1996	4.2	3.2	1.2	.7	.08	.18	.41	.68	1.01	1.40	1.89	2.52	3.43	4.99	6.57
Jun	1.56	1.22	2.10	1996	26	4.35	2000	.09	1973	3.7	2.9	.9	.5	.23	.36	.58	.80	1.02	1.27	1.56	1.91	2.38	3.15	3.89
Jul	1.30	.79	2.04	1975	21	4.21	1973	.00+	2000	4.0	2.7	.9	.3	.00	.03	.17	.34	.55	.80	1.12	1.55	2.15	3.21	4.28
Aug	1.46	1.00	3.00	1993	25	4.67	1996	.00	2000	4.4	2.8	.9	.4	.08	.22	.44	.66	.89	1.14	1.43	1.80	2.29	3.10	3.89
Sep	2.35	2.01	3.90	1975	12	7.58	1980	.00+	2000	4.8	3.5	1.4	.7	.00	.15	.51	.87	1.26	1.71	2.24	2.90	3.83	5.37	6.90
Oct	1.24	1.14	2.18	1981	16	3.78	1978	.00	1992	3.9	2.3	.9	.3	.01	.06	.20	.36	.55	.79	1.09	1.48	2.04	3.02	4.00
Nov	.63	.52	3.40	1983	5	3.56	1983	.00+	1999	1.9	1.2	.4	.1	.00	.00	.00	.04	.13	.27	.45	.71	1.09	1.77	2.48
Dec	.61	.32	1.38	1986	22	2.78	1986	.00+	1996	1.9	1.2	.4	.1	.00	.00	.00	.07	.20	.34	.52	.75	1.07	1.62	2.16
Ann	13.29	12.91	4.53	Apr 1969	12	7.75	May 1987	.00+	Sep 2000	37.3	24.7	8.2	3.4	7.16	8.23	9.65	10.79	11.82	12.84	13.93	15.15	16.67	18.94	20.96

+ Also occurred on an earlier date(s)

# Denotes amounts of a trace

@ Denotes mean number of days greater than 0 but less than .05

\*\* Statistics not computed because less than six years out of thirty had measurable precipitation

(1) From the 1971-2000 Monthly Normals

(2) Derived from station's available digital record: 1955-2001

(3) Derived from 1971-2000 serially complete daily data

Complete documentation available from:  
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Station: PENWELL, TX

COOP ID: 416932

Climate Division: TX 5

NWS Call Sign:

Elevation: 2,940 Feet

Lat: 31°44N

Lon: 102°35W

Snow (inches)																							
Snow Totals															Mean Number of Days (1)								
Means/Medians (1)					Extremes (2)										Snow Fall ≥ Thresholds					Snow Depth ≥ Thresholds			
Month	Snow Fall Mean	Snow Fall Median	Snow Depth Mean	Snow Depth Median	Highest Daily Snow Fall	Year	Day	Highest Monthly Snow Fall	Year	Highest Daily Snow Depth	Year	Day	Highest Monthly Mean Snow Depth	Year	0.1	1.0	3.0	5.0	10.0	1	3	5	10
Jan	.9	.0	0	0	7.0	1985	14	7.0	1985	0	0	0	0	0	.2	.2	.1	.1	.0	.0	.0	.0	.0
Feb	.4	.0	0	0	5.0	1985	1	7.0	1985	0	0	0	0	0	.2	.2	.1	.1	.0	.0	.0	.0	.0
Mar	.1	.0	0	0	1.0	1987	11	1.5	1989	0	0	0	0	0	.2	.1	.0	.0	.0	.0	.0	.0	.0
Apr	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
May	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jun	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Jul	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Aug	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Sep	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Oct	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Nov	.0	.0	0	0	.0	0	0	.0	0	0	0	0	0	0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Dec	.5	.0	#	0	6.3	1998	12	6.3	1998	6	1998	12	#+	1998	.2	.2	.1	.1	.0	.1	@	@	.0
Ann	1.9	.0	N/A	N/A	7.0	Jan 1985	14	7.0+	Feb 1985	6	Dec 1998	12	#+	Dec 1998	.8	.7	.3	.3	.0	.1	@	@	.0

+ Also occurred on an earlier date(s) #Denotes trace amounts

@ Denotes mean number of days greater than 0 but less than .05

-9/-9.9 represents missing values

Annual statistics for Mean/Median snow depths are not appropriate

(1) Derived from Snow Climatology and 1971-2000 daily data

(2) Derived from 1971-2000 daily data

Complete documentation available from:

