Climatic Perspectives

A WEEKLY REVIEW OF CANADIAN CLIMATE

FEBRUARY 3 ,1984 (Aussi disponible en français) VOL.6 NO.4

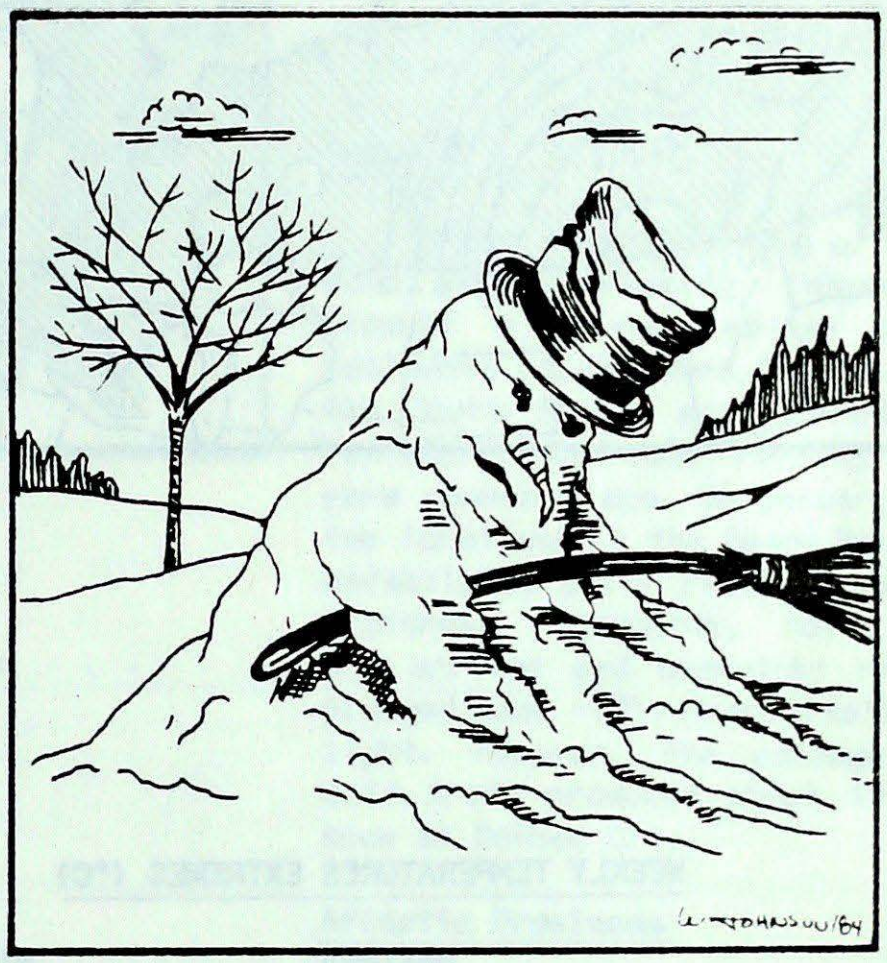
FOR THE PERIOD JANUARY 24-30, 1984

• January thaw takes the chill out of Canada's winter

Canadians enjoyed a break from the winter's bitter cold as the temperatures climbed above freezing from the Yukon to Newfoundland. Chinook winds blowing down out of the Rockies resulted in daytime readings in the low teens, but created threats of avalanches. On the East Coast, the sudden thaw resulted in ice jams in several rivers in Nova Scotia and contributed to widespread flooding near Truro.

The term, "January Thaw", is widely used in southern Ontario, southern Québec and New England to denote several days of mild, above-freezing weather after mid-month, both preceded and followed by a significant cold spell. It is popularly thought to occur in the vast majority of years and usually in the third week of January.

(Cont'd on Page 6)



(Temperature graphs of major cities page 7)

