U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU
IN COOPERATION WITH University of Wyoming #
CLIMATOGRAPHY OF THE UNITED STATES NO. 20 — 48

CLIMATOLOGICAL SUMMARY

LATITUDE 43° 25' N
LONGITUDE 106° 17' W
ELEV. (GROUND) 4840 Feet

STATION Midwest 1 SW, Wyoming

MEANS AND EXTREMES FOR PERIOD 1931 - 1960

Month	Temperature (°F)							**	Precipitation Totals (Inches)								Mean number of days					Month
	Means			Extremes								Snow, Sleet						Temperatures				
																		Max.		Min.		
	Daily maximum	Daily minimum	Monthly	Record highest	Year	Record lowest	Year	Mean degree days	Mean	Greatest daily	Year	Mean	Maximum monthly	Year	Greatest daily	Year	Precip. .10 inch or more	90° and above	32° and below	32° and below	0° and below	
(a)	30	30	30	30		30		30	30	30		30	30		30		30	30	30	30	30	
Jan.	36.3	11.9	24.1	62	1953	-39	1949+	1268	0.55	0.63	1938	8.3	33.1	1949	10.0	1938	2	0	9	30	6	Jan.
Feb.	40.2	14.4	27.3	69	1950	-41	1936	1056	0.55	0.90	1953	7.7	48.0	1953	12.0	1953	2	0	7	27	4	Feb.
Mar.	47.5	20.6	34.1	77	1960+	-20	1943	958	1.01	1.50	1954	9.5	28.6	1937	13.0	1933	3	0	4	27	2	Mar.
Apr.	59.7	30.3	45.0	89	1952	-16	1936	600	1.72	2.35	1932	8.3	38.0	1955	28.0	1955	4	0	1	18	*	Apr.
May	70.1	39.7	54.9	94	1934	14	1927	335	2.21	2.29	1952	1.6	12.5	1942	6.0	1950	6	*	*	5	0	May
June	80.8	47.9	64.4	102	1954	26	1951	120	1.74	1.38	1944	0.1	3.0	1937	3.0	1937	5	6	0	*	0	June
July	91.1	54.9	73.0	106	1931	37	1945	9	1.19	1.74	1936	0.0	0.0		0.0		3	20	0	0	0	July
Aug.	89.5	52.8	71.2	105	1949	32	1948	16	0.80	2.69	1953	0.0	0.0		0.0		2	18	0	*	0	Aug.
Sep.	78.9	43.2	61.1	100	1950	14	1945+	168	0.93	3.56	1934	0.2	2.5	1942	2.0	1942	3	4	*	3	0	Sep.
Oct.	65.9	33.7	49.8	89	1957+	4	1941	481	0.90	1.53	1942	2.4	14.8	1932	12.0	1932	3	0	*	13	0	Oct.
Nov.	47.6	22.0	34.8	76	1953+	-26	1955	906	0.72	0.62	1931	7.5	18.9	1942	7.5	1956	3	0	4	26	2	Nov.
Dec.	39.9	16.5	28.2	69	1948	-31	1932	1141	0.52	0.60	1955	7.2	24.3	1955	11.0	1955	2	0	7	29	4	Dec.
Year	62.3	32.3	47.3	106	July 1931	-41	Feb. 1936	7058	12.84	3.56	Sep. 1934	52.8	48.0	Feb. 1953	28.0	Apr. 1955	38	48	32	178	18	Year

(a) Average length of record, years.

T Trace, an amount too small to measure.

** Base 65°F; values computed from mean temperatures.

\+ Also on earlier dates, months, or years.

* Less than one half.

