LIMITED REPORT

Saskatoon SRC Climatological Reference Station Annual Summary, 1994

by

C.R. Beaulieu
V. Wittrock

Environment Technology Division

SRC Publication No. E-2900-2-E-95

March, 1995

ERRATA

CORRECTION TO SOIL TEMPERATURES FOR 1994

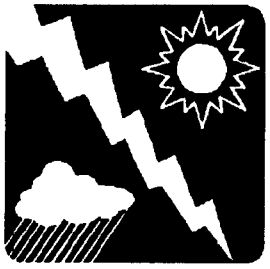
Please note:

Please be advised that the soil temperatures given in the 1994 Annual Summary have been revised because of re-calibration of the data logger. In the 1995 report, the 1994 soil temperatures in the Monthly Summaries have been corrected and revised graphs for 1994 have been included.

Correction Factors for the Annual Summary 1994

Add the appropriate value to the given figure in the 1994 Monthly Summaries excluding January.

Level	Add	For example	Uncorrected	Corrected
10cm	3.5°		-8.7	-5.2
50cm	2.2°		-3.7	-1.5
150cm	2.7°		-1.0	1.7
300cm	2.3°		1.2	3.5



SASKATOON SRC
CLIMATOLOGICAL REFERENCE STATION

ANNUAL SUMMARY, 1994

By

C.R. Beaulieu
V. Wittrock

Climatology Section

External Services and
Corporate Development Branch
Saskatchewan Research Council

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ACKNOWLEDGEMENTS

Carol Beaulieu and Virginia Wittrock were responsible for the data collection and recording along with the biweekly site checks. Instrument maintenance was ably carried out by the people in SRC - Instrumentation. Elaine Wheaton assisted with the editing. Consultations with Environment Canada, Atmospheric Environment Service (AES), as usual, were most helpful, especially during February when new equipment was installed. We have appreciated our colleagues' advice and encouragement in the preparation of this report, especially their encouragement. Although every caution was taken to ensure the accuracy of data and information presented, errors no doubt have occurred. If an error is noticed we would appreciate being informed so it can be corrected.

Enquiries concerning the SRC Climatological Reference Station (CRS), its data, measurement programs and publications are most welcome. For further information contact:

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SUMMARY

Data concerning temperature, precipitation, soil temperature, wind speed, bright sunshine and solar radiation recorded at the SRC Climatological Reference Station (CRS), (59°09'N, 106°36'W, 497m asl) are presented for the year 1994 and compared with the long term historic and standard period (1961-1990) records.

Warm spring and very mild fall temperatures were offset by an unusually cold February. The annual average temperature was only 0.6°C above the 30-year average for the year. The annual average maximum was 0.7 °C and minimum was 0.5°C above average for the year. The extreme maximum temperature occurred during September instead of the usual summer date. Saskatoon received 14.4 mm less precipitation than average for the year, even with May and August precipitation being well above the expected; 233% in the former and 153% in the latter. June is usually the wettest month, however in 1994, May was the wettest month followed by June and August. The harvest months were ideal both for temperature and precipitation. Since frost did not occur until October 4th, the frost-free period was unusually long this year. Growing degree-days were slightly above the average.

WEATHER EVENTS

Frost Free Season

Last Spring Frost	First Fall Frost	Length of Season
1994 May 9	October 4	147 days
1993 May 17	September 14	119 days
1992 May 23	September 14	114 days
1991 May 27	September 18	113 days
30 year Average		
May 19	*September 15*	*119 days*

Extreme Temperatures

Hottest day = September 18th at 32.0°C

Coldest day = February 7th at -43.0°C

Rainfall Extremes

Rainiest Month	Rainiest Day	Heaviest Rainfall
May	May 17th	June 29th
102.4 mm	38.8 mm	15.6 mm between 5:30 and 6:15 pm

Tipping Bucket was engaged between May 6th and November 1st to officially record precipitation.

Other Notes

Hail, the size of small golf balls, occurred in the City of Saskatoon on May 22nd starting at about 17:15 h. The climate station itself did not receive hail.

Smoke haze from northern forest fires was noted in the City during August and September.

STATION HISTORY AND LOCATION

The first meteorological observations were taken at or near Saskatoon by the Royal Northwest Mounted Police in 1889 with only temperatures being recorded at the start. There is some disagreement in the early records as to the exact location of the weather observing point, but the majority of the evidence indicates 52°15'N and 106°20'W, elevation 480 m above sea level as the most probable location. This would place it at Clark's Crossing, on the South Saskatchewan River, approximately 16 km northeast of the centre of the present City of Saskatoon. At that time there was a settlement at Clark's Crossing along with 10 to 15 families at Saskatoon on either side of the river.

Little is known about the very early observers; however, the records do show that Major T.H. Keenan took the observations from March 1892 until March 1895 and Mr. George Will was the observer from January 1897 until April 1897. It is thought that Thomas H. Copeland was involved in the observational program from 1895 to May 1, 1901, at which time it was taken over by Mr. Eby, Sr. Continuous observations were taken by the Ebys at a site on 8th Street until October 31, 1942, when the station was closed. Mr. Eby, Sr. took the observations until his death in 1921, at which time his daughter, Miss E.S. Eby, recorded the observations until April 1931 who was later replaced by her brother, Mr. J.M. Eby, who continued the observations until the station was closed. The Eby station recorded temperature, precipitation and weather notes on fog, thunderstorms, winds and any unusual weather phenomena. Reports were made twice daily, morning and evening.

In 1916 a climatological station was established by the Physics Department of the University of Saskatchewan and continuous observations were kept twice daily until January 15, 1965. The long time observer at this site was Mr. Sidney Cox. The Saskatchewan Research Council took over the program in the fall of 1963 at the newly established Climatological Reference Station.

The location of the Saskatchewan Research Council's Climatological Reference Station is latitude 52°09'N and longitude 106°36'W and the elevation is 497 m asl[1].

The long time observer (16 years) at this present site was Mr. Joe Calvert, who retired from the program in August, 1983. Ray Begrand succeeded Mr. Calvert until September, 1988 when Virginia Wittrock became the primary observer. Carol Beaulieu became the primary observer in 1992.

In the summer of 1992 the CRS began to be converted to an automated system of data collection with the installation of a Campbell Scientific Data Logger and automatic sensors. The following manual data collection duties were turned over to Environment Canada: evaporation, bright sunshine (Campbell-Stokes), snow survey, snow cover, and manual temperature and precipitation programs. Manual temperature, precipitation and snow cover at the site are still possible in the event of total extended power failure.

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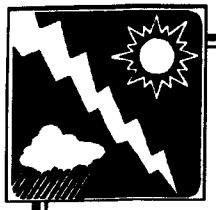
[1]From various sources including the *Physical Environment of Saskatoon, Canada* (E.A. Christiansen (ed.) 1970) and 1974 *Annual Meteorological Summary, Saskatoon, Saskatchewan,* (Environment Canada, Atmospheric Environment Service).



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	ANNUAL SUMMARY 1994	1994 VALUE	1993 VALUE	AVERAGES (1961 - 1990) EXTREME VALUES (1892-1994)
TEMPERATURE	Annual Average (°C)	2.6[3]	2.9	2.0
	Extreme Annual Maximum (°C)/Date	32.0/Sept18	32.0/Aug	41.0/June, 1988
	Annual Average Maximum (°C)	8.5[3]	8.2	7.8
	Extreme Annual Minimum (°C)/Date	-43.2/Feb13[2]	-36.5/Jan	-50.0/Feb,1893
	Annual Average Minimum (°C)	-3.3[3]	-2.5	-3.8
	Days with Frost	184[1]	188[1]	198
	Heating Degree-Days (18°C base)	5619.7[2]	5372.0	5684.0
	Growing Degree-Days (5°C base)	1769.1[2]	1493.0	1660.0
PRECIPITATION	Yearly total (mm)	347.0	300.0[8]	361.4
	Greatest 24-hr (mm)/Date	38.8/May17	35.6/Sept	99.4/June 1983
	Days with Precipitation	101[2]	84[1]	114
WIND	Average Speed (km/h)	14.1[3]	14.4	16.3
	Peak Gust Speed (km/h)/Date	81.0/July11[3]	97.4/July	151/Aug[10]
SUNSHINE	Total Bright Sunshine (h)	2192.2[4]	2004.1	2399.3
	% Possible Bright Sunshine	49.2[4]	45.0[4]	53.8
	Number of days with Bright Sun	319[5]		
	Total Global Radiation (MJ/m²)	3980.6[6]	4396.6[8]	4322.0
	Total Diffuse Radiation (MJ/m²)	1444.5[7]	1831.7[5]	1729.5

FOR YOUR INFORMATION

[1]Confirmed with AES, Saskatoon
[2]February 1-12 missing data supplied by AES, Saskatoon
[3]Missing 12 days data in February
[4]Missing 4 days + 7 hours of data
[5]Missing 4 days of data
[6]Missing 8 days of data + 6 days of partial data
[7]Missing 6 days of partial data
[8]one month missing data
[9]Information from AES Saskatoon

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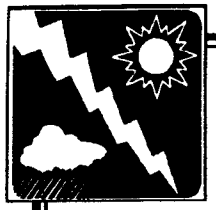

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	JANUARY 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-20.2	-16.3	-17.6	
	Extreme Monthly Maximum (°C)/Date	-4.5/31	7.0/30	7.0/1986/11	10.0/1931/30
	Monthly Average Maximum (°C)	-16.8	-11.4	-12.4	
	Number of recording years			28	96
	Extreme Monthly Minimum (°C)/Date	-34.5/8	-36.5/1	-43.9/1966/22&1969/29	-48.9/1893/31
	Monthly Average Minimum (°C)	-23.6	-21.1	-22.7	
	Number of recording years			28	96
	Days with Frost	31	31	31	
	Heating Degree-Days (18°C base)	1171.3	1062.5	1043.0	
	Growing Degree-Days (5°C base)	0.0	0.0	0.0	
PRECIPITATION	Monthly total (mm)	31.0	3.0	20.8	
	Greatest 24-hr (mm)/Date	5.0/5&15	0.6/7	15.4/1989/30	30.5/1893 /23
	Number of recording years			28	96
	Days with Precipitation	17	4	11	
	Total Year - to - Date	31.0	3.0	20.8	
WIND	Average Speed (km/h)	13.2	12.6	15.7	
	Peak Gust Speed (km/h)/Date	66.6/31	84.5	111.0	
SUNSHINE	Total Bright Sunshine (h)	48.6	131.4	104.9	
	% Possible Bright Sunshine	19.0	51.0	41.0	
	Number of days with Bright Sun	18	30		
	Total Global Radiation (MJ/m²)	n/a	128.3[1]	129.9	
	Total Diffuse Radiation (MJ/m²)	77.3	75.2[2]	71.4	
SOIL	Average Temperature (°C) 10 cm / 50 cm	-4.7/0.2	-5.6 /-1.1	-8.3/-3.9	
	150cm / 300 cm	3.0/5.1	2.7/5.2	1.8/4.4	

FOR YOUR INFORMATION

[1] 2 days of missing data
[2] 1 day of missing data
n/a = not available

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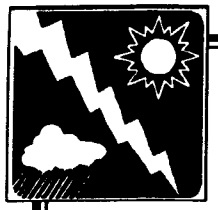

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	FEBRUARY 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-20.8[2]	-13.6[8]	-13.8	
	Extreme Monthly Maximum (°C)/Date	0.1/13[2]	4.5/28[8]	7.5/ 1988/26	12.8/1931/19
	Monthly Average Maximum (°C)	-15.3[2]	-9.2[h]	-9.0	
	Number of recording years			28	98
	Extreme Monthly Minimum (°C)/Date	-43.2/7[2]	-28.5/16&17[8]	-41.1/1972/6	-50.0 /1893/1
	Monthly Average Minimum (°C)	-26.4[2]	-18.0[8]	-18.3	
	Number of recording years			28	98
	Days with Frost	28[1]	28[1]	28	
	Heating Degree-Days (18°C base)	1073.8[2]	778.8[8]	878.0	
	Growing Degree-Days (5°C base)	0[1]	0.0[8]	0.0	
PRECIPITATION	Monthly total (mm)	12.0	3.0[9]	14.5	
	Greatest 24-hr (mm)/Date	n/a	1.6/11[9]	14.2/1979/13	20.3/1918 /7
	Number of recording years			28	98
	Days with Precipitation	n/a	6[1]	10	
	Total Year - to - Date	43.0	6.0	35.3	
WIND	Average Speed (km/h)	16.9[3]	12.9	15.8	
	Peak Gust Speed (km/h)/Date	35.8[3]	52.7	106.0	
SUNSHINE	Total Bright Sunshine (h)	91.9[4]	136.4	133.2	
	% Possible Bright Sunshine	n/a	49.8	48.6	
	Number of days with Bright Sun	20[4]	26		
	Total Global Radiation (MJ/m²)	68.7[5]	223.9	210.1	
	Total Diffuse Radiation (MJ/m²)	48.8[6]	115.5	105.3	
SOIL	Average Temperature (°C) 10 cm / 50 cm	-8.7/-3.7[7]	-4.7 /-0.7	-7.3/-4.1	
	150cm / 300 cm	-1.0/1.2[7]	1.8/3.6	0.8/3.2	

FOR YOUR INFORMATION

February of 1994 saw the installation of new recording instruments at the site. Unfortunately there were problems resulting in lost data. Daily data is available after the 12th but could not be used to calculate monthly averages.