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# Climatography of the United States

## No. 20 1971-2000

Station: PENWELL, TX

COOP ID: 416932

Climate Division: TX 5

NWS Call Sign:

Elevation: 2,940 Feet

Lat: 31° 44N

Lon: 102° 35W

Freeze Data									
Spring Freeze Dates (Month/Day)									
Temp (F)	Probability of later date in spring (thru Jul 31) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	4/21	4/17	4/14	4/12	4/10	4/07	4/05	4/02	3/29
32	4/13	4/08	4/05	4/01	3/30	3/27	3/23	3/20	3/15
28	4/07	4/01	3/27	3/23	3/19	3/15	3/11	3/06	2/28
24	4/01	3/23	3/16	3/10	3/05	2/28	2/22	2/16	2/07
20	3/12	3/02	2/23	2/16	2/10	2/04	1/29	1/21	1/08
16	2/26	2/16	2/08	2/02	1/26	1/20	1/12	1/02	0/00
Fall Freeze Dates (Month/Day)									
Temp (F)	Probability of earlier date in fall (beginning Aug 1) than indicated(*)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	10/13	10/18	10/23	10/26	10/30	11/02	11/06	11/10	11/16
32	10/20	10/26	10/31	11/04	11/07	11/11	11/15	11/19	11/26
28	10/28	11/04	11/08	11/12	11/16	11/19	11/23	11/28	12/04
24	11/08	11/14	11/18	11/22	11/26	11/29	12/03	12/07	12/13
20	11/20	11/27	12/02	12/07	12/11	12/16	12/20	12/27	1/07
16	11/30	12/12	12/22	12/30	1/07	1/15	1/25	2/10	0/00
Freeze Free Period									
Temp (F)	Probability of longer than indicated freeze free period (Days)								
	.10	.20	.30	.40	.50	.60	.70	.80	.90
36	224	216	211	207	203	198	194	189	182
32	247	238	232	227	222	217	212	206	197
28	268	259	252	246	241	236	230	223	214
24	299	287	279	272	265	258	251	242	230
20	>365	333	321	312	304	296	288	279	267
16	>365	>365	>365	>365	348	331	318	305	289

\* Probability of observing a temperature as cold, or colder, later in the spring or earlier in the fall than the indicated date.

0/00 Indicates that the probability of occurrence of threshold temperature is less than the indicated probability.

Derived from 1971-2000 serially complete daily data

Complete documentation available from:  
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No. 20  
1971-2000**

**Station: PENWELL, TX**

**COOP ID: 416932**

**Climate Division: TX 5      NWS Call Sign:      Elevation: 2,940 Feet    Lat: 31°44N      Lon: 102°35W**

Degree Days to Selected Base Temperatures (°F)													
Base	Heating Degree Days (1)												
Below	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
65	661	453	284	105	23	0	0	0	13	79	352	619	2589
60	507	320	159	42	6	0	0	0	2	28	232	465	1761
57	418	245	102	20	2	0	0	0	0	12	173	374	1346
55	361	199	72	12	1	0	0	0	0	7	138	316	1106
50	228	109	22	1	0	0	0	0	0	1	71	185	617
32	9	1	0	0	0	0	0	0	0	0	0	1	11

Base	Cooling Degree Days (1)												
Above	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
32	371	471	749	976	1286	1450	1574	1538	1293	1039	654	405	11806
55	10	26	108	297	573	760	861	825	603	333	102	7	4505
57	5	16	76	246	513	700	799	763	543	276	77	3	4017
60	1	7	40	178	424	610	706	670	455	199	46	1	3337
65	0	0	10	91	286	460	551	515	315	96	16	0	2340
70	0	0	1	36	172	315	396	362	195	34	4	0	1515