\# Agricultural Experiment Station, Plant Science Division

CLIMATE OF MIDWEST 1 SW, WYOMING

Midwest is located 40 miles north of Casper on Salt Creek, a northerly flowing tributary of the Powder River. To the northwest 35 miles are the Big Horn Mountains with peaks ranging 8,000' to 9,000' in that portion of the range. Cloud Peak, the highest in the Big Horns at 13,175' is 80 miles north-northwest of Midwest. Casper Mountain, 6 miles south of Casper, an east-west oriented range, rises to 8,500'. The Black Hills are 130 miles northeast of Midwest. Between the Black Hills, the Big Horns and Casper Mountain, is a large rolling grassland, part of which is the Thunder Basin National Grassland. Precipitation is generally the result of frontal and upslope activity during the winter and of thermal activity during the summer. Midwest is in the latitudes of the prevailing westerlies and the numerous mountain ranges between Midwest and the west coast form effective barriers to moisture. Midwest is subject to cold air outbreaks from Canada as there are no mountains to the north to halt the passage of this cold air southward. However, most of the cold airmasses do not stay for more than one to three days as the prevailing westerlies and general downslope of the land to the east tends to move the cold air out. Westerly winds moving downslope, with the accompanied warming of the air by compression, greatly modify Midwest's wintertime temperatures. Midwest's climate is classified semi-arid.

Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air which permits rapid incoming and outgoing radiation, and the passage of both warm and cold airmasses. Cold air outbreaks from Canada generally do not last long as their path is usually southeasterly, then easterly in these latitudes, leaving Midwest in the western edge of the cold airmass for a limited time. Midwest is, however, subject to abrupt, and sometimes large temperature changes. Some temperature extremes not included in the 30-year period covered by the above table are a maximum of 85° in November 1924, and minimums of 14° in May 1927, -2° in October 1925, and -33° in December 1964.

Because of cold air outbreaks from Canada, and rapid nighttime radiation cooling, late spring and early fall freezes are not too uncommon. The average last occurrences of 32° and 28° in the spring are May 17 and May 5 respectively. The average first occurrences of 32° and 28° in the fall are September 21 and October 5 respectively. This gives an average growing season of 127 days for 32° and 152 days for 28°. Only 20% of the time would the temperature be expected to drop to 32° or lower after May 28, or to 28° or lower after May 16. Also, only 20% of the time would the temperature be expected to drop to 32° or lower before September 9, or to 28° or lower before September 23.

The normal precipitation pattern shows the lightest fall during December, January and February, increasing rapidly to a peak in May. Precipitation amounts decrease rapidly through June and July to a low in August, increase a little to a secondary peak in September and October, then decrease to the wintertime minimum. Normally, about 42% (5.38") of the annual precipitation falls between the 32° freeze-free dates, and about 52% (6.66") falls between the average 28° freeze-free dates. The greatest precipitation measured in any one month was 6.46" during May 1962, while no precipitation was recorded for November 1939 and November 1949. The greatest one-day precipitation amounts not reported in the above 1931-1960 table were 2.71" on May 21, 1962, 2.03" on June 15, 1967, and 1.86" on October 6, 1962. The greatest snowfall measured in any one month was 48 inches during February 1953.

Sunshine is quite abundant in the Midwest area with but few days during the year without some sunshine. There is no instrumental record of sunshine duration at Midwest, but it is estimated to average about 65% of possible sunshine on an annual basis, ranging from about 55% in the winter to about 75% in the late summer.

Relative humidities average comparatively low during the year and are estimated to average about 55%. They range from 60 to 65% in late spring to about 40% in late summer. Daily ranges are estimated to average from 75% in early morning to 50% in the heat of the day during late winter, while during late summer the range is estimated to be 60% to 20-25% for the same times.

Hourly winds are estimated to average about 13 mph annually, ranging from hourly speeds averaging about 17 mph during the winter to about 10 mph during the summer. Daytime winds are typically stronger than nighttime and occasional storms can bring brief periods of quite high winds with gusts bettering 75 mph.

John D. Alyea
State Climatologist
ESSA, Weather Bureau
Cheyenne, Wyoming
September 1968