[1]confirmed with AES Saskatoon
[2]missing temperature data supplied by AES Saskatoon
[3]based on data from Feb. 12-28
[4]4 days of missing data
[5]8 days of missing data & 6 days of partial data
[6]6 days of partial data
[7]based on data from Feb. 11-28
[8]3 days of missing data
[9]missing precipitation data supplied by AES Saskatoon
n/a=not available

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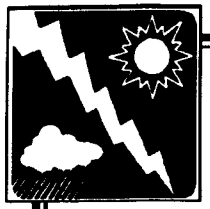

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	MARCH 1994	1994[1] VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS	FOR YOUR INFORMATION
TEMPERATURE	Monthly Average (°C)	-1.3	-0.4	-7.1		[1] 4 hrs of missing data
	Extreme Monthly Maximum (°C)/Date	17.0/31	20.0/23	15.0/1973/24&1981/16	22.8/1910/23	
	Monthly Average Maximum (°C)	3.2	3.8	-2.2		
	Number of recording years			28	98	
	Extreme Monthly Minimum (°C)/Date	-25.5/8	-19.0/17	-38.9/1972/2	-43.3/1897/14	
	Monthly Average Minimum (°C)	-5.8	-4.5	-12.1		
	Number of recording years			28	98	
	Days with Frost	30	26	30		
	Heating Degree-Days (18°C base)	601.1	569.7	727.8		
	Growing Degree-Days (5°C base)	2.5	18.3	1.5		
PRECIPITATION	Monthly total (mm)	3.0	16.8	19.9		
	Greatest 24-hr (mm)/Date	1.0	11.3/25	32.0/1967/30	32.0/1967/30	
	Number of recording years			28	93	
	Days with Precipitation	4	6	9		
	Total Year - to - Date	46.0	22.8	55.2		
WIND	Average Speed (km/h)	16.2	15.3	16.6		
	Peak Gust Speed (km/h)/Date	51.4/6	55.0	87.0		
SUNSHINE	Total Bright Sunshine (h)	226.7	176.4	176.9		
	% Possible Bright Sunshine	61.9	48.2	48.3		
	Number of days with Bright Sun	30	27			
	Total Global Radiation (MJ/m²)	197.7	359.4	362.4		
	Total Diffuse Radiation (MJ/m²)	45.9	164.0	173.9		
SOIL	Average Temperature (°C) 10 cm / 50 cm	-4.2/-1.6	-0.7/1.0	-3.1/-1.8		
	150cm / 300 cm	-1.5/0.5	1.6/3.3	0.4/2.4		

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SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	APRIL 1994	1994[1] VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	5.5[2]	5.4	3.5	
	Extreme Monthly Maximum (°C)/Date	25.5/17	20.0/23	30.6/1977/26	33.0/1952/28
	Monthly Average Maximum (°C)	12.5	11.2	9.9	
	Number of recording years			28	97
	Extreme Monthly Minimum (°C)/Date	-10.0/4	-4.0/16	-27.8/1979/1	-28.3/1893/5&19054/2
	Monthly Average Minimum (°C)	-1.5[2]	-0.5	-2.0	
	Number of recording years			28	97
	Days with Frost	17	18	20	
	Heating Degree-Days (18°C base)	367.1	379.8	388.0	
	Growing Degree-Days (5°C base)	72.2	37.5	60.2	
PRECIPITATION	Monthly total (mm)	4.0	21.0	20.2	
	Greatest 24-hr (mm)/Date	1.0/8,10,18,&23	6.5/6	24.6/1985/19	30.2/1955/19
	Number of recording years			28	97
	Days with Precipitation	4	9	7	
	Total Year - to - Date	50.0	43.8	75.4	
WIND	Average Speed (km/h)	12.2[2]	16.2	17.6	
	Peak Gust Speed (km/h)/Date	64.1/19	62.3	93.0	
SUNSHINE	Total Bright Sunshine (h)	240.3	176.5	231.3	
	% Possible Bright Sunshine	57.9	42.5	56.0	
	Number of days with Bright Sun	29	27		
	Total Global Radiation (MJ/m²)	411.7	484.1	492.2	
	Total Diffuse Radiation (MJ/m²)	135.4[3]	209.7	178.5	
SOIL	Average Temperature (°C) 10 cm / 50 cm	1.0 /0.9	3.9/4.2	3.1/2.5	
	150cm / 300 cm	-0.4 /0.3	2.8/3.2	1.2/2.2	

FOR YOUR INFORMATION

[1]data missing for April 1
[2]6 hrs of missing data
[3]1.5 hrs of missing data

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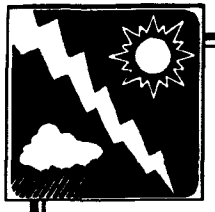

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	MAY 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	12.1	12.4	11.5	
	Extreme Monthly Maximum (°C)/Date	30.0/27	32.0/11	35.0/1988/30	37.2/1936/27
	Monthly Average Maximum (°C)	19.1	19.1	18.5	
	Number of recording years			28	97
	Extreme Monthly Minimum (°C)/Date	-4.0/4	-0.5/16	-10.0/1967/2	-19.8/1907/6
	Monthly Average Minimum (°C)	5.0	5.7	4.5	
	Number of recording years			28	97
	Days with Frost	4	2	6	
	Heating Degree-Days (18°C base)	187.0	188.2	193.1	
	Growing Degree-Days (5°C base)	221.2	235.9	209.9	
PRECIPITATION	Monthly total (mm)	102.4	24.4	43.9	
	Greatest 24-hr (mm)/Date	38.8/17	11.0/27	39.9/1985/4	51.3/1909/30
	Number of recording years			28	97
	Days with Precipitation	13	7	9	
	Total Year - to - Date	152.4	68.2	119.3	
WIND	Average Speed (km/h)	15.9[1]	15.6	17.6	
	Peak Gust Speed (km/h)/Date	65.7/29[1]	89.3	98.0	
SUNSHINE	Total Bright Sunshine (h)	249.3	262.5	284.6	
	% Possible Bright Sunshine	51.4	54.1	59.0	
	Number of days with Bright Sun	29	30		
	Total Global Radiation (MJ/m²)	604.4[1]	659.7	586.3	
	Total Diffuse Radiation (MJ/m²)	173.1[1]	233.0	222.2	
SOIL	Average Temperature (°C) 10 cm / 50 cm	7.5/7.2	10.9/10.6	10.5/8.9	
	150cm / 300 cm	2.8/1.3	6.1/4.5	4.4/3.1	

FOR YOUR INFORMATION

On May 22nd starting at about 5:15pm, parts of Saskatoon received hail about the size of small golf balls. The climate site missed the hail stones.

[1]45 minutes of missing data

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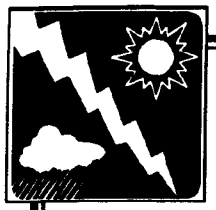
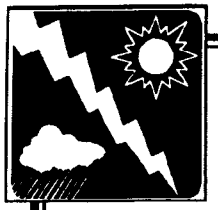


SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N **SASKATOON** Longitude 106°36' W

	JUNE 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS	FOR YOUR INFORMATION
TEMPERATURE	Monthly Average (°C)	16.1	14.1	15.9		
	Extreme Monthly Maximum (°C)/Date	30.0/23	30.0/21	41.0/1988/5	41.0/1988/5	[1]0.5 hr of missing data
	Monthly Average Maximum (°C)	22.0	19.8	22.6		
	Number of recording years			28	98	
	Extreme Monthly Minimum (°C)/Date	2.0/16	1.5/3	-3.3/1967/6	-3.9/1903/9&1917/2	
	Monthly Average Minimum (°C)	10.2	8.3	9.2		
	Number of recording years			28	98	
	Days with Frost	0	0	0		
	Heating Degree-Days (18°C base)	69.8	134.0	77.9		
	Growing Degree-Days (5°C base)	332.7	270.6	338.8		
PRECIPITATION	Monthly total (mm)	60.8	53.6	63.6		
	Greatest 24-hr (mm)/Date	16.8/29	14.6/13	99.4/1983/24	99.4/1983/24	
	Number of recording years			28	98	
	Days with Precipitation	13	12	12		
	Total Year - to - Date	213.2	121.8	182.9		
WIND	Average Speed (km/h)	15.2	16.8	17.0		
	Peak Gust Speed (km/h)/Date	79.7/29	78.4	117.0		
SUNSHINE	Total Bright Sunshine (h)	213.7	207.1	299.3		
	% Possible Bright Sunshine	43.0	41.7	60.0		
	Number of days with Bright Sun	28	26			
	Total Global Radiation (MJ/m²)	594.8	586.5	638.7		
	Total Diffuse Radiation (MJ/m²)	211.9[1]	225.3	228.1		
SOIL	Average Temperature (°C) 10 cm / 50 cm	11.8/11.4	14.0/13.9	15.7/14.0		
	150cm / 300 cm	6.0/3.3	8.7/6.3	8.3/5.3		



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N **SASKATOON** Longitude 106°36' W

	JULY 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS	FOR YOUR INFORMATION
TEMPERATURE	Monthly Average (°C)	18.0	15.9	18.4		
	Extreme Monthly Maximum (°C)/Date	31.5/28	32.0/29	38.5/1984/27	40.0/1919/17&1941/19	
	Monthly Average Maximum (°C)	24.5	21.2	25.1		
	Number of recording years			28	98	
	Extreme Monthly Minimum (°C)/Date	6.5/25	5.0/12	1.7/1967/2	-0.6/1918/25	
	Monthly Average Minimum (°C)	11.6	10.5	11.6		
	Number of recording years			28	98	
	Days with Frost	0	0	0		
	Heating Degree-Days (18°C base)	30.9	77.2	28.7		
	Growing Degree-Days (5°C base)	407.2	339.9	409.8		
PRECIPITATION	Monthly total (mm)	50.8	66.0	55.8		
	Greatest 24-hr (mm)/Date	12.2/18	29.6/4	45.5/1968/29	79.2/1946/3	
	Number of recording years			27	98	
	Days with Precipitation	15	13	12		
	Total Year - to - Date	264.0	187.8	238.7		
WIND	Average Speed (km/h)	12.3	13.9	15.5		
	Peak Gust Speed (km/h)/Date	81.0/11	97.4	103.0		
SUNSHINE	Total Bright Sunshine (h)	288.8	233.8	333.1		
	% Possible Bright Sunshine	57.6	46.7	66.5		
	Number of days with Bright Sun	31	30			
	Total Global Radiation (MJ/m²)	691.4	641.3	633.5		
	Total Diffuse Radiation (MJ/m²)	226.0	242.0	216.5		
SOIL	Average Temperature (°C) 10 cm / 50 cm	14.1/14.2	15.9/15.8	18.1/16.8		
	150cm / 300 cm	8.5/5.3	9.8/7.9	11.0/7.5		

SRC

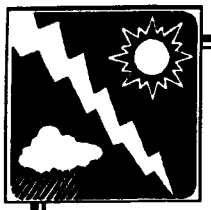
SRC Publication No. E-2900-2-E-95

March 1995

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N **SASKATOON** Longitude 106°36' W