• Heavy rains plague both the East and West Coasts

• Above average snowfall in Eastern Canada page 3

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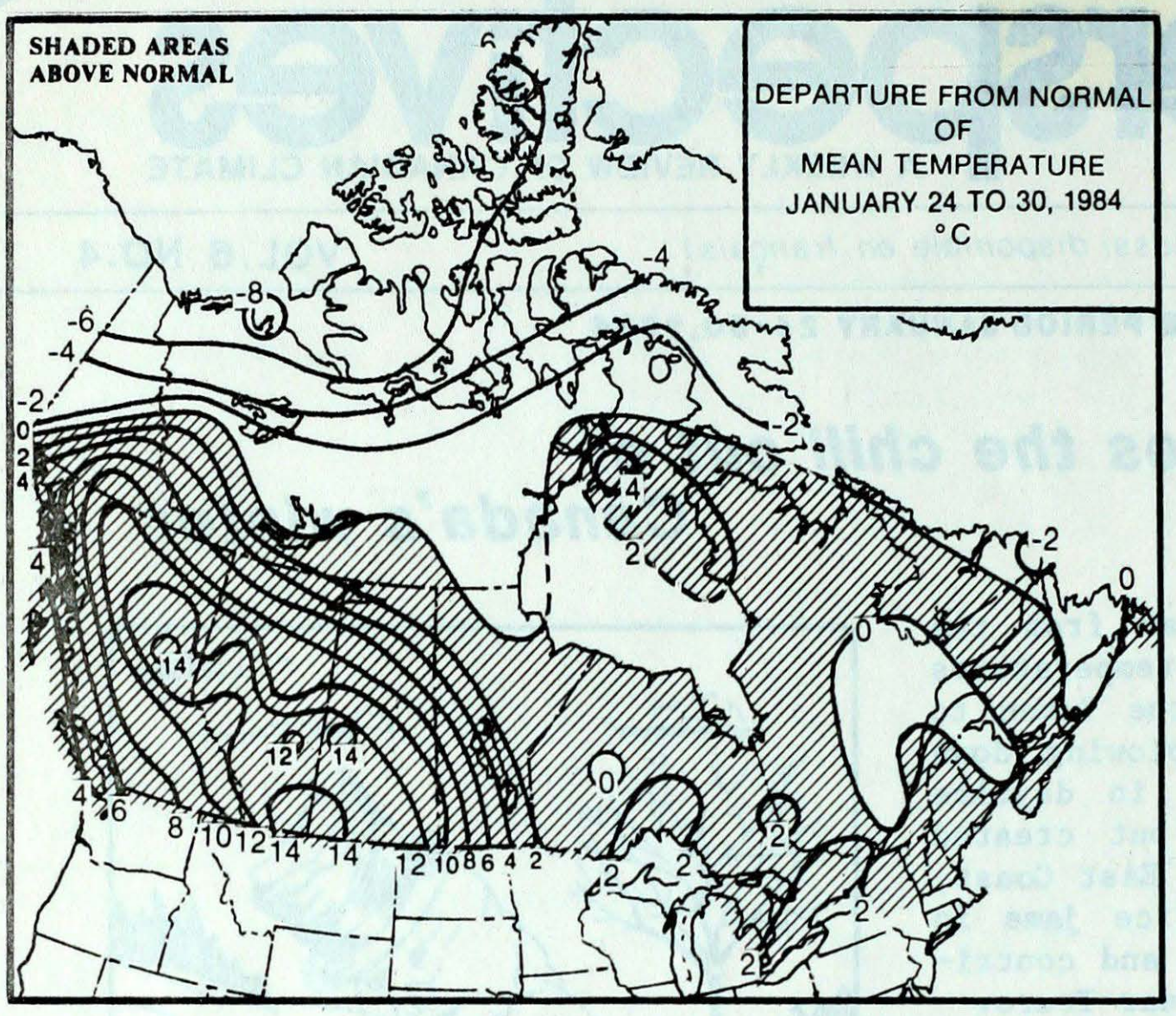
NOTE: The data shown in this publication are based on unverified reports from approximately 225 Canadian synoptic stations.

Canada



WEEKLY TEMPERATURES EXTREMES (°C)

	MAXIMUM		MINIMUM	
YUKON TERRITORY	3.7	Whitehorse	-52.0	Mayo
NORTHWEST TERRITORIES	-11.6	Fort Smith	-50.6	Gladman Point
BRITISH COLUMBIA	14.4	Lytton	-31.0	Fort Nelson
ALBERTA	12.8	Lethbridge	-40.1	High Level
SASKATCHEWAN	6.2	North Battleford	-42.5	Uranium City
MANITOBA	2.2	Gimli Portage la Prairie	-40.8	Thompson
ONTARIO	4.2	Windsor	-37.0	Moosonee
QUEBEC	4.9	Sherbrooke	-39.5	Schefferville
NEW BRUNSWICK	6.3	Chatham	-25.9	Charlo
NOVA SCOTIA	10.0	Sable Island	-22.1	Truro
PRINCE EDWARD ISLAND	5.0	Charlottetown	-18.0	Charlottetown
NEWFOUNDLAND	10.1	Argentia VTMS	-36.5	Churchill Falls

ACROSS THE NATION

Warmest mean temperature	7.2	Victoria, BC
Coolest mean temperature	-42.2	Eureka, NWT

ACROSS THE COUNTRY...