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Average Temperature (°F)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1931	29.4	34.8	34.6	44.6	53.2	69.4	74.0	71.0	63.4	50.0	33.0	27.8	48.8
1932	18.2	29.8	28.6	45.9	55.8	64.0	73.0	72.4	59.8	43.4	39.0	17.8	45.6
1933	28.4	18.7	37.2	39.6	51.4	70.0	74.6	67.8	61.6	51.8	38.0	35.6	47.0
1934	31.6	32.8	38.1	46.2	62.5	64.7	74.2	70.4	55.3	53.8	39.6	27.3	49.7
1935	30.2	33.4	35.8	40.3	45.9	61.0	74.4	69.2	59.8	47.4	30.8	27.2	46.3
1936	21.1	9.6	34.3	44.3	60.1	68.1	76.8	71.3	59.3	47.2	35.0	27.9	46.2
1937	7.4	23.9	31.3	42.8	55.9	61.3	71.7	72.4	62.2	50.3	34.7	25.2	44.9
1938	26.2	28.6	38.1	44.6	52.8	65.1	71.2	70.7	63.7	53.5	28.9	26.8	47.5
1939	28.4	15.7	36.2	47.6	59.2	62.4	73.6	69.2	62.2	49.8	40.0	34.8	48.3
1940	16.8	27.6	40.2	43.4	56.2	68.0	74.2	71.8	64.9	52.3	28.6	29.4	47.8
1941	27.2	30.5	33.2	41.6	56.8	63.6	71.2	69.5	55.6	45.2	38.8	29.5	46.9
1942	21.6	20.7	32.6	48.5	50.8	62.3	73.2	72.6	59.9	49.0	35.2	29.2	46.3
1943	25.6	33.8	28.8	52.6	50.6	62.2	74.0	74.4	62.2	52.8	38.4	30.4	48.8
1944	24.0	26.2	29.0	45.2	57.2	61.6	71.0	71.3	61.4	52.6	34.6	24.2	46.5
1945	27.5	28.4	36.1	38.5	54.0	58.4	72.0	71.5	58.2	52.1	37.2	23.8	46.5
1946	28.6	32.0	41.2	52.8	50.5	65.2	74.6	69.7	61.8	45.4	35.4	33.4	49.2
1947	25.6	24.8	33.6	44.9	55.6	59.2	74.6	73.8	63.6	54.1	27.5	28.3	47.1
1948	23.0	23.1	29.8	47.4	56.8	65.2	73.0	72.0	64.6	49.6	32.6	24.6	46.8
1949	11.0	22.7	37.2	51.0	57.9	64.3	73.5	73.2	60.7	44.3	45.1	25.7	47.2
1950	17.5	36.1	33.5	44.5	48.6	64.4	67.9	67.4	57.8	53.3	34.8	31.4	46.4
1951	18.9	32.7	30.6	40.4	54.3	57.3	72.6	71.3	57.8	46.8	35.1	21.7	44.9
1952	27.2	30.2	30.6	50.8	56.8	67.3	70.9	70.7	63.7	51.3	30.8	30.0	48.4
1953	34.5	25.5	38.8	41.0	50.4	67.4	75.7	70.9	63.4	52.3	40.7	25.9	48.9
1954	27.1	39.0	28.0	47.7	55.6	64.6	77.0	70.5	63.5	46.7	41.4	30.5	49.3
1955	23.4	22.3	28.9	44.7	56.5	61.8	74.2	74.1	60.7	51.5	26.7	25.7	45.8
1956	26.1	24.7	35.3	42.1	57.6	70.1	71.5	68.2	62.2	52.2	32.1	29.9	47.7
1957	17.5	33.1	37.8	42.0	54.7	62.5	73.8	72.7	59.6	49.4	30.7	33.9	47.3
1958	30.1	32.4	31.4	42.1	60.5	63.7	67.2	72.5	61.7	50.8	35.1	28.3	48.0
1959	26.2	25.3	35.6	44.7	53.5	69.3	72.3	72.1	59.4	46.7	30.5	32.3	47.4
1960	23.3	21.1	35.4	47.6	56.2	66.6	73.4	70.0	62.3	49.1	34.2	27.4	47.2
1961	29.8	32.9	38.7	43.3	55.6	68.3	71.8	73.3	54.2	45.8	30.9	21.0	47.2
1962	16.6	28.9	33.0	48.5	56.1	63.5	69.0	68.8	59.9	52.0	39.9	29.9	47.2
1963	14.2	33.7	36.8	43.8	56.2	65.8	72.8	71.8	65.0	56.8	41.2	25.3	48.6
1964	24.9	25.0	29.4	43.8	56.3	62.3	75.9	68.7	59.3	50.3	32.7	24.9	46.1
1965	31.2	25.3	24.0	48.4	52.2	62.8	70.6	67.8	49.2	52.6	40.0	31.9	46.3
1966	23.6	26.6	39.0	40.9	57.8	64.0	76.1	68.6	63.8	47.7	37.0	27.5	47.7
1967	28.9	29.8	38.4	47.1	51.1	61.1	71.2	70.5	63.5	52.4	35.6	21.3	47.6