	AUGUST 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS	FOR YOUR INFORMATION
TEMPERATURE	Monthly Average (°C)	17.1	16.7	17.2		
	Extreme Monthly Maximum (°C)/Date	31.5/5	29.0/7&21	37.0/1984/10	37.8/1893/6&1949/6	
	Monthly Average Maximum (°C)	24.1	22.3	24.3		
	Number of recording years			28	97	
	Extreme Monthly Minimum (°C)/Date	3.0/31	5.0/3	-2.8/1976/28	-2.8/1976/28	
	Monthly Average Minimum (°C)	10.1	11.0	10.1		
	Number of recording years			28	97	
	Days with Frost	0	0	0		
	Heating Degree-Days (18°C base)	61.6	52.8	63.3		
	Growing Degree-Days (5°C base)	370.1	366.6	378.3		
PRECIPITATION	Monthly total (mm)	54.0	31.4	35.2		
	Greatest 24-hr (mm)/Date	16.0/6	10.0/16	27.9/1989/25	73.7/1945/3	
	Number of recording years			28	97	
	Days with Precipitation	13	10	9		
	Total Year - to - Date	318.0	219.2	273.9		
WIND	Average Speed (km/h)	11.3	12.6	15.5		
	Peak Gust Speed (km/h)/Date	65.2/13	70.5	105.0		
SUNSHINE	Total Bright Sunshine (h)	240.1	212.6	294.8		
	% Possible Bright Sunshine	53.0	46.9	65.0		
	Number of days with Bright Sun	30	31			
	Total Global Radiation (MJ/m²)	541.4	511.9	529.0		
	Total Diffuse Radiation (MJ/m²)	202.2	202.5	185.6		
SOIL	Average Temperature (°C) 10 cm / 50 cm	13.5/14.6	16.4/17.2	16.7/16.8		
	150cm / 300 cm	9.9/6.8	12.2/9.3	12.4/9.3		



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	SEPTEMBER 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	14.2	10.6	11.3	
	Extreme Monthly Maximum (°C)/Date	32.0 /18	26.0 /8	35.6 /1978 /4	35.6 /1978 /4
	Monthly Average Maximum (°C)	22.2	17.2	17.7	
	Number of recording years			28	95
	Extreme Monthly Minimum (°C)/Date	1.0 /30	-4.5 /30	-7.8 /1978 /30	-11.1/1908/28
	Monthly Average Minimum (°C)	6.2	3.9	4.8	
	Number of recording years			28	95
	Days with Frost	0	7	4	
	Heating Degree-Days (18°C base)	112.9	225.8	199.6	
	Growing Degree-Days (5°C base)	288.6	169.0	196.2	
PRECIPITATION	Monthly total (mm)	1.6	46.6	32.8	
	Greatest 24-hr (mm)/Date	0.8 /20	35.6 /12	29.6/1980/3	44.2 /1931/12
	Number of recording years			28	95
	Days with Precipitation	3	10	9	
	Total Year - to - Date	319.6	265.8	306.7	
WIND	Average Speed (km/h)	13.7	15.0	16.7	
	Peak Gust Speed (km/h)/Date	55.3/11	81.0	89.0	
SUNSHINE	Total Bright Sunshine (h)	222.3	163.3	188.9	
	% Possible Bright Sunshine	58.7	43.1	50.0	
	Number of days with Bright Sun	27	29		
	Total Global Radiation (MJ/m²)	398.0	387.5	351.8	
	Total Diffuse Radiation (MJ/m²)	124.2	149.1	127.6	
SOIL	Average Temperature (°C) 10 cm / 50 cm	10.0 /12.2	10.2 /13.5	11.2/13.3	
	150cm / 300 cm	9.4/7.5	11.5/10.0	11.9 /9.9	

FOR YOUR INFORMATION

September was the perfect harvest month with record above average temperatures and record below average rain. Long dry harvest days totalling 222.3 h. of sunshine contributed to the enjoyable weather.

The growing season continued into October as frost was still not reported at the site. Our last frost day was on May 9 making 144 continuous frost free days so far this year.

This September also saw some gorgeous sunsets due to harvest dust and forest fire smoke.

Air pollution from smoke is not new. In 1330 King Edward of England issued the following: "Be it known to all within the sound of my voice, whosoever shall be found guilty of burning coal shall suffer the loss of his head." As far as it is known only one misguided person lost his head.

(Lutgens&Tarbuck 1992)

SRC

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	OCTOBER 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	6.4	5.2[2]	4.8	
	Extreme Monthly Maximum (°C)/Date	21.0/9	18.0 /23&24	28.5 /1984 /8	32.2 /1943 /5
	Monthly Average Maximum (°C)	12.2	11.3[2]	10.9	
	Number of recording years			28	95
	Extreme Monthly Minimum (°C)/Date	-10.0/31	-8.0[2]/29	-19.5/1984/30&31	-25.6/1919/26
	Monthly Average Minimum (°C)	0.6	-0.9[2]	-1.3	
	Number of recording years			28	95
	Days with Frost	13	17[2]	19	
	Heating Degree-Days (18°C base)	364.8	388.2[2]	405.2	
	Growing Degree-Days (5°C base)	74.6	55.4[2]	62.2	
PRECIPITATION	Monthly total (mm)	14.4	0.4	18.0	
	Greatest 24-hr (mm)/Date	5.4/2	0.2/26&28	36.7/1984/16	36.7/1984 /16
	Number of recording years			28	95
	Days with Precipitation	8	2	6	
	Total Year - to - Date	334.0	266.2	324.7	
WIND	Average Speed (km/h)	15.6	14.1[2]	17.1	
	Peak Gust Speed (km/h)/Date	62.6/30	68.3[2]	96.0	
SUNSHINE	Total Bright Sunshine (h)	146.5[1]	162.8	166.4	
	% Possible Bright Sunshine	44.5[1]	49.5	51	
	Number of days with Bright Sun	24	27		
	Total Global Radiation (MJ/m²)	228.5	256.4	239.1	
	Total Diffuse Radiation (MJ/m²)	87.7	83.0	92.6	
SOIL	Average Temperature (°C) 10 cm / 50 cm	3.1/7.7	5.3/9.4	4.5 /8.1	
	150cm / 300 cm	7.7/7.2	9.5/9.5	9.7/9.5	

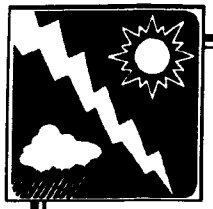
FOR YOUR INFORMATION

Our first frost for fall occurred on the 4th making 147 continuous frost free days for 1994. Both the average maximum and minimum temperatures were above the 30 year average. Although the sunshine total is below the average, October, nevertheless was a very pleasant month to finish outdoor work in anticipation for the winter months. All hallows' eve was cool but the snow stayed away allowing a good evening for the "trick or treaters".

Ten years ago we were not so lucky. On October 17th an equivalent of 36.7 cm of wet snow was dumped on Saskatoon causing many companies to send employees home early. Many university staff and students were seen the next day walking to the U of S carrying snow shovels to dig out their abandoned cars. This snow stayed until spring.

[1] 7 h of missing data due to equipment maintenance
[2] 1 day of missing data

SRC Publication No. E-2900-2-E-95



SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	NOVEMBER 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-3.8	-6.8	-6.1	
	Extreme Monthly Maximum (°C)/Date	8.5/15	4.5 /1	19.4/1975 /4	21.7 /1903 /3
	Monthly Average Maximum (°C)	1.2	-3.0	-1.5	
	Number of recording years			29	96
	Extreme Monthly Minimum (°C)/Date	-21.5/28	-25.5/23	-33.5/1985/24	-39.4 /1893/30
	Monthly Average Minimum (°C)	-8.8	-10.7	-10.5	
	Number of recording years			29	96
	Days with Frost	30	28	29	
	Heating Degree-Days (18°C base)	654.8	753.8	692.0	
	Growing Degree-Days (5°C base)	0.0	0.0	2.8	
PRECIPITATION	Monthly total (mm)	5.0	26.1	14.9	
	Greatest 24-hr (mm)/Date	2.0	7.0/1	19.3/1978/4	27.9/1938 /1
	Number of recording years	26		29	96
	Days with Precipitation	4	6	8	
	Total Year - to - Date	339.0	292.3	339.6	
WIND	Average Speed (km/h)	14.9	13.8	15.3	
	Peak Gust Speed (km/h)/Date	59.4/24	75.1	100.0	
SUNSHINE	Total Bright Sunshine (h)	121.2	92.3	101.8	
	% Possible Bright Sunshine	46.1	35.1	39.0	
	Number of days with Bright Sun	26	23		
	Total Global Radiation (MJ/m²)	136.1	151.6	123.7	
	Total Diffuse Radiation (MJ/m²)	60.1	71.0	73.6	
SOIL	Average Temperature (°C) 10 cm / 50 cm	-4.6/2.0	-0.1/5.0	-1.7/2.6	
	150cm / 300 cm	4.8/6.0	7.0/8.0	6.8/8.1	

FOR YOUR INFORMATION

November was a warm bright month. The temperature was almost 2°C warmer than usual. We received 46.1 % of the possible sunshine which is 7% higher than normal.

Unfortunately for those looking forward to the skiing season, the precipitation was way below the average with only 5.0 mm being received by month's end.

Snow fall is measured as if the snow was melted and poured into a rain gauge. one mm of melted snow will, on the average, equal one cm of unmelted snow.

Lack of snow for skiing was not a problem on November 16, 1900 at Indian Head, near Regina. They received 88.9 cm of snow; the greatest 1-day total on record for any station in Saskatchewan.
(1989 Canadian Weather Trivia Calendar)

SRC Publication No. E-2900-2-E-95

SASKATCHEWAN RESEARCH COUNCIL MONTHLY WEATHER SUMMARY

Latitude 52°09' N — SASKATOON — Longitude 106°36' W

	DECEMBER 1994	1994 VALUE	1993 VALUE	AVERAGE OR EXTREME VALUE 1961 - 1990	EXTREME ALL YEARS
TEMPERATURE	Monthly Average (°C)	-12.4	-8.8[1]	-14.8	
	Extreme Monthly Maximum (°C)/Date	6.0/20	5.5[1] /11	9.5/1987/7	13.3/1939 /5
	Monthly Average Maximum (°C)	-7.5	-4.4[1]	-9.8	
	Number of recording years			29	96
	Extreme Monthly Minimum (°C)/Date	-29.0/10	-29.0[2]/ 27	-42.2/ 1973/31	-43.9 / 1892/ 22
	Monthly Average Minimum (°C)	-17.0	-13.2[1]	-19.3	
	Number of recording years			29	96
	Days with Frost	31	31[2]	31	
	Heating Degree-Days (18°C base)	924.6	761.4[1]	987.7	
	Growing Degree-Days (5°C base)	0.0	0.0[1]	0.0	
PRECIPITATION	Monthly total (mm)	8.0	7.7[1]	20.6	
	Greatest 24-hr (mm)/Date	2.0/7&28	5.0[1]/5	14.5/1973/23	20.6/1936 /24
	Number of recording years			29	96
	Days with Precipitation	6	4[1]	13	
	Total Year - to - Date	347.0	300.0	360.2	
WIND	Average Speed (km/h)	12.2	13.9	15.7	
	Peak Gust Speed (km/h)/Date	49.3/2	53.6	97.0	
SUNSHINE	Total Bright Sunshine (h)	102.8	49.0[1]	84.2	
	% Possible Bright Sunshine	43.0	20.5	35.0	
	Number of days with Bright Sun	27	17		
	Total Global Radiation (MJ/m²)	107.9		95.2	
	Total Diffuse Radiation (MJ/m²)	51.9	61.4[1]	54.3	
SOIL	Average				
	Temperature (°C) 10 cm / 50 cm	-9.5/-2.7	-2.5 /2.1[1]	-6.6/-1.7	
	150cm / 300 cm	1.4/4.1	4.6/6.6[1]	3.9/6.3	

FOR YOUR INFORMATION

December was a very pleasant month. Saskatoon experienced only four days without bright sunshine. From the 19th to the 24th the temperature was above freezing and the average temperatures for the month were 2.4°C above normal. Although the snow fall was less than 1/2 the expected for the month, the year ended with the total precipitation values very close to the average. By Christmas Day little snow was on the ground and this was reflected in the below average soil temperatures.

According to Peter Fidler, a Hudson's Bay Company employee and one of the first weather observers in Canada, Holland gin freezes solid at -27°; English brandy at -32° and rum at -35°C (Can. Weather Trivia Calendar, 1988). He would not have had to worry about that this Christmas.