Growing Degree Units (2)																								
Base	Growing Degree Units (Monthly)												Growing Degree Units (Accumulated Monthly)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40	184	297	514	741	1039	1207	1318	1282	1049	782	418	212	184	481	995	1736	2775	3982	5300	6582	7631	8413	8831	9043
45	92	180	369	591	884	1057	1163	1127	899	629	287	108	92	272	641	1232	2116	3173	4336	5463	6362	6991	7278	7386
50	39	97	235	447	729	907	1008	972	749	479	177	44	39	136	371	818	1547	2454	3462	4434	5183	5662	5839	5883
55	11	40	127	308	575	757	853	817	600	335	89	11	11	51	178	486	1061	1818	2671	3488	4088	4423	4512	4523
60	0	10	55	190	422	607	698	662	455	200	33	0	0	10	65	255	677	1284	1982	2644	3099	3299	3332	3332
Base	Growing Degree Units for Corn (Monthly)												Growing Degree Units for Corn (Accumulated Monthly)											
50/86	169	229	354	477	670	786	864	838	687	503	287	182	169	398	752	1229	1899	2685	3549	4387	5074	5577	5864	6046

(1) Derived from the 1971-2000 Monthly Normals

(2) Derived from 1971-2000 serially complete daily data

**Note:** For corn, temperatures below 50 are set to 50, and temperatures above 86 are set to 86

Complete documentation available from:  
[www.ncdc.noaa.gov/oa/climate/normals/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normals/usnormals.html)

## Notes

- a. The monthly means are simple arithmetic averages computed by summing the monthly values for the period 1971-2000 and dividing by thirty. Prior to averaging, the data are adjusted if necessary to compensate for data quality issues, station moves or changes in station reporting practices. Missing months are replaced by estimates based on neighboring stations.
- b. The median is defined as the middle value in an ordered set of values. The median is being provided for the snow and precipitation elements because the mean can be a misleading value for precipitation normals.
- c. Only observed validated values were used to select the extreme daily values.
- d. Extreme monthly temperature/precipitation means were selected from the monthly normals data.  
Monthly snow extremes were calculated from daily values quality controlled to be consistent with the Snow Climatology.
- e. Degree Days were derived using the same techniques as the 1971-2000 normals.  
Complete documentation for the 1971-2000 Normals is available on the internet from:  
[www.ncdc.noaa.gov/oa/climate/normal/usnormals.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormals.html)
- f. Mean "number of days statistics" for temperature and precipitation were calculated from a serially complete daily data set.  
Documentation of the serially complete data set is available from the link below:
- g. Snowfall and snow depth statistics were derived from the Snow Climatology.  
Documentation for the Snow Climatology project is available from the link under references.

## Data Sources for Tables

Several different data sources were used to create the Clim20 climate summaries. In some cases the daily extremes appear inconsistent with the monthly extremes and or the mean number of days statistics. For example, a high daily extreme value may not be reflected in the highest monthly value or the mean number of days threshold that is less than and equal to the extreme value. Some of these difference are caused by different periods of record. Daily extremes are derived from the station's entire period of record while the serial data and normals data were for the 1971-2000 period. Therefore extremes observed before 1971 would not be included in the 1971-2000 normals or the 1971-2000 serial daily data set. Inconsistencies can also occur when monthly values are adjusted to reflect the current observing conditions or were replaced during the 1971-2000 Monthly Normals processing and are not reconciled with the Summary of the Day data.

- a. Temperature/ Precipitation Tables
  - 1. 1971-2000 Monthly Normals
  - 2. Cooperative Summary of the Day
  - 3. National Weather Service station records
  - 4. 1971-2000 serially complete daily data
- b. Degree Day Table
  - 1. Monthly and Annual Heating and Cooling Degree Days Normals to Selected Bases derived from 1971-2000 Monthly Normals
  - 2. Daily Normal Growing Degree Units to Selected Base Temperatures derived from 1971-2000 serially complete daily data
- c. Snow Tables
  - 1. Snow Climatology
  - 2. Cooperative Summary of the Day
- d. Freeze Data Table  
1971-2000 serially complete daily data

## References

U.S. Climate Normals 1971-2000, [www.ncdc.noaa.gov/normal.html](http://www.ncdc.noaa.gov/normal.html)  
U.S. Climate Normals 1971-2000-Products Clim20, [www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html](http://www.ncdc.noaa.gov/oa/climate/normal/usnormalsprods.html)  
Snow Climatology Project Description, [www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html](http://www.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html)  
Eischeid, J. K., P. Pasteris, H. F. Diaz, M. Plantico, and N. Lott, 2000: Creating a serially complete, national daily time series of temperature and precipitation for the Western United States. J. Appl. Meteorol., 39, 1580-1591,  
[www1.ncdc.noaa.gov/pub/data/special/serialcomplete\\_jam\\_0900.pdf](http://www1.ncdc.noaa.gov/pub/data/special/serialcomplete_jam_0900.pdf)