Yukon and Northwest Territories

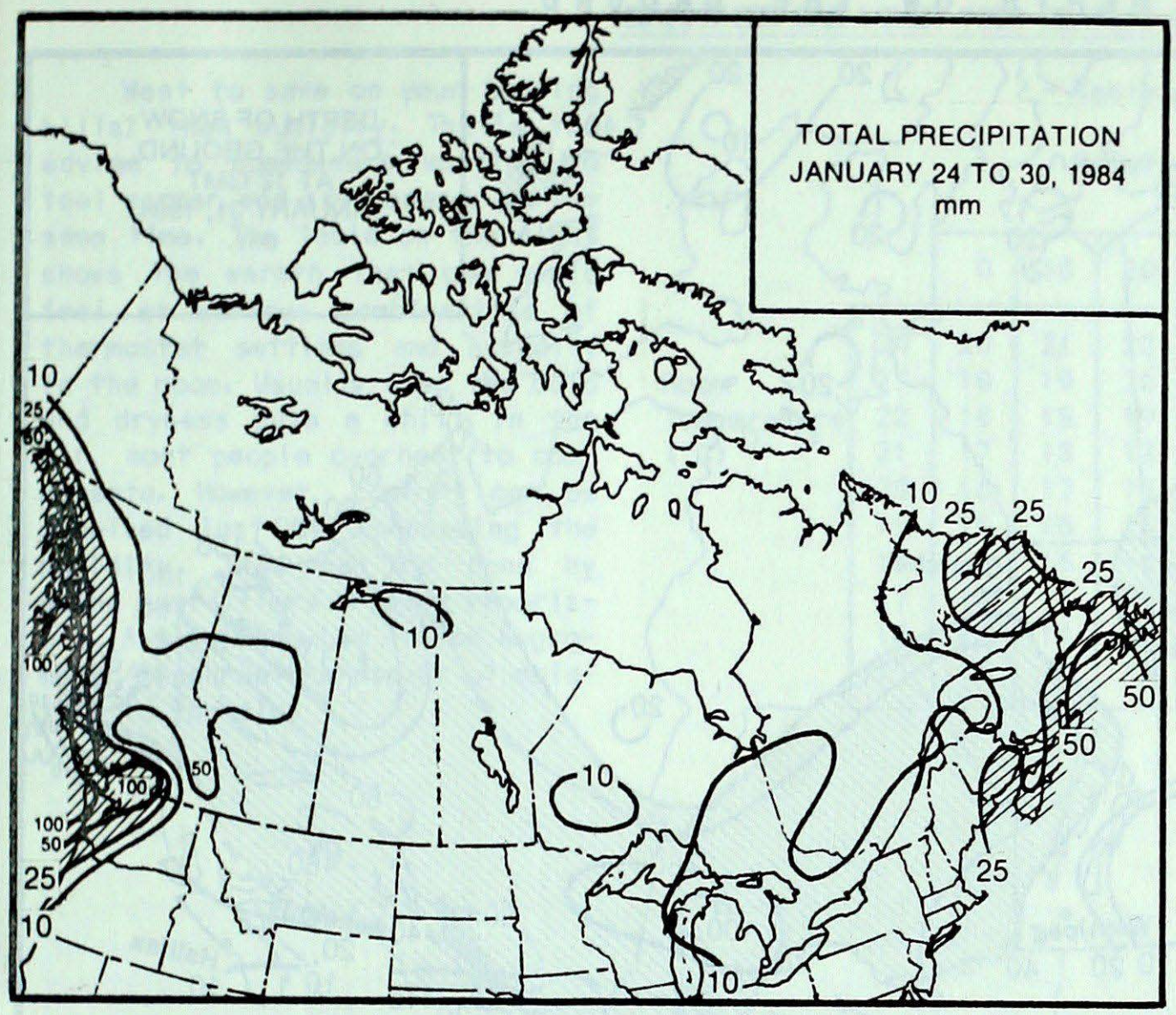
A drastic change occurred in the Yukon. Bitterly cold temperatures early in the week climbed to record-high values. In the cold air mass, many Yukon locations experienced minimums below -50°, and the wind chill factor became dangerously high. However, towards the weekend, warm Pacific air moved into the Yukon and the mercury rose to near 4° in the southern areas. Whitehorse established record-high temperatures of 1° and 3.4° on the 28th and 29th of January respectively. In the eastern Arctic, the temperatures averaged 5 to 8 degrees below normal. Precipitation was light almost everywhere, but Haines Junction had nearly 25 cm of snow.

British Columbia

An onshore flow of a mild and moist Pacific air mass allowed temperatures to remain at above normal values. Coastal areas were deluged with more than 100 mm of rain, but many parts of the interior received less than 10 mm. Balmy weather depleted the snow cover along the coastal mountains and several ski resorts had to close ski runs due to an inadequate snow base. Skiing conditions remain good in the interior due to a deep 200 cm snow base. The main CP Rail line near Golden was closed temporarily earlier this week because of mud slides.

Prairies

Most of Alberta was affected by strong Chinook winds blowing out of the mountains, accompanied by mild temperatures and variably sunny skies. Daytime readings rose to the low double digit values breaking numerous long standing temperatures records. The mercury at Lethbridge climbed to 13° on January 28, breaking the old record of 12° set in 1906. The much above normal temperatures prompted the issuance of avalanche warnings for the back-country. In the East, sunny and cold weather gave way to a moderating trend and increased cloud cover. By mid-week many high temperature records were set.



HEAVIEST WEEKLY PRECIPITATION (mm)

YUKON	25.0	Haines Junction
NORTHWEST TERRITORIES	12.2	Fort Simpson
BRITISH COLUMBIA	149.5	Port Hardy
ALBERTA	18.4	Whitecourt
SASKATCHEWAN	12.4	Collins Bay
MANITOBA	11.4	Norway House
ONTARIO	20.0	Mount Forest
QUEBEC	30.6	Blanc Sablon
NEW BRUNSWICK	57.6	Saint John
NOVA SCOTIA	61.4	Sydney
PRINCE EDWARD ISLAND	22.1	Charlottetown
NEWFOUNDLAND	101.2	Burgeo

A Look at This Winter's Snowfall

Seasonal snowfall accumulations till the end of January, as per cent of normal, at some Canadian locations stack up as follows:

Edmonton	82%
Calgary	73%
Winnipeg	42%
Toronto	122%
Montréal	134%
Saint John	93%
Halifax	128%

Ontario

A brief January thaw produced balmy temperatures throughout most of the Province. During mid-week, daytime readings remained above freezing at many southern locations. However, more snow accompanied the mild weather adding to the already above-normal amounts. For example in Toronto, season snowfall to the end of January was 22 per cent more than normal. With nearly 110 cm of snow on the ground, Timmins was the snowiest place in Ontario. Owing to the ample snow cover, outdoor winter recreation was described as excellent. Also Ontario's "Winter Carnival" was in full swing.