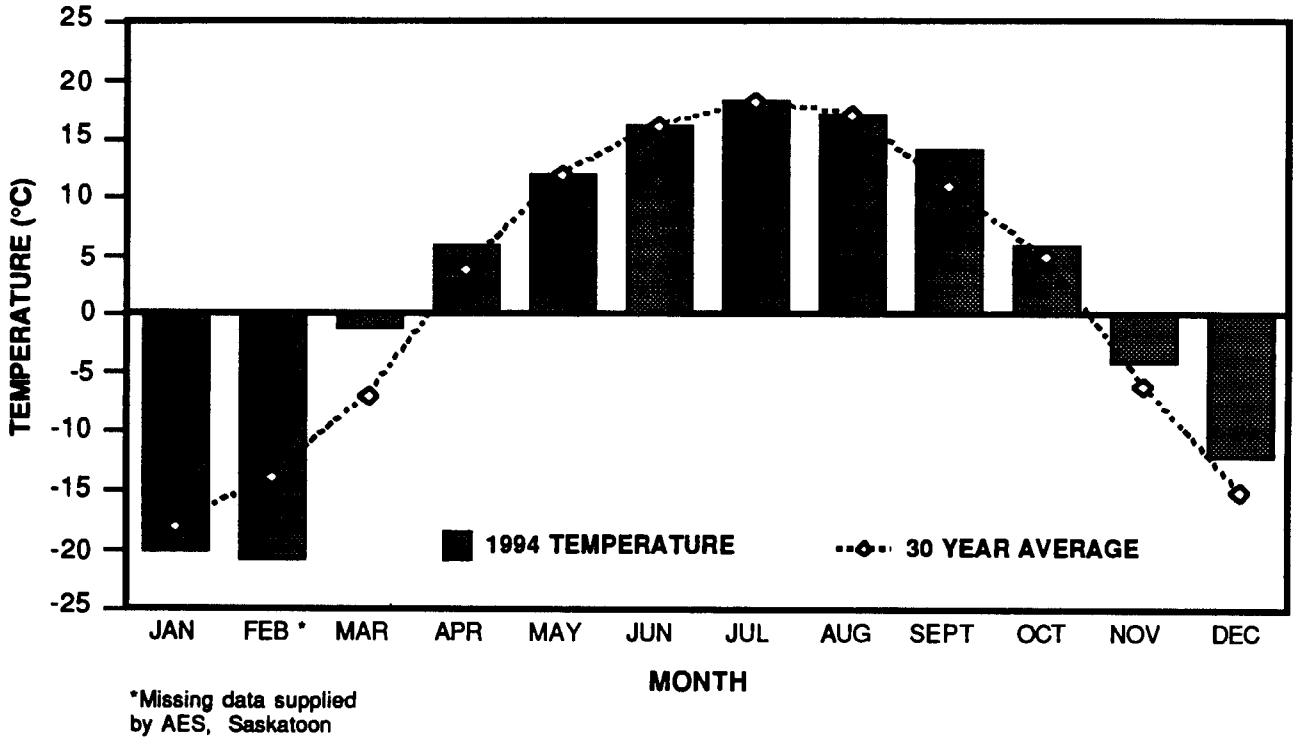
SRC

[1]2 days of missing data

[2]Confirmed minimum temperatures with Saskatoon Airport

SASKATOON SRC CRS

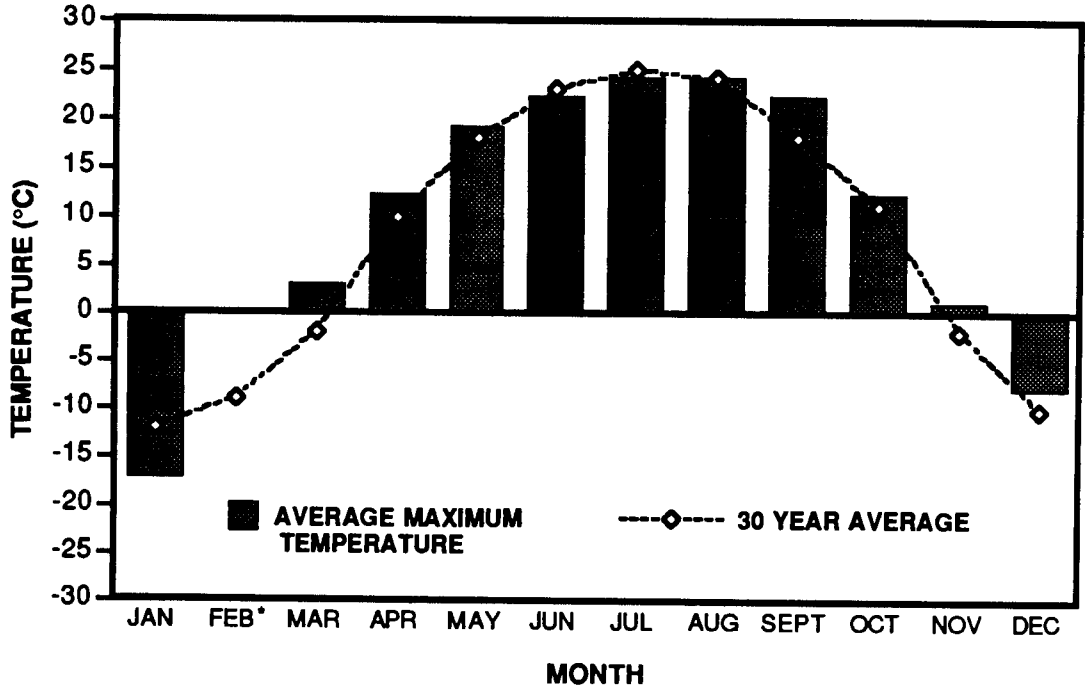
MONTHLY AVERAGE TEMPERATURE 1994



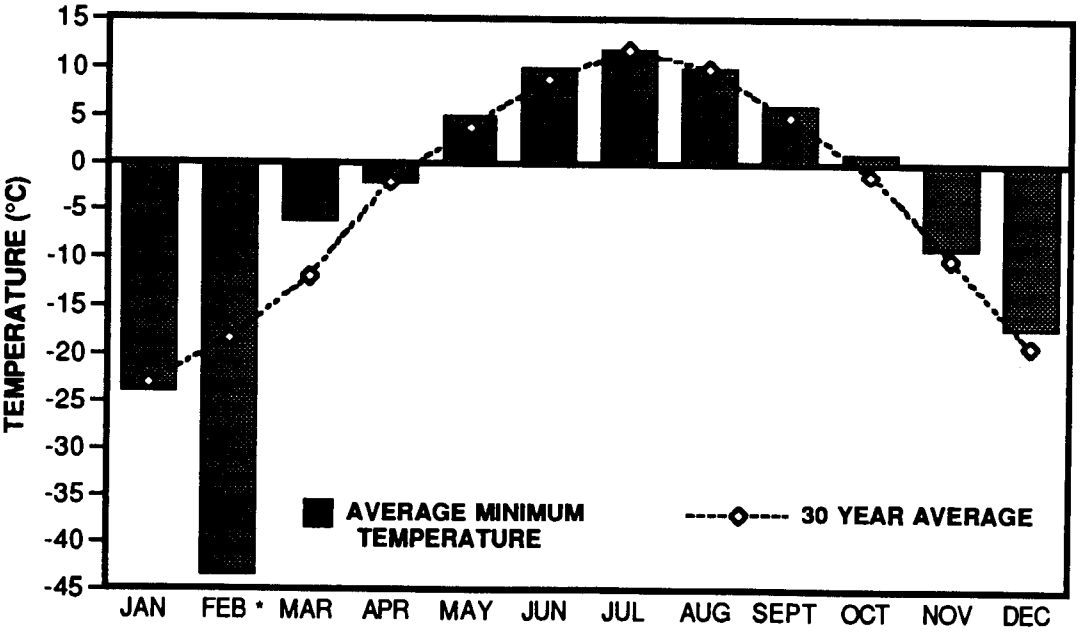
*Missing data supplied by AES, Saskatoon

SASKATOON SRC CRS

MAXIMUM MONTHLY TEMPERATURES 1994



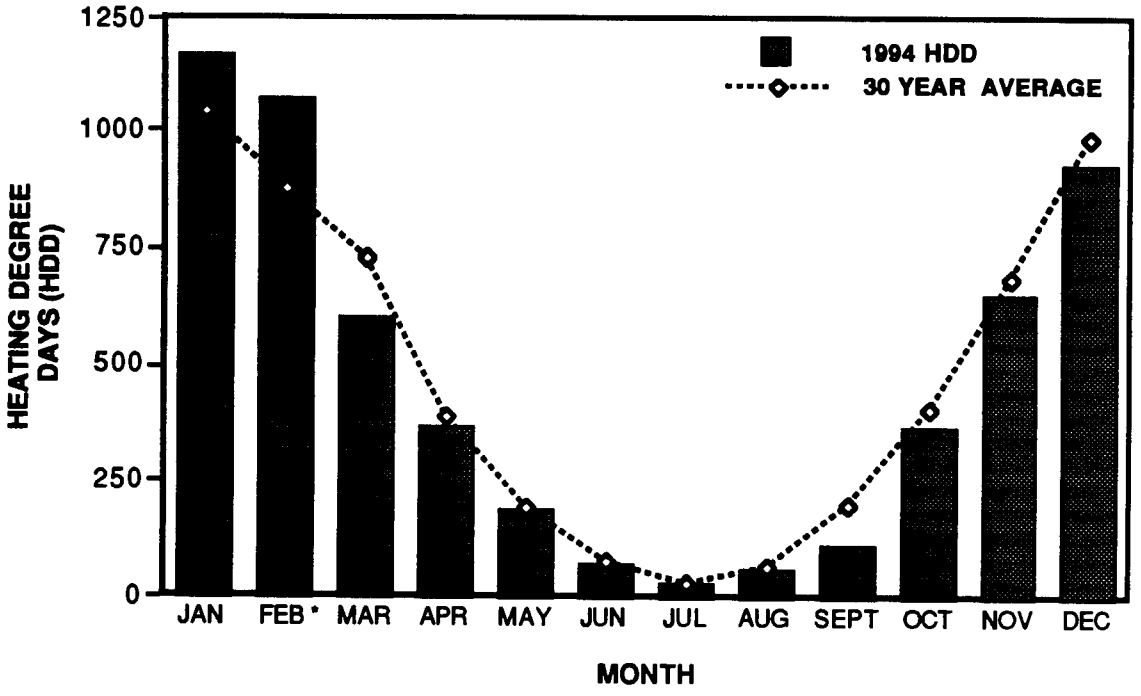
MINIMUM MONTHLY TEMPERATURES 1994



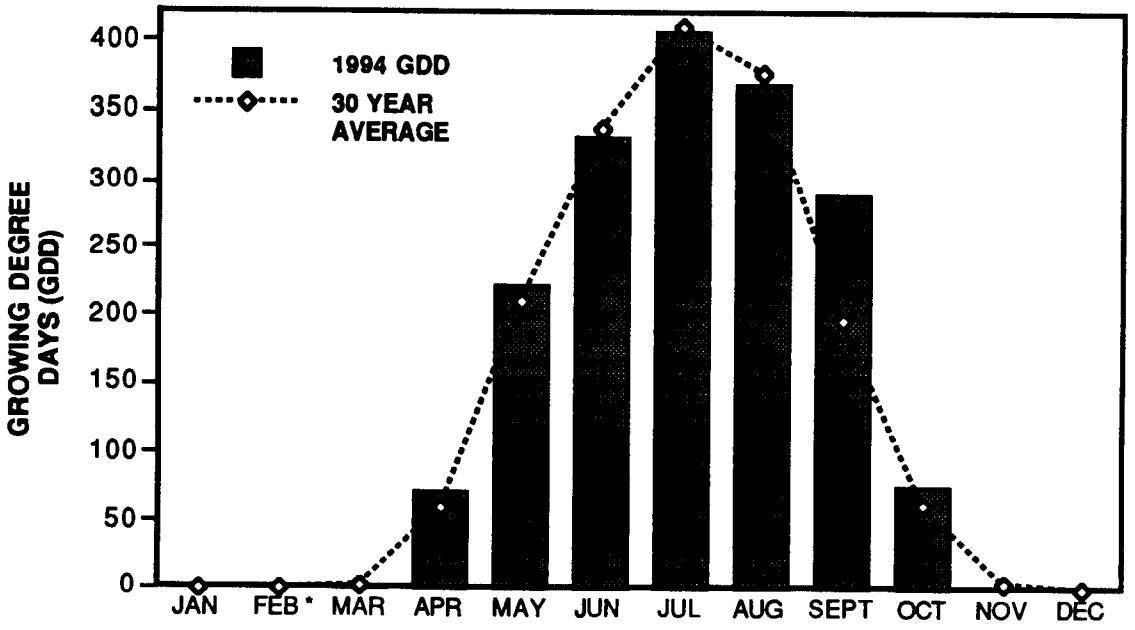
* Missing data supplied by AES, Saskatoon