Total Precipitation (Inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann'l
1931	0.52	0.27	1.77	0.96	4.76	1.25	0.94	0.64	0.83	1.38	1.13	0.18	14.63
1932	1.31	0.35	0.59	3.20	4.03	1.34	0.38	0.34	0.20	1.67	0.59	0.85	14.85
1933	0.29	0.38	2.61	3.68	4.35	0.14	0.36	2.13	1.34	T	0.91	0.18	16.37
1934	0.46	0.26	1.06	1.20	0.26	2.39	1.15	0.48	2.11	0.58	0.72	0.68	11.35
1935	0.19	0.59	0.99	1.34	4.57	1.58	1.11	1.15	0.88	0.26	0.33	0.44	13.43
1936	0.58	0.65	1.16	0.25	0.11	1.47	1.84	0.37	0.17	0.85	0.31	0.81	8.57
1937	0.35	0.32	2.28	0.79	2.00	2.04	4.70	0.37	0.28	1.56	0.53	1.15	16.37
1938	1.34	0.28	0.26	1.78	1.15	1.20	1.47	0.13	0.82	0.19	1.04	1.04	10.70
1939	0.76	0.83	0.19	1.04	2.50	1.72	0.14	0.73	0.71	1.31	0.00	0.45	10.38
1940	0.61	1.10	0.43	2.14	0.47	1.28	0.53	0.12	1.70	0.21	0.40	0.07	9.06
1941	0.52	0.02	0.83	4.06	1.61	0.68	1.98	1.68	1.31	0.86	0.26	0.47	14.28
1942	0.20	0.42	0.24	1.90	2.07	0.29	1.10	0.45	1.29	3.75	1.51	0.26	13.48
1943	0.69	0.14	1.37	2.31	2.22	1.54	0.27	0.92	0.69	1.65	0.60	0.38	12.78
1944	0.93	0.25	1.54	2.01	3.28	3.10	1.26	0.24	0.54	1.42	1.17	0.67	16.41
1945	0.27	0.87	2.30	2.76	1.93	3.31	0.99	1.56	2.11	0.32	0.64	1.58	18.64
1946	0.25	0.20	1.88	0.75	3.58	1.91	0.75	0.07	1.77	1.13	0.38	0.16	12.83
1947	0.79	0.73	0.59	1.26	2.62	2.88	0.19	0.15	0.93	0.49	1.06	0.14	11.83
1948	0.50	1.27	0.42	1.46	0.70	2.11	0.90	0.08	1.15	0.93	0.86	0.34	10.72
1949	1.80	0.26	0.21	0.36	2.01	3.03	2.74	0.17	0.95	1.52	0.00	0.58	13.63
1950	0.39	0.07	1.13	1.80	1.46	0.93	2.62	0.21	1.53	0.83	0.47	0.28	11.72
1951	0.23	0.27	0.45	0.80	1.74	1.10	0.89	0.31	1.25	0.41	0.16	0.78	8.39
1952	0.03	0.66	0.70	0.36	5.19	1.73	0.39	0.93	0.40	0.10	1.02	0.12	11.63
1953	0.74	2.78	0.23	2.01	0.85	0.77	1.23	2.95	0.42	0.49	0.93	0.56	13.96
1954	0.48	0.24	2.78	0.42	0.69	0.65	1.17	0.81	0.21	1.64	0.20	0.24	9.53
1955	0.46	1.27	0.68	2.72	1.64	3.23	0.39	0.43	1.31	0.73	1.09	1.29	15.24
1956	0.45	0.35	0.32	2.37	2.13	0.93	2.82	1.15	0.08	0.31	0.84	0.22	11.97
1957	0.23	0.11	0.45	3.45	3.81	2.75	0.71	1.86	0.78	1.40	0.85	0.35	16.75
1958	0.23	0.30	1.34	2.65	1.08	3.27	1.67	1.24	0.24	0.01	1.49	0.51	14.03
1959	0.37	0.52	1.12	0.70	2.34	2.40	0.35	0.76	1.46	0.59	0.70	0.23	11.54
1960	0.55	0.66	0.42	1.15	1.09	1.15	0.67	1.55	0.58	0.34	1.39	0.46	10.01
1961	0.05	1.00	1.61	0.62	2.09	0.21	2.69	0.24	3.06	1.84	0.60	0.79	14.80
1962	0.90	0.45	0.60	0.79	6.46	4.34	0.94	0.27	1.11	1.90	0.36	0.17	18.29
1963	0.16	0.80	0.53	1.84	0.93	2.31	1.06	0.25	1.84	0.19	0.09	0.40	10.40
1964	0.98	0.89	0.42	2.18	4.20	3.04	0.06	0.48	0.35	0.22	1.23	1.40	15.45
1965	1.16	0.27	0.37	1.02	3.09	1.64	1.80	0.59	2.43	0.06	0.12	0.47	13.02
1966	0.20	0.44	0.75	2.29	0.53	1.75	1.23	0.72	1.03	1.13	0.25	0.40	10.72
1967	0.70	0.65	0.66	0.62	1.59	4.67	2.11	0.53	1.59	1.29	0.39	1.38	16.18