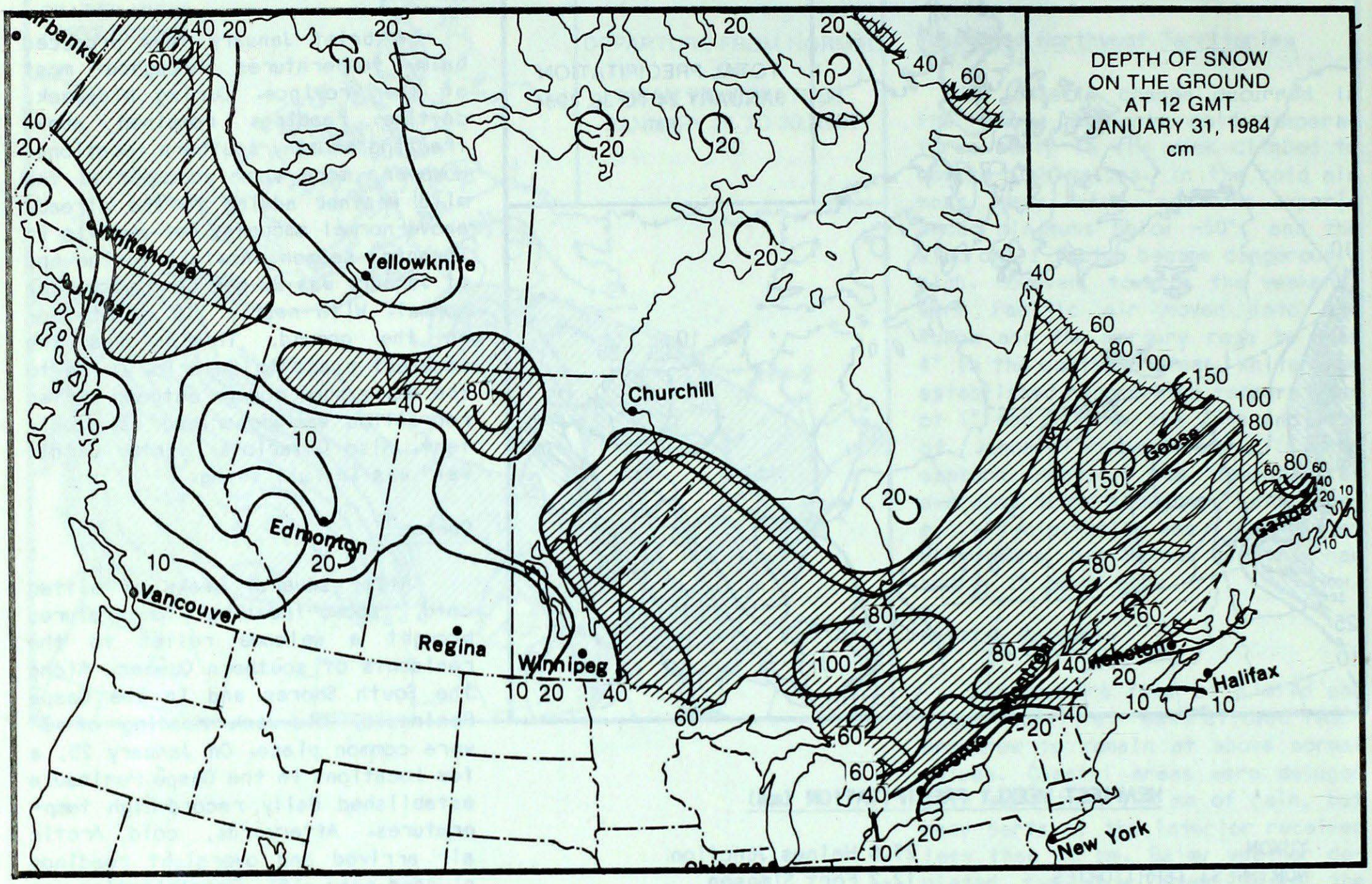
Québec

After several weeks of bitter cold, above-freezing temperatures brought a welcome relief to the residents of southern Québec. Along the South Shores and in the Gaspé Peninsula, mid-week reading of 3° were common place. On January 25, a few locations in the Gaspé Peninsula established daily record-high temperatures. Afterwards, cold Arctic air arrived and overnight readings plunged near -18°. Precipitation was light. However, the passage of a cold front produced about 10 cm of snow at Québec City.