SASKATOON SRC CRS

MONTHLY HEATING DEGREE-DAYS 1994



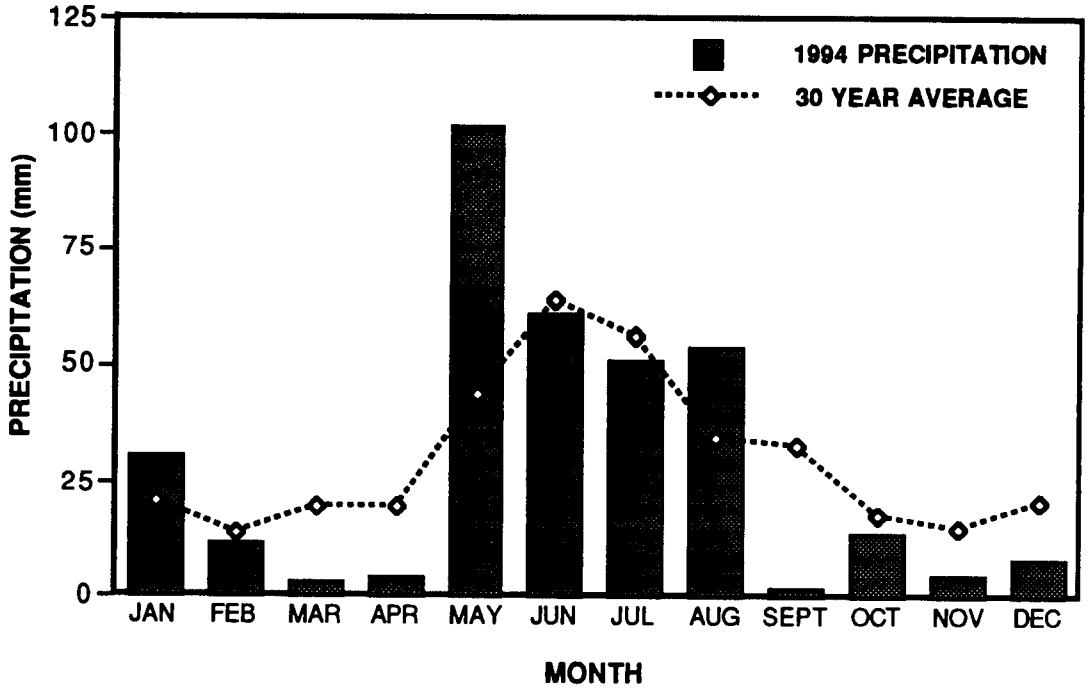
MONTHLY GROWING DEGREE-DAYS 1994



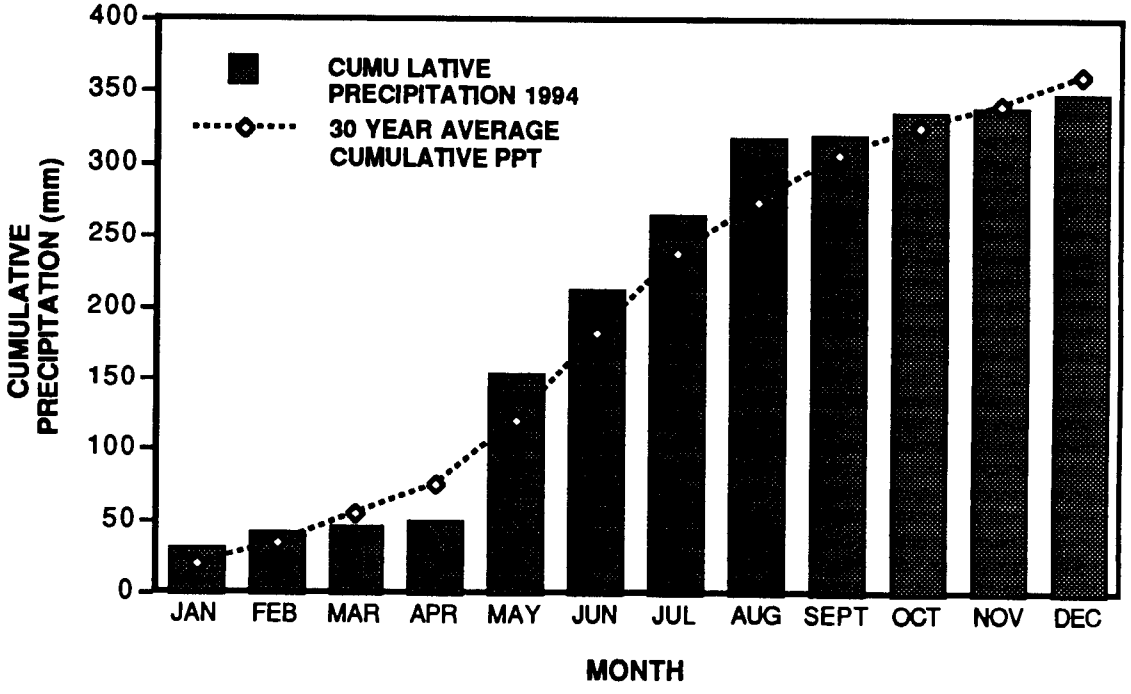
* missing data supplied by AES, Saskatoon

SASKATOON SRC CRS

ANNUAL PRECIPITATION 1994



CUMULATIVE PRECIPITATION 1994



SASKATOON SRC CRS

GLOBAL SOLAR RADIATION, 1994

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	M	M	5.7	M	25.2	22.6	15.5	22.8	19.5	7.4	1.5	3.0
2	M	M	5.8	6.0	19.9	7.7	19.1	23.7	20.1	1.4	4.5	1.6
3	M	M	5.9	7.7	13.1	15.4	25.9	20.8	4.4	7.3	7.3	4.3
4	M	M	6.4	10.0	26.3	20.4	15.4	21.8	7.0	8.1	4.1	5.1
5	M	M	4.1	10.1	20.9	16.8	14.9	22.5	17.6	12.9	8.2	5.5
6	M	M	5.9	10.3	23.4	25.1	19.1	10.6	18.8	11.4	7.3	5.3
7	M	M	6.8	4.8	18.8	23.9	23.5	19.5	16.8	10.0	6.9	2.0
8	M	M	7.2	5.6	26.0	6.4	27.1	9.7	15.4	12.1	6.3	3.8
9	M	M	5.4	10.2	25.3	13.8	25.1	17.9	10.7	10.3	5.0	2.1
10	M	M	4.2	8.7	22.5	27.4	13.3	18.2	15.1	11.6	3.3	4.2
11	M	M	7.4	9.4	26.1	26.1	25.3	15.5	17.6	4.7	6.8	2.6
12	M	3.4*	6.1	8.5	11.2	28.6	20.2	17.7	14.0	8.8	5.9	3.8
13	M	3.9	5.8	5.7	14.2	7.9	22.0	24.4	16.8	4.3	5.5	4.2
14	M	0.0*	7.3	8.7	19.5	11.4	18.7	23.1	12.4	3.7	5.2	4.0
15	M	3.8*	8.0	8.7	23.4	9.1	21.1	17.7	17.2	1.5	4.3	4.2
16	M	3.8	6.9	10.8	11.0	18.3	21.6	10.3	16.8	1.5	3.8	2.3
17	M	3.6	3.6	18.0	2.5	19.7	26.0	16.1	16.2	3.2	1.6	3.1
18	M	3.1	6.8	23.0	15.3	16.4	7.6	16.0	16.1	7.1	2.5	3.6
19	M	5.0	4.0	23.0	20.9	22.7	20.3	17.7	14.7	9.7	4.9	4.8
20	M	5.4	4.5	20.9	2.9	29.5	24.0	20.9	6.3	7.2	2.6	2.4
21	M	4.9	9.2	22.5	15.9	29.7	27.7	16.8	14.1	6.7	4.6	3.6
22	M	4.3	7.2	16.8	21.1	27.7	27.0	16.0	14.5	2.5	4.4	3.5
23	M	3.0	7.7	20.7	23.8	27.9	27.4	20.4	14.4	9.9	4.3	3.2
24	M	4.3	8.9	15.3	24.5	24.6	27.1	20.9	14.6	9.6	4.7	3.9
25	M	6.2	5.6	20.6	25.2*	16.8	28.0	20.3	14.8	8.7	4.1	3.2
26	M	4.9	4.3	25.4	28.4	20.3	27.1	2.6	10.6	6.7	2.1	2.5
27	M	3.8	8.7	16.3	20.3	19.9	26.5	18.0	7.9	8.6	2.8	3.8
28	M	5.2	2.5	20.5	12.3	22.2	24.3	20.6	3.7	8.4	5.3	1.1
29	M		7.6	18.8	15.4	16.5	22.5	10.0	5.9	7.8	3.9	2.7
30	M		9.3	24.8	21.7	20.2	24.9	13.2	4.0	8.2	2.2	2.7
31	M		9.0		27.2		23.1	15.7		7.3		5.9
TOTAL		68.7*	197.7	411.7*	604.4*	594.8	691.4	541.4	398.0	228.5	136.1	107.9