STATION HISTORY

Official weather observations have been kept at Midwest since June 1922. The U. S. Geological Survey performed the longest period of service, 32 and 1/3 years. The observers listed in their order of service are as follows:

Employees, Midwest Refining, June 1922 - January 1930
Employees, U. S. Geological Survey, February 1930 - May 1962
Officer in Charge, Naval Petroleum & Oil Shale Reserves, June 1962 - May 1967
Pan American Petroleum Corp., June 1967 -

EVAPOTRANSPIRATION

Evapotranspiration, a comination of two words - evaporation and transpiration, is the combined processes by which water is transferred from the earth's surface to the atmosphere. P.E.T. is maximum potential evapotranspiration. P.E.T., 32° is potential evapotranspiration between the average 32° freeze-free dates. P.E.T., 28° is potential evapotranspiration between the average 28° freeze-free dates. P.-P.E.T. is normal monthly precipitation minus potential evapotranspiration. These values, in inches and hundredths, are computed values based on C. W. Thornthwaite's method, using the Palmer-Havens graphical technique.

	J	F	M	A	M	J	J	A	S	O	N	D	Annual
P.E.T.	0.00	0.00	0.18	1.34	2.89	4.42	5.86	5.14	3.16	1.63	0.17	0.00	24.79
P.E.T., 32°	0.00	0.00	0.00	0.00	1.49	4.42	5.86	5.14	1.58	0.00	0.00	0.00	18.49
P.E.T., 28°	0.00	0.00	0.00	0.00	2.52	4.42	5.86	5.14	3.16	0.00	0.00	0.00	21.10
P. - P.E.T.	+0.55	+0.55	+0.83	+0.38	-0.68	-2.68	-4.67	-4.34	-2.23	-0.73	+0.55	+0.52	-11.95

SHORT DURATION MAXIMUM RAINFALL INTENSITIES (in inches and tenths) FOR SELECTED RETURN PERIODS

Return Period (expected recurrence)	Duration of Precipitation: 30 Min.	1 hour	2 hours	3 hours	6 hours	12 hours	24 hours	2 days	4 days	7 days	10 days
2 years	0.5	0.6	0.8	0.9	1.1	1.3	1.5	1.7	1.9	2.3	2.4
5 years	0.7	0.9	1.1	1.3	1.5	1.8	2.1	2.3	2.6	3.0	3.2
10 years	0.9	1.3	1.4	1.5	1.8	2.2	2.5	2.7	3.1	3.6	3.9
25 years	1.1	1.4	1.7	1.8	2.1	2.6	2.9	3.4	3.7	4.2	4.5
50 years	1.3	1.6	1.9	2.1	2.5	2.9	3.3	3.8	4.1	4.6	5.0

These values are extracted from "Weather Bureau Technical Paper Nos. 40 and 49."