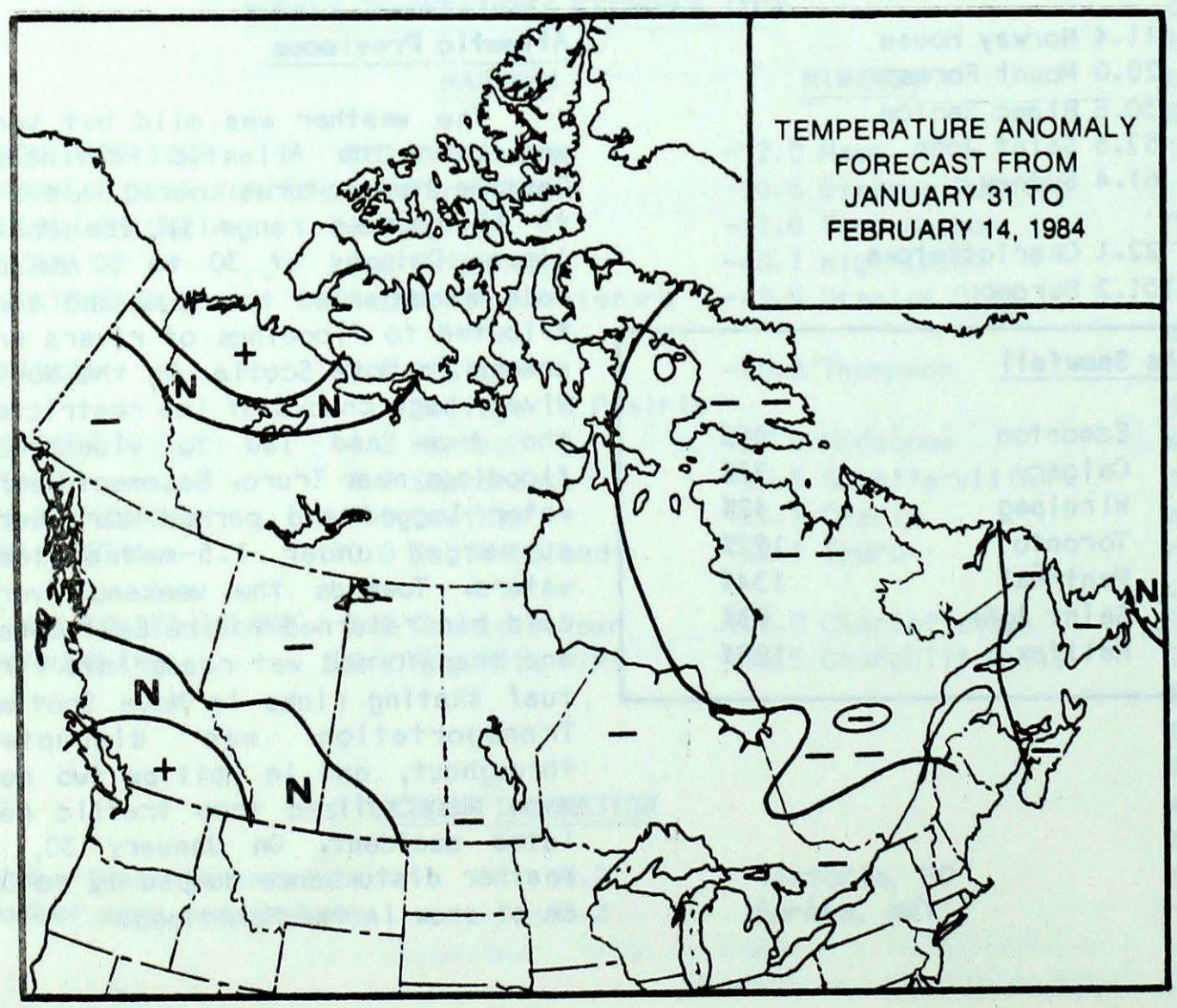
Atlantic Provinces

The weather was mild but very wet over the Atlantic Provinces. Daytime temperatures soared in the 8 to 10 degrees range in the Maritimes. Deluges of 30 to 50 mm of rain accompanied the thaw and contributed to floodings of rivers and creeks in Nova Scotia. On the North River, huge chucks of ice restricted the flow and led to widespread floodings near Truro. Basements were water logged and parked cars were submerged under 1.5-metre deep waters. Towards the weekend, very cold air returned to the East Coast and transformed wet roads into virtual skating rinks in Nova Scotia. Transportation was disrupted throughout, and in Halifax two men were hospitalized from traffic related accident. On January 30, a weather disturbance dumped 12 to 30 cm of snow in the Maritimes.

SNOW DEPTH ON THE GROUND



TEMPERATURE ANOMALY FORECAST



Temperature Anomaly Forecast

The temperature anomaly forecast, for each of the 70 Canadian stations, is prepared by searching historical weather maps to find cases similar to the present one. The principle used is that a prediction for the next 15 days may be based on what is known to have actually happened during 15-day periods. After the five best cases are selected, the surface temperature anomalies are calculated. This results in five separate forecasts, which are averaged to provide the forecast depicted.