* Partial data
M Missing data

SASKATOON SRC CRS

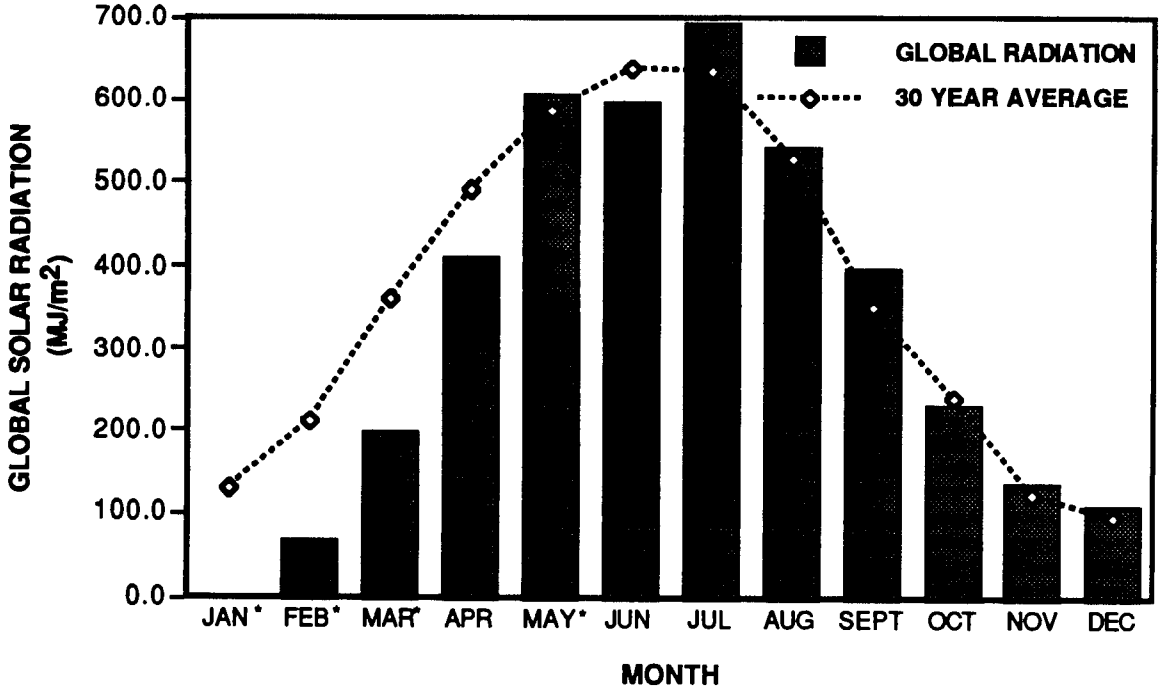
DIFFUSE SOLAR RADIATION, 1994

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	2.2	3.7	1.0	M	3.3	3.0	11.9	7.2	4.1	5.4	1.5	1.7
2	1.4	1.9	1.1	2.5	6.9	5.2	10.1	5.8	3.2	1.4	4.2	1.4
3	2.0	2.5	1.2	2.0	6.2	6.7	7.5	8.7	4.0	5.0	1.8	1.3
4	2.8	3.8	0.9	1.0	3.0	5.7	11.1	9.2	5.1	4.6	3.5	1.1
5	1.8	4.0	1.6	0.9	7.6	6.7	10.2	5.8	4.1	1.5	1.6	1.1
6	2.6	2.2	1.1	1.0	7.7	7.8	9.0	8.0	2.0	3.7	1.5	1.4
7	1.9	3.3	1.0	2.7	9.7	10.2	8.0	9.6	5.0	4.3	1.5	2.0
8	2.8	2.5	1.0	2.4	3.8	4.5	6.4	6.6	6.9	1.7	1.6	1.3
9	2.4	0.2*	2.3	1.5	3.6	10.2	6.7	6.7	7.5	4.0	3.6	2.1
10	1.4	0.1*	2.3	1.9	6.2	4.1	8.4	8.1	5.9	2.3	3.0	1.8
11	2.1	0.9*	1.0	5.8	0.2*	5.0	6.8	6.2	2.5	4.4	2.2	2.5
12	2.6	1.3*	1.8	3.0	0.0*	4.4	10.0	7.8	5.0	4.4	1.3	2.0
13	3.0	1.6	1.9	3.0	8.9	5.6	9.4	3.0	2.5	4.1	1.9	1.2
14	2.0	0.2*	1.0	2.9*	8.1	7.7	10.4	4.8	7.4	3.6	1.8	1.4
15	1.7	0.2*	1.2	6.6	5.7	8.2	8.5	6.6	3.3	1.5	3.0	1.3
16	2.1	0.1	1.3	5.0	7.9	10.7	8.0	7.5	1.8	1.5	2.9	1.7
17	2.0	2.0	2.0	8.8	1.5	9.5	5.3	9.2	2.1	3.0	1.6	1.8
18	2.6	1.9	1.7	3.7	8.5	6.7	6.5	8.1	2.2	3.1	2.1	2.1
19	1.7	1.1	1.9	4.0	10.4	5.7	8.3	7.4	4.6	2.0	1.1	1.5
20	2.5	0.9	2.2	7.1	1.8	3.7	6.8	5.3	5.0	4.8	1.0	2.2
21	2.8	0.4	1.0	6.6	8.3	3.8	4.2	8.2	4.5	3.6	1.7	1.0
22	2.6	2.2	1.5	9.4	5.7	5.4	5.3	6.3	4.0	2.4	1.5	1.5
23	2.7	1.8	1.4	4.5	5.0	7.6	3.3	4.4	2.5	1.6	1.2	2.3
24	3.0	2.7	1.0	10.8	6.0	6.5	3.7	3.5	2.9	1.3	2.1	1.7
25	3.4	1.2	1.8	7.7	5.3*	10.7	3.2	5.6	2.1	2.0	2.5	1.8
26	3.1	2.0	2.2	3.4	3.0	10.6	4.4	2.5	5.8	2.7	2.0	1.8
27	2.9	2.4	1.9	8.5	5.8	7.9	6.4	6.0	6.0	1.2	1.2	1.4
28	1.9	1.9	1.5	5.8	4.8	9.4	4.7	3.2	3.4	1.3	1.3	1.1
29	3.7		2.3	8.5	8.0	8.9	9.4	6.8	5.3	1.7	2.0	2.7
30	3.8		0.9	4.5	7.4	10.0	5.8	8.5	3.8	1.3	2.1	2.5
31	3.5		1.0		2.9		6.4	5.5		2.3		1.5
TOTAL	77.3	48.8*	45.9	135.4*	173.1*	211.9	226.0	202.2	124.2	87.7	60.1	51.9

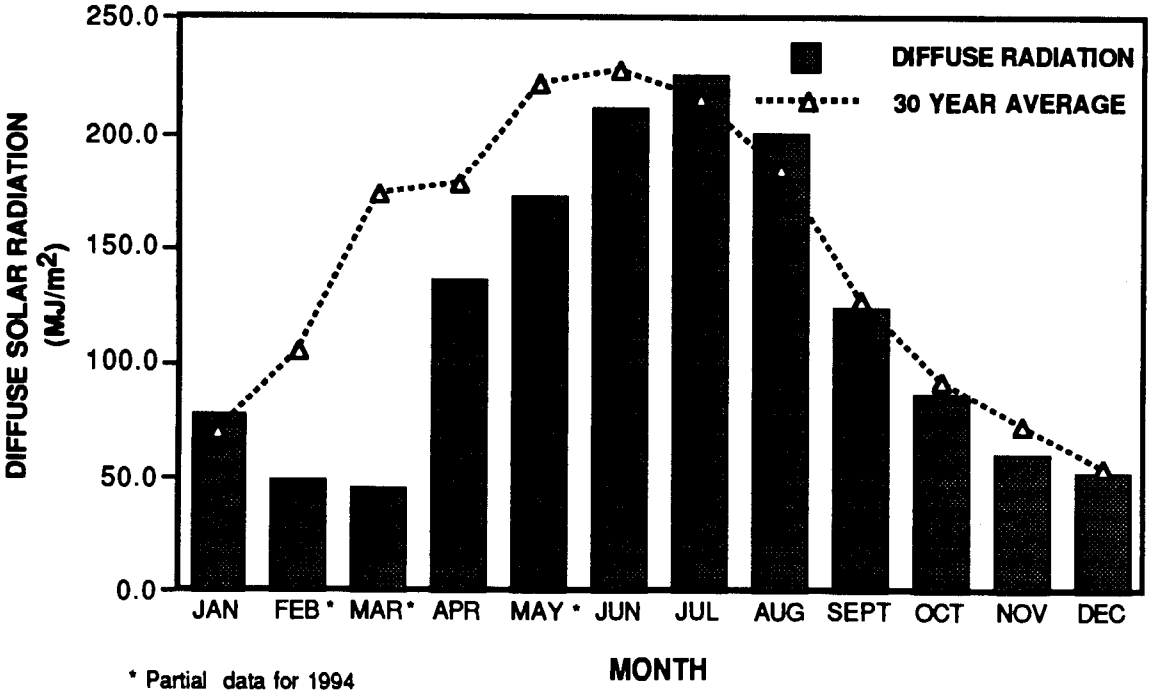
* Partial data
M Missing data

SASKATOON SRC CRS

MONTHLY GLOBAL SOLAR RADIATION, 1994



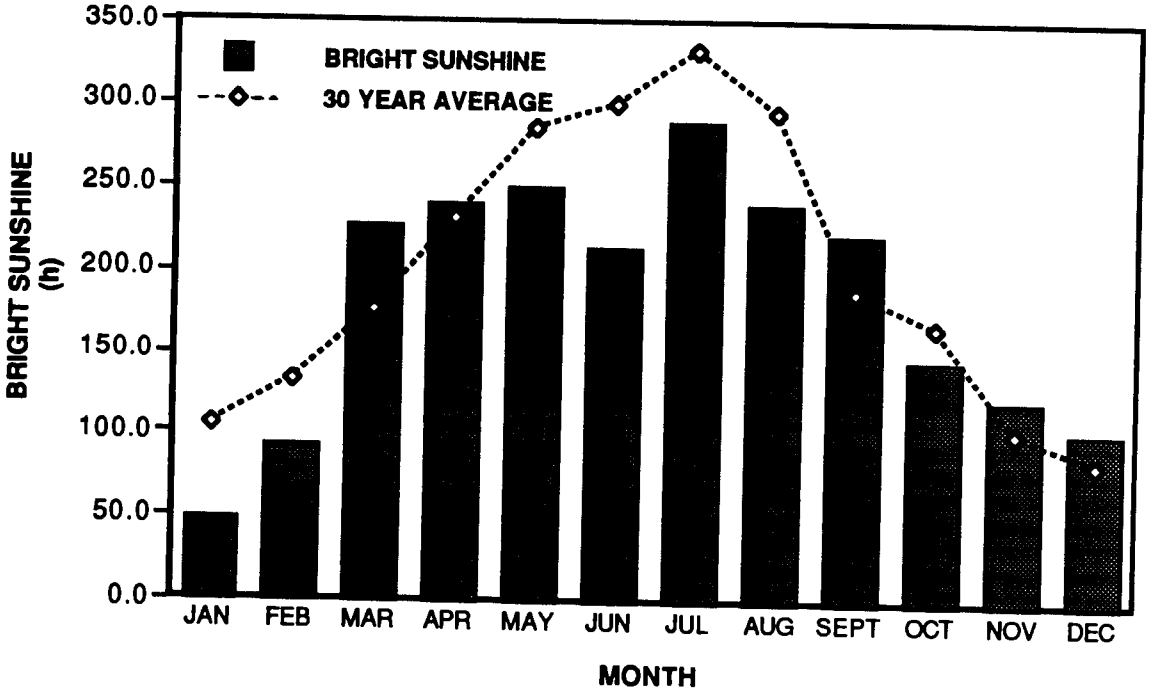
MONTHLY DIFFUSE SOLAR RADIATION, 1994



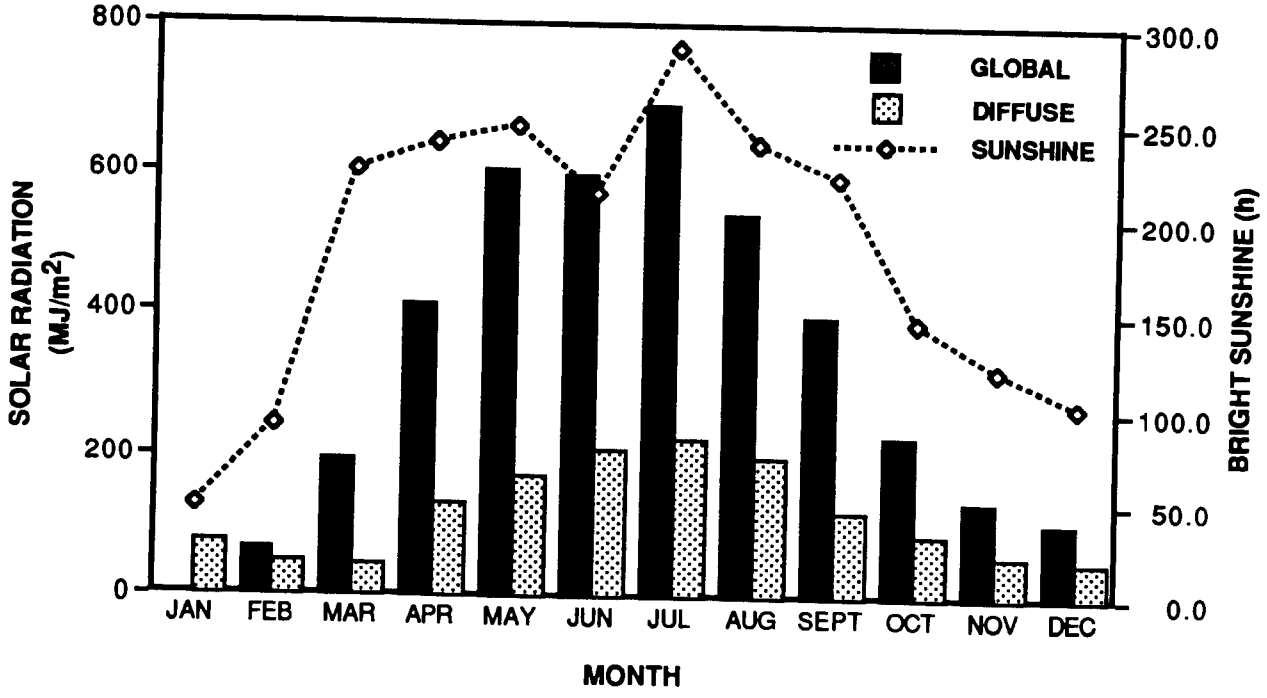
* Partial data for 1994

SASKATOON SRC CRS

MONTHLY BRIGHT SUNSHINE, 1994



COMPARISON OF MONTHLY SOLAR RADIATION, 1994



SASKATOON SRC CRS

SUNRISE, 1994

(local time : hours and minutes)

DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	9:16	8:47	7:53	6:42	5:37	4:52	4:50	5:28	6:18	7:08	8:02	8:53
2	9:16	8:46	7:51	6:39	5:35	4:51	4:51	5:29	6:20	7:09	8:04	8:55
3	9:15	8:44	7:48	6:37	5:33	4:50	4:52	5:31	6:21	7:11	8:06	8:56
4	9:15	8:42	7:46	6:35	5:31	4:50	4:52	5:32	6:23	7:13	8:08	8:57
5	9:15	8:41	7:44	6:32	5:29	4:49	4:53	5:34	6:25	7:14	8:09	8:59
6	9:14	8:39	7:42	6:30	5:27	4:48	4:54	5:36	6:26	7:16	8:11	9:00
7	9:14	8:37	7:39	6:28	5:25	4:48	4:55	5:37	6:28	7:18	8:13	9:01
8	9:14	8:35	7:37	6:26	5:24	4:47	4:56	5:39	6:30	7:20	8:15	9:02
9	9:13	8:34	7:35	6:23	5:22	4:47	4:57	5:40	6:31	7:21	8:17	9:04
10	9:12	8:32	7:33	6:21	5:20	4:46	4:58	5:42	6:33	7:23	8:18	9:05
11	9:12	8:30	7:30	6:19	5:19	4:46	4:59	5:44	6:35	7:25	8:20	9:06
12	9:11	8:28	7:28	6:16	5:17	4:46	5:00	5:45	6:36	7:26	8:22	9:07
13	9:10	8:26	7:26	6:14	5:15	4:46	5:01	5:47	6:38	7:28	8:24	9:08
14	9:10	8:24	7:23	6:12	5:14	4:45	5:03	5:49	6:39	7:30	8:26	9:09
15	9:09	8:22	7:21	6:10	5:12	4:45	5:04	5:50	6:41	7:32	8:27	9:09
16	9:08	8:20	7:19	6:08	5:11	4:45	5:05	5:52	6:43	7:33	8:29	9:10
17	9:07	8:18	7:16	6:05	5:09	4:45	5:06	5:54	6:44	7:35	8:31	9:11
18	9:06	8:16	7:14	6:03	5:08	4:45	5:08	5:55	6:46	7:37	8:33	9:12
19	9:05	8:14	7:12	6:01	5:06	4:45	5:09	5:57	6:48	7:39	8:34	9:12
20	9:04	8:12	7:09	5:59	5:05	4:45	5:10	5:58	6:49	7:41	8:36	9:13
21	9:03	8:10	7:07	5:57	5:04	4:46	5:12	6:00	6:51	7:42	8:38	9:14
22	9:01	8:08	7:05	5:55	5:02	4:46	5:13	6:02	6:53	7:44	8:39	9:14
23	9:00	8:06	7:03	5:53	5:01	4:46	5:14	6:03	6:54	7:46	8:41	9:14
24	8:59	8:04	7:00	5:51	5:00	4:46	5:16	6:05	6:56	7:48	8:43	9:15
25	8:58	8:02	6:58	5:49	4:59	4:47	5:17	6:07	6:58	7:49	8:44	9:15
26	8:56	7:59	6:56	5:47	4:58	4:47	5:19	6:08	6:59	7:51	8:46	9:15
27	8:55	7:57	6:53	5:45	4:57	4:48	5:20	6:10	7:01	7:53	8:47	9:16
28	8:53	7:55	6:51	5:43	4:56	4:48	5:22	6:12	7:03	7:55	8:49	9:16
29	8:52		6:49	5:41	4:55	4:49	5:23	6:13	7:04	7:57	8:50	9:16
30	8:50		6:46	5:39	4:54	4:49	5:25	6:15	7:06	7:58	8:52	9:16
31	8:49		6:44		4:53		5:26	6:16		8:00		9:16