++ much above normal

+ above normal

N normal

- below normal

-- much below normal

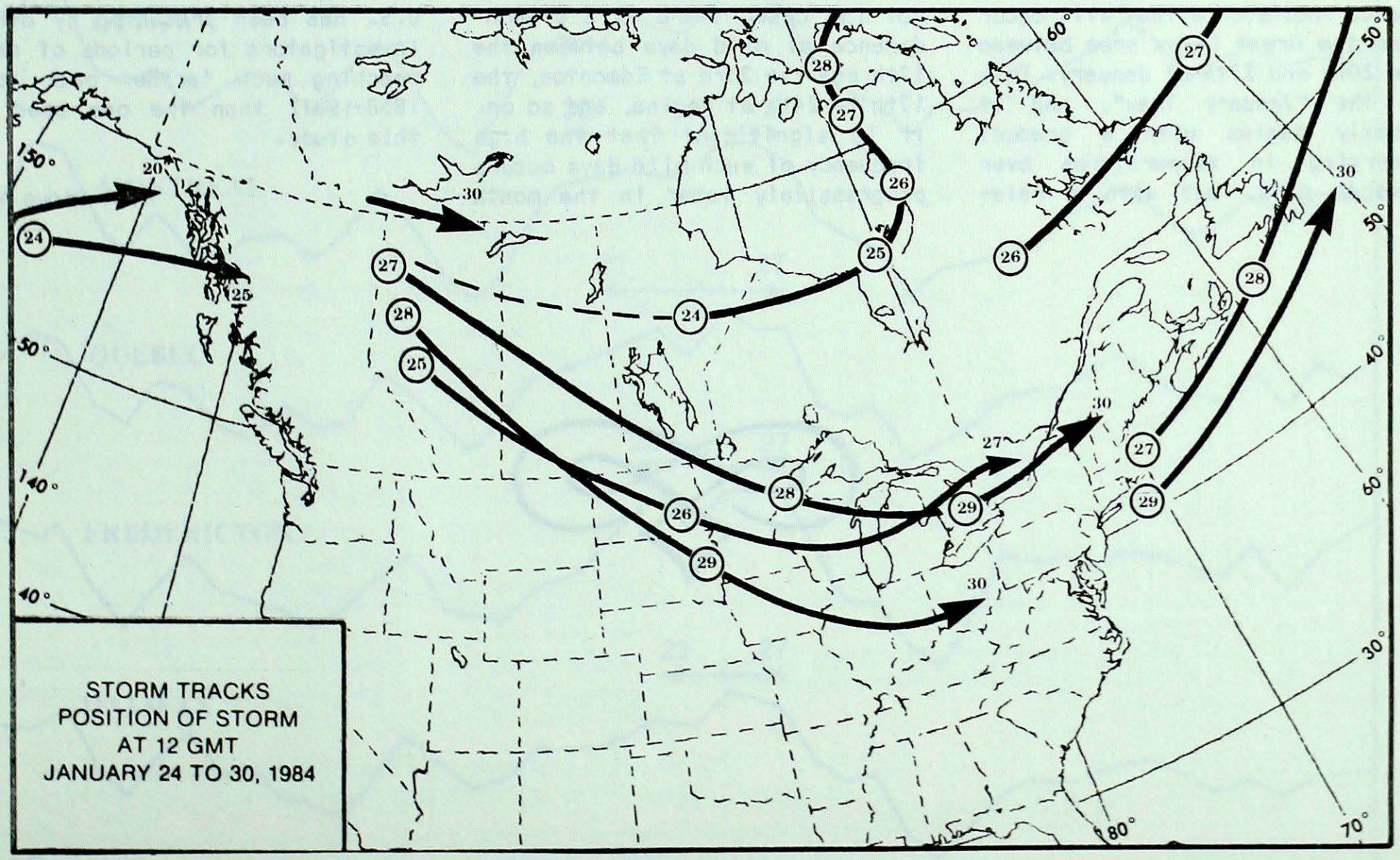
HUMIDIFIER CAN LOWER YOUR HEATING COSTS

Want to save on your heating bills? then humidify. That's the advice to homeowners wanting to feel warmer and save energy at the same time. The table on the right shows the warmth that one would feel at various combinations of thermostat settings and humidity in the room. Usually when the cold and dryness puts a chill in the air, most people overheat to compensate. However, comfort can be acheived just by increasing the humidity. This can be done by using humidifiers or even vaporizers. A simple device called hygrometer measures the amount of moisture in the air.

- Table provided by NOAA -

Room Temperature (°C)	Relative Humidity (%)										
	0	10	20	30	40	50	60	70	80	90	100
24	20	21	22	22	23	24	24	24	25	26	26
23	18	19	20	21	22	22	23	23	24	24	25
22	18	18	19	20	21	22	22	23	23	24	24
21	17	18	18	19	19	20	21	21	22	22	23
20	16	17	17	18	18	19	19	20	21	21	22
19	15	16	16	17	17	18	18	19	19	19	20
18	14	15	16	16	16	17	17	18	18	18	19
17	14	14	15	15	16	16	17	17	17	18	18
16	13	14	14	14	15	15	16	16	16	16	17
15	13	13	13	14	14	14	15	15	16	16	16

STORM TRACKS



JANUARY THAW

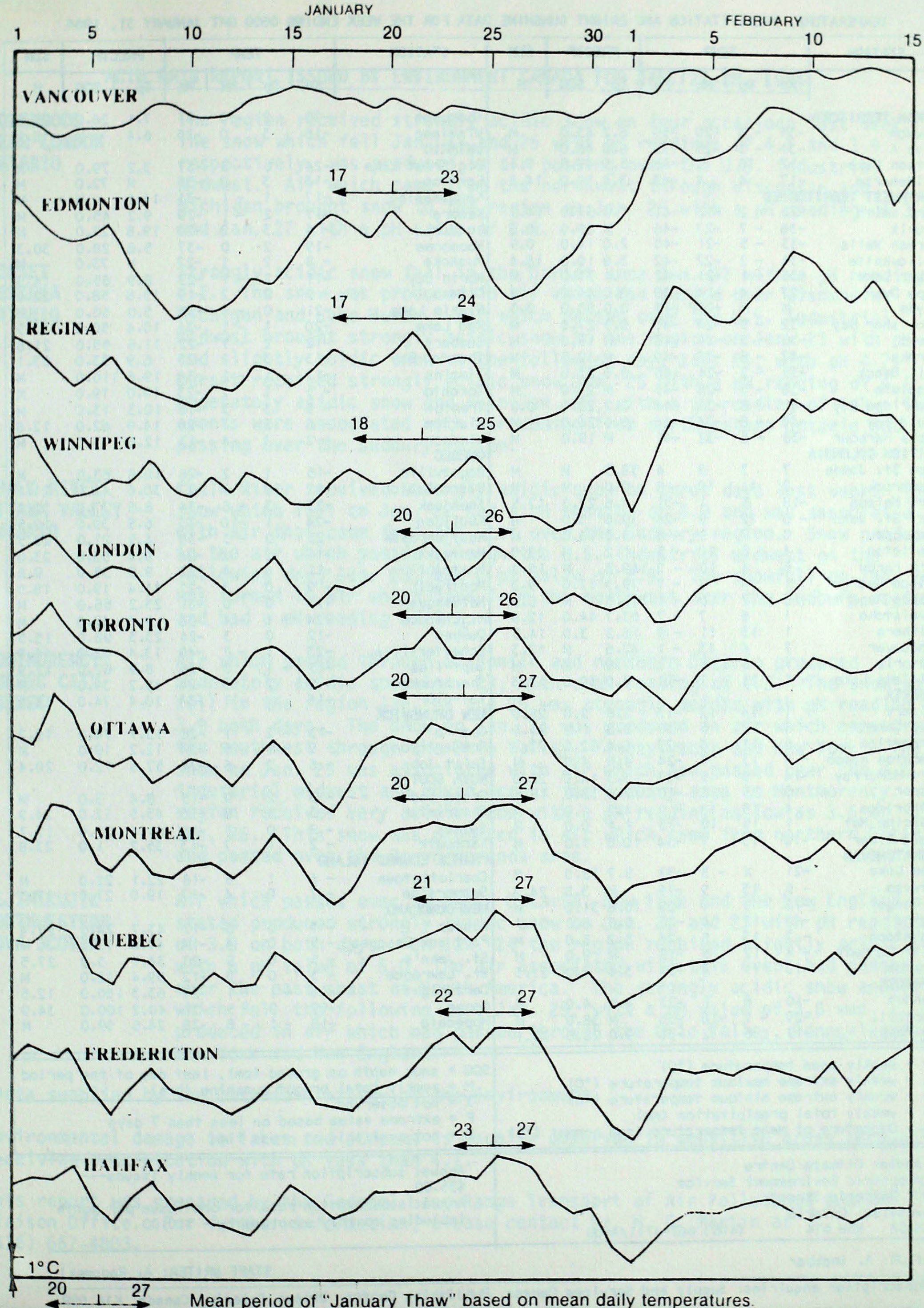
In reality, the "January Thaw" has indeed a strong statistical basis. January weather of course does vary significantly from year to year in most parts of the temperate latitudes, and the Great Lakes basin. New England and southern Québec are not exceptions. While January temperatures can range from persistently mild to persistently cold, most are characterized by periods of cold weather interpersed by one or more days of mild conditions with temperatures close to or above the freezing point. Many of these "thaws" are temporary, caused by warm sectors of travelling disturbances that normally progress in an easterly direction across North America every few days. Such "thaws" may last from a few hours to a day or two. Every so often, usually once or twice a month, the cold-weather regime breaks down, and mild air covers eastern Canada and the U.S. for several days in a row. Such a significant thaw might typically last from two or three days to a week, but rarely longer. While such a phenomenon can occur any time during the winter, there is indeed a strong chance that such a thaw will occur over the Great Lakes area between the 20th and 27th of January. This is the "January Thaw", and it usually begins with a gradual upsurging in temperatures over several days, but with a relatively sudden drop to below-normal conditions at its close.

The accompanying diagram shows a plot of mean daily temperatures for the 30-year period, 1951-1980, from the beginning of January to the middle of February for a number of cities across Canada. These figures are unsmoothed, and there is considerable variation from day to day. This statistical "noise" is common to all such data, and is caused by the relatively short 30-year period used in the calculations. The coldest time of the year is thus toward the end of January, after which the increasing length of day and the power of the sun's rays serve to raise temperatures significantly at most localities. What is amazing is that at all stations except Vancouver, there is on the average a very mild period showing up after mid-January. One would normally expect that mild spells, whether of the short-duration or long-duration type, would occur randomly throughout the month over such a period of years, so that the likelyhood of occurrence of a mild day could be roughly the same for any day in the month. Such is not the case. There is a preponderance of mild days between the 17th and the 23rd at Edmonton, the 17th to 24th at Regina, and so on. It is significant that the high frequency of such mild days occurs progressively later in the month as one travels eastward across Canada.

The cause of the "January thaw" is the breakdown in the prevailing northwesterly steering flow across west-central North America at high altitudes in the atmosphere. Normaly such a flow causes frequent cold outbreaks of Arctic air to stream southward and eastward across the continent. Every so often, this steering currently becomes more westerly, or even southwesterly, and mild Pacific air spreads eastward across Canada, often beginning in Alberta accompanied by a "chinook", and reaching the Great Lakes several days later. While this westerly steering flow may last several days, it inevitably shifts in due course to northwest again, allowing the Arctic air to surge southward and eastward.

While the mechanism causing the "January Thaw" is understandable it remains an enigma just why this phenomena so often occurs at roughly the same time of the month during so many of the years. It should also be noted that statistically significant evidence for Januaray Thaws in the northeastern U.S. has been presented by other investigators for periods of data reaching much farther back (eg. 1858-1981) than the one used in this study.

R.B. Crowe



Mean period of "January Thaw" based on mean daily temperatures.