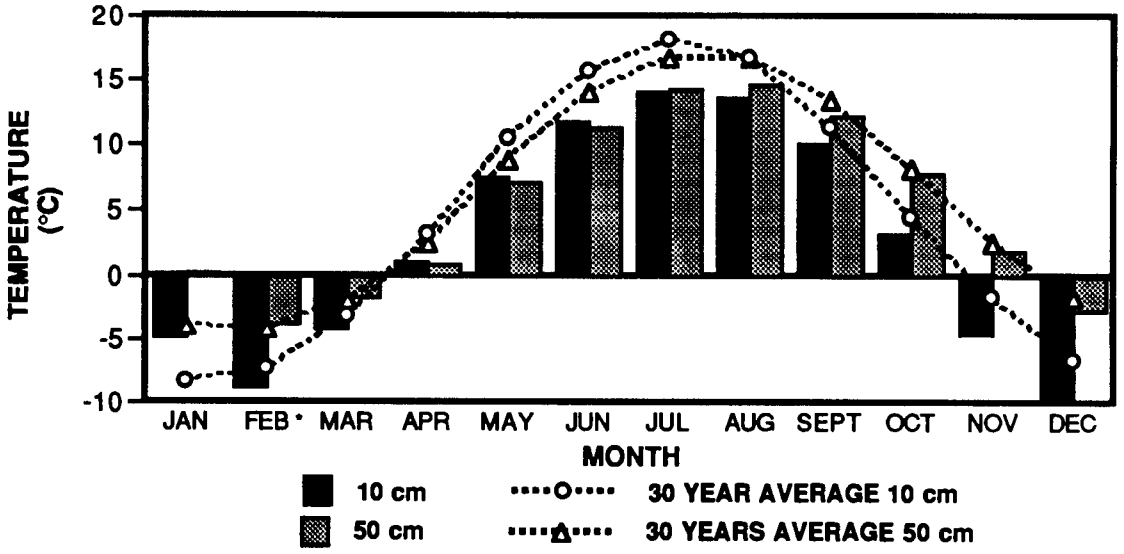
SASKATOON SRC CRS

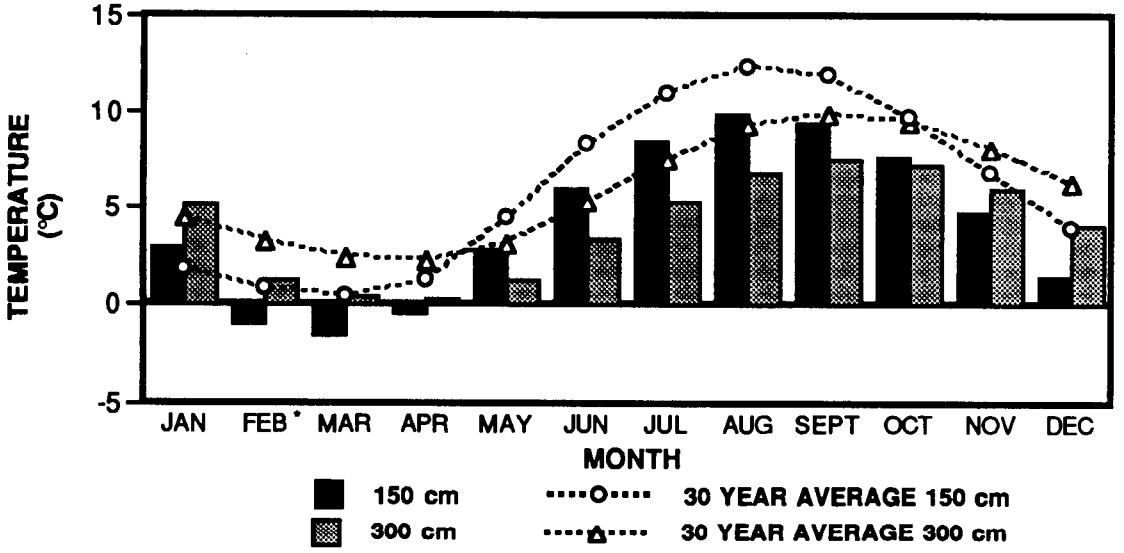
SUNSET, 1994
(local time: hours and minutes)

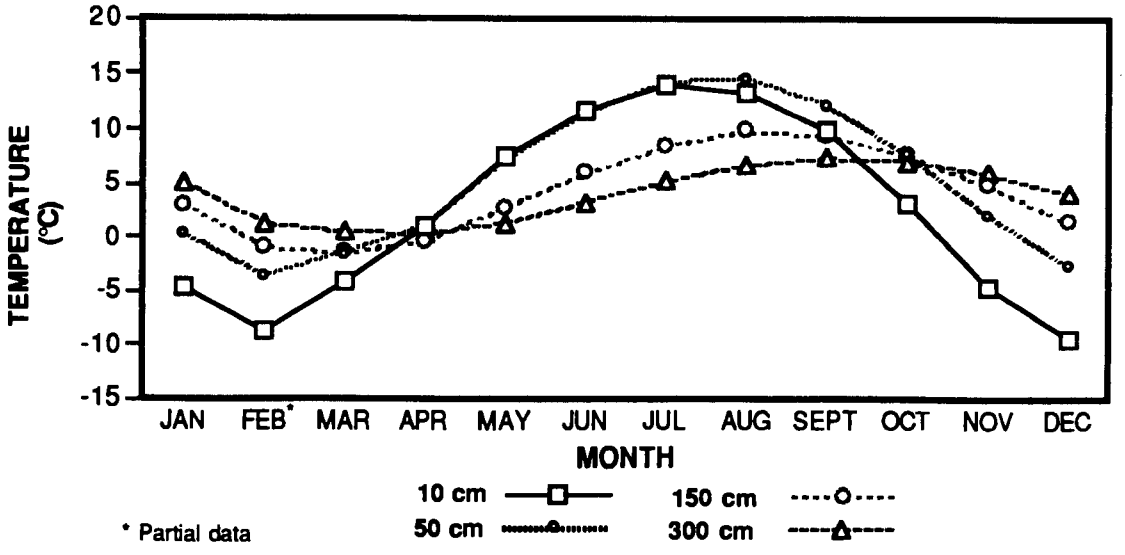
DATE	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
1	17:05	17:54	18:46	19:41	20:32	21:18	21:31	20:57	19:54	18:44	17:38	16:58
2	17:06	17:56	18:48	19:43	20:34	21:19	21:30	20:56	19:52	18:42	17:36	16:58
3	17:08	17:58	18:50	19:44	20:36	21:20	21:30	20:54	19:50	18:40	17:34	16:57
4	17:09	18:00	18:52	19:46	20:37	21:21	21:30	20:52	19:47	18:37	17:33	16:56
5	17:10	18:02	18:54	19:48	20:39	21:22	21:29	20:50	19:45	18:35	17:31	16:56
6	17:11	18:04	18:55	19:49	20:41	21:23	21:28	20:49	19:43	18:33	17:29	16:56
7	17:13	18:05	18:57	19:51	20:42	21:24	21:28	20:47	19:40	18:30	17:27	16:55
8	17:14	18:07	18:59	19:53	20:44	21:25	21:27	20:45	19:38	18:28	17:26	16:55
9	17:15	18:09	19:01	19:55	20:46	21:26	21:26	20:43	19:36	18:26	17:24	16:55
10	17:17	18:11	19:02	19:56	20:47	21:26	21:26	20:41	19:33	18:24	17:22	16:55
11	17:18	18:13	19:04	19:58	20:49	21:27	21:25	20:39	19:31	18:21	17:21	16:54
12	17:20	18:15	19:06	20:00	20:50	21:28	21:24	20:37	19:29	18:19	17:19	16:54
13	17:21	18:17	19:08	20:01	20:52	21:28	21:23	20:35	19:26	18:17	17:18	16:54
14	17:23	18:19	19:10	20:03	20:54	21:29	21:22	20:33	19:24	18:15	17:16	16:54
15	17:24	18:20	19:11	20:05	20:55	21:30	21:21	20:31	19:22	18:12	17:15	16:54
16	17:26	18:22	19:13	20:07	20:57	21:30	21:20	20:29	19:19	18:10	17:14	16:55
17	17:28	18:24	19:15	20:08	20:58	21:30	21:19	20:27	19:17	18:08	17:12	16:55
18	17:29	18:26	19:17	20:10	21:00	21:31	21:18	20:25	19:15	18:06	17:11	16:55
19	17:31	18:28	19:18	20:12	21:01	21:31	21:16	20:23	19:12	18:04	17:10	16:56
20	17:33	18:30	19:20	20:13	21:03	21:31	21:15	20:21	19:10	18:02	17:08	16:56
21	17:34	18:32	19:22	20:15	21:04	21:32	21:14	20:19	19:08	18:00	17:07	16:56
22	17:36	18:34	19:24	20:17	21:05	21:32	21:13	20:16	19:05	17:58	17:06	16:57
23	17:38	18:35	19:25	20:19	21:07	21:32	21:11	20:14	19:03	17:56	17:05	16:57
24	17:40	18:37	19:27	20:20	21:08	21:32	21:10	20:12	19:01	17:54	17:04	16:58
25	17:41	18:39	19:29	20:22	21:09	21:32	21:08	20:10	18:58	17:52	17:03	16:59
26	17:43	18:41	19:30	20:24	21:11	21:32	21:07	20:08	18:56	17:50	17:02	17:00
27	17:45	18:43	19:32	20:25	21:12	21:32	21:05	20:05	18:54	17:48	17:01	17:00
28	17:47	18:45	19:34	20:27	21:13	21:32	21:04	20:03	18:51	17:46	17:00	17:01
29	17:49		19:36	20:29	21:15	21:31	21:02	20:01	18:49	17:44	17:00	17:02
30	17:51		19:37	20:31	21:16	21:31	21:01	19:59	18:47	17:42	16:59	17:03
31	17:52		19:39		21:17		20:59	19:57		17:40		17:04

SASKATOON SRC CRS

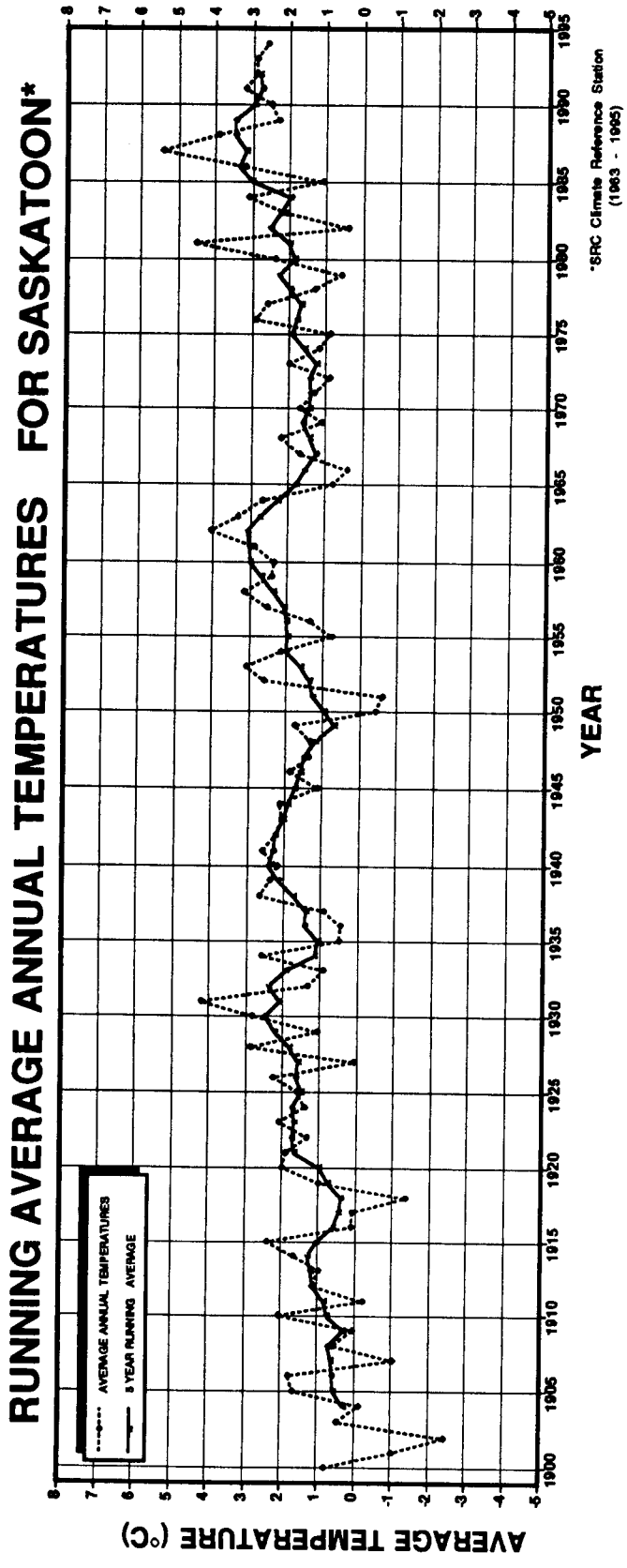
MONTHLY SOIL TEMPERATURES, 1994

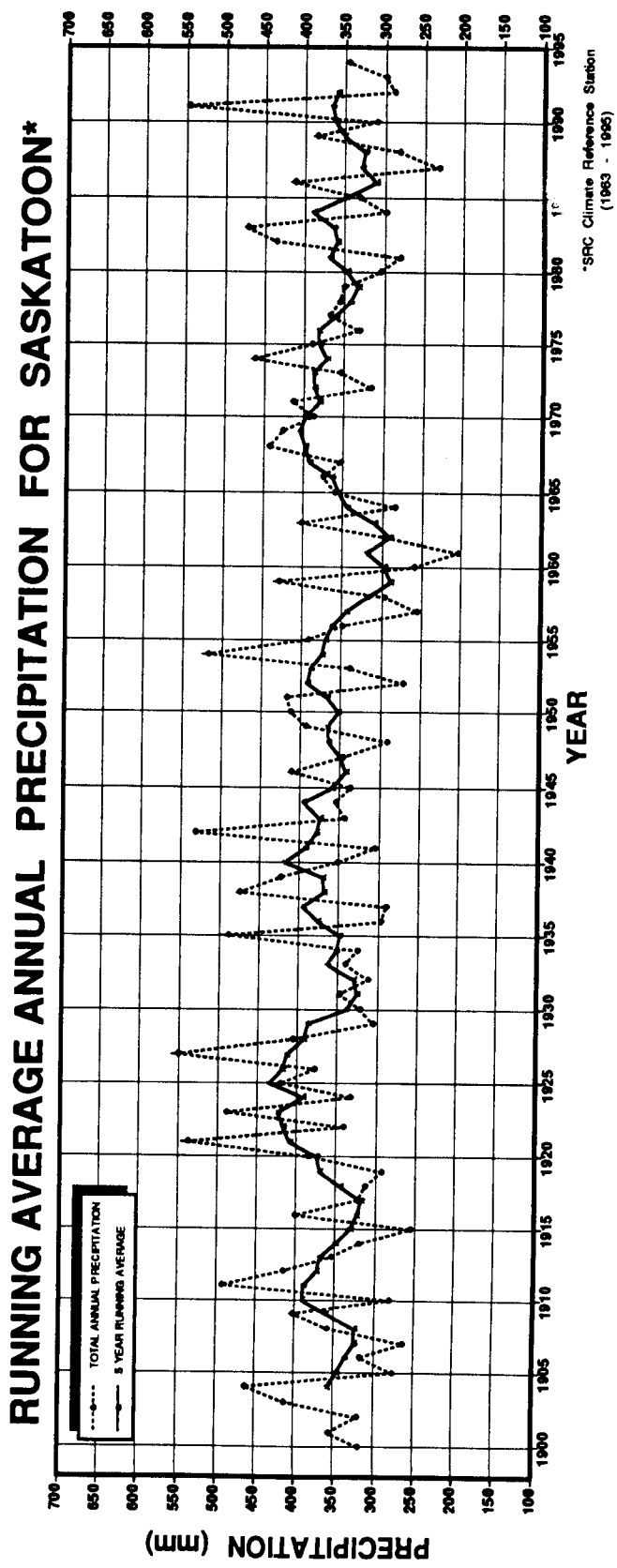






* Partial data


RUNNING AVERAGE ANNUAL TEMPERATURES FOR SASKATOON*
AVERAGE ANNUAL TEMPERATURES
5 YEAR RUNNING AVERAGE
AVERAGE TEMPERATURE (°C)
YEAR
*SRC Climate Reference Station (1963 - 1995)


RUNNING AVERAGE ANNUAL PRECIPITATION FOR SASKATOON*
TOTAL ANNUAL PRECIPITATION
5 YEAR RUNNING AVERAGE
PRECIPITATION (mm)
YEAR
*SRC Climate Reference Station (1963 - 1995)

GLOSSARY OF TERMS AND INSTRUMENTS USED AT SASKATOON SRC CRS

AVERAGE VALUE (1961-1990) In climatology it is often useful to make spatial comparisons of particular element values over a common time period. At an interior continental site such as Saskatoon, a period of 30 years is required to produce statistically stable estimates of the more variable elements. To facilitate spatial comparisons, the World Meteorological Organization recommends the standard normal (average) period January 1st, 1961 to December 31st, 1990 for data analysis. Data conform to this standard, except where noted.

BRIGHT SUNSHINE is the unobscured direct radiation from the sun, as opposed to the shading of a location by clouds or by other obstructions.

BRIGHT SUNSHINE - NUMBER OF DAYS is the total number of days in a given period where any value of bright sunshine was recorded.

BRIGHT SUNSHINE - PERCENTAGE POSSIBLE refers to the ratio of measured bright sunshine hours to total possible daylight hours in a given period, expressed as a percentage.

BRIGHT SUNSHINE - TOTAL is the sum of the daily bright sunshine values in hours and tenths of hours as recorded by an automatic sunshine recorder using voltaic cells.

DIFFUSE SOLAR RADIATION - TOTAL The instrument used is an Eppley pyranometer with a shade ring. (See GLOBAL SOLAR RADIATION -TOTAL)

EXTREME is the highest or lowest value of a particular element recorded during the period in question.

EXTREME ALL YEARS Temporal comparisons at a point are also of value in some types of climatic studies. Therefore, it is desirable to produce the maximum length of reliable climatic record to carry out studies over a period of time. Data are drawn from the following data sets:

Saskatoon SRC 1963 to 1994

Saskatoon U. of S. 1916 to 1963

Saskatoon 1892 to 1915

Station locations, exposures and measurement procedures were subject to change during this time period. Data presented in this column are <u>not adjusted</u> and users are cautioned accordingly.

FROST is recorded on each occasion when the daily minimum temperature is equal to or less than 0°C.

GLOBAL SOLAR RADIATION - TOTAL is the sum of the daily values of short wave solar radiation recorded during the period in question. Measurements are carried out on a horizontal surface at the ground and integrated over the whole celestial dome, summing the diffuse and direct components of the solar beam. The temperature-compensated Eppley pyranometer is used. The standard metric unit of measurement is the megajoule per square metre (MJ/m^2). (To facilitate comparison with past years' data: 1.0 MJ/m^2 = 23.895 langleys). Comparison is provided with a provisional average based on sixteen years of data (1975-1990).

GROWING DEGREE-DAY (GDD) is an index of the growing requirement in order for plant growth to proceed. The air temperature must exceed a critical value appropriate to the plant species in question. For many members of the grass family, including most commercial cereals grown on the prairies, a base temperature of 5.0°C has been established. On a specified day, the difference between the daily average temperature and the 5.0°C base temperature defines the number of growing degree-days. Mathematically:

GDD = (T - 5.0°C), for that day,

where T = daily mean temperature in °C

if T is equal to or less than 5.0°C, GDD = 0.

Daily GDD values are summed to provide totals for the appropriate month, growing season or year.

HEATING DEGREE-DAY (HDD) is an index of the heating requirement to achieve a stipulated comfort value in an indoor environment. For most purposes, a temperature of less than 18°C is considered uncomfortable and supplementary heating is required. On a specific day, the amount by which 18°C exceeds the daily average temperature defines the number of heating degree-days for that day. Mathematically:

HDD = (18°C - T), for that day,

where T = daily mean temperature in °C

if T is equal to or greater than 18°C, HDD = 0.

Monthly and annual values of HDD are obtained by summing daily values.

MONTHLY AVERAGE TEMPERATURE is the average of the daily average temperatures for the one month under consideration. In turn, the daily average temperature is defined as the arithmetic mean of the daily maximum temperature and the daily minimum temperature for the day in question.

NUMBER OF RECORDING YEARS Due to missing observations, faulty instrument calibration, lost records, etc., only partial data are available especially during the period 1892 - 1915. The number of years of useful record is therefore cited.

PEAK GUST SPEED refers to the highest instantaneous value recorded by the anemometer system for the period of reference, irrespective of direction and/or duration. Comparison is again with published data for Saskatoon Airport.

PRECIPITATION - TOTAL is the sum of the daily recorded rainfall and daily snowfall. The snowfall component of precipitation is recorded as an equivalent amount of liquid water. For particulars on precipitation measurement procedures and instruments, the reader is referred to the Atmospheric Environment Service publication *Manual of Climatological Observations*, second edition, January, 1978. The notation "T" in this column refers to a trace of precipitation (less than 0.2 mm water equivalent). As of August 7th, 1993, total precipitation was measured using the Belfort weighing gauge for the winter season and the tipping bucket during frost free periods.

PRECIPITATION DAY is recorded on occasions when the amount of precipitation in a 24-hour period equals or exceeds 0.2 mm water The so-called climatological day, beginning at 9 a.m. standard time on the date of reference and ending at 9 a.m. the next morning, was employed in record keeping for the month of January, 1994 only. On February 1st, 1994, after consultation with AES, record keeping was changed to the 24-hour period of 0000 hours - 2400 hours to conform to their reporting of climatological statistics. For this report the January data was re-evaluated to conform with the new time period. An asterisk (*) appearing in the average column denotes the occurrence of measurable precipitation on one or more occasions, and that the calculated 30-year average amounts to less than a trace.

SOIL TEMPERATURE under a short grass surface with normal accumulation, is measured according to procedures outlined in the AES publication "*Soil Temperature*" January lst, 1976. Depths below surface at which soil temperature measurements are made are: 5 cm, 10 cm, 20 cm, 50 cm, 100 cm, 150 cm and 300 cm. Only 10 cm, 50 cm 150 cm and 300 cm are reported in this report. Since soil temperature is affected by profile structure and water content, extrapolation of the measured data is difficult.

SUNRISE/SUNSET times have been included in this report. They have been calculated using the computer program "TONITE" by Leonard Abbey and compared against the sunrise/sunset tables in the "*Observer's Handbook*" published by The Royal Astronomical Society of Canada.

TEMPERATURE - AVERAGE ANNUAL is the average of the daily average temperatures for one year.

TEMPERATURE - AVERAGE MAXIMUM is the average of the daily maximum temperatures for one year or for the particular month in question. For details concerning measurement procedures, the reader is referred to the AES publication, " *Manual of Climatological Observations*", 2nd ed., January, 1978.

TEMPERATURE - AVERAGE MINIMUM is the average of the daily minimum temperatures averaged over the appropriate time periods. Refer to AVERAGE MAXIMUM TEMPERATURE concerning measurement procedures.

WIND SPEED - AVERAGE is the average of the hourly wind speeds for the period in question. Average hourly wind speeds are obtained from a RM Young Wind Monitor anemometer at a height of 10 m.

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