TEMPERATURE, PRECIPITATION AND BRIGHT SUNSHINE DATA FOR THE WEEK ENDING 0600 GMT JANUARY 31, 1984

STATION	TEMP				PRECIP		SUN
	Av	Dp	Mx	Mn	Tp	SOG	H
YUKON TERRITORY							
Dawson	-35	- 6	-20	-50	6.2	43.0	M
Mayo A	-31	- 3	-15	-52	6.8	46.0	M
Watson Lake	-17	10	3	-41	5.9	49.0	9.4
Whitehorse	-17	4	4	-43	3.4	19.0	14.3
NORTHWEST TERRITORIES							
Fort Smith	-26	2	-12	-41	7.6	37.0	14.9
Inuvik	-36	- 7	-27	-46	M	69.0	0.0
Norman Wells	-33	- 5	-21	-40	2.0	14.0	0.9
Yellowknife	-31	- 2	-22	-42	3.8	10.0	16.4
Baker Lake	-36	- 1	-25	-42	1.1	31.0	M
Cape Dyer	-27	- 4	-14	-39	0.0	44.0	M
Clyde	M	M	-25P	-43	0.0	80.0	0.0
Frobisher Bay	-32	- 5	-24	-41	0.5	27.0	M
Alert	-36	- 5	-24	-43	M	19.0	M
Eureka	-42	- 6	-32	-49	M	19.0	M
Hall Beach	-35	- 2	-24	-46	0.0	23.0	M
Resolute	-38	- 5	-28	-45	M	25.0	M
Cambridge Bay	-41	- 8	-36	-44	0.2	23.0	0.0
Mould Bay	-40	- 8	-34	-46	0.0	26.0	M
Sachs Harbour	-36	- 6	-32	-41	M	19.0	M
BRITISH COLUMBIA							
Cape St. James	7	3	9	4	58.5	M	M
Cranbrook	2	11	10	- 8	0.0	M	M
Fort Nelson	-18	5	1	-31	7.6	27.0	17.5
Fort St. John	- 6	12	9	-26	9.6	3.0	M
Kamloops	0	7	9	- 8	5.0	10.0	M
Penticton	4	8	10	- 5	1.2	M	19.0
Port Hardy	6	4	10	- 2	149.5	M	15.0
Prince George	1	14	7	- 7	19.3	17.0	9.3
Prince Rupert	6	7	10	- 1	110.6	M	6.2
Revelstoke	1	6	7	- 7	53.7	44.0	12.9
Smithers	1	13	11	- 9	16.2	3.0	14.0
Vancouver	7	4	13	- 1	42.6	M	12.3
Victoria	7	5	14	- 1	7.8	M	M
Williams Lake	- 1	11	7	-11	8.0	30.0	17.3
ALBERTA							
Calgary	1	14	12	-13	2.6	2.0	28.0
Cold Lake	- 8	12	6	-30	8.8	M	21.4
Coronation	- 6	11	6	-25	6.4	22.0	23.7
Edmonton Namao	- 4	13	7	-24	4.6	4.0	M
Fort McMurray	-14	9	5	-33	5.3	14.0	20.0
Jasper	0	13	6	-10	7.8	18.0	18.6
Lethbridge	4	15	13	- 9	4.2	1.0	M
Medicine Hat	1	15	10	-15	1.4	0.0	M
Peace River	-10	13	7	-34	10.8	5.0	M
SASKATCHEWAN							
Cree Lake	-21	X	- 3	-37	5.7	18.0	M
Estevan	- 5	13	5	-19	M	3.0	24.2
La Ronge	-16	7	1	-29	10.8	31.0	M
Regina	- 6	12	4	-20	5.6	6.0	31.7
Saskatoon	- 7	13	5	-26	3.2	5.0	M
Swift Current	- 4	12	5	-19	M	9.0	M
Yorkton	-10	11	4	-24	3.4	4.0	21.3
MANITOBA							
Brandon	-10	8	1	-23	4.0	4.0	M
Churchill	-29	- 1	-18	-35	M	38.0	M
The Pas	-17	6	2	-31	9.0	28.0	23.1
Thompson	-25	2	-10	-41	7.1	36.0	23.6
Winnipeg	-16	3	0	-25	6.4	M	18.2
ONTARIO							
Big Trout Lake	-24	0	- 3	-37	3.2	79.0	M
Earlton	-13	3	0	-35	M	72.0	M
Kapuskasing	-17	1	- 1	-31	14.1	M	M
Kenora	-17	2	- 1	-29	9.2	45.0	M
London	- 4	3	2	-20	19.8	22.0	M
Moosonee	-19	2	0	-37	5.6	28.0	30.3
Muskoka	- 8	2	1	-27	M	73.0	M
North Bay	-11	2	- 1	-23	8.9	65.0	14.9
Ottawa	- 9	2	2	-19	15.6	58.0	22.0
Pickle Lake	-21	0	- 4	-35	5.0	66.0	M
Red Lake	-20	1	- 1	-34	10.4	50.0	13.5
Sudbury	-12	2	- 1	-22	11.6	55.0	21.8
Thunder Bay	-13	3	1	-25	6.9	33.0	33.1
Timmins	-17	- 1	- 1	-34	19.6	110.0	M
Toronto	- 5	1	2	-23	19.0	19.0	M
Trenton	- 5	3	3	-18	10.3	13.0	M
Wiarton	- 6	2	1	-20	14.9	62.0	12.8
Windsor	- 2	3	4	-13	12.6	7.0	M
QUEBEC							
Bagotville	-15	1	2	-26	10.8	63.0	M
Blanc-Sablon	-12	0	1	-27	30.6	42.0	21.1
Inukjuak	-23	3	- 6	-34	8.6	27.0	11.2
Kuujjuaq	-24	1	-10	-35	6.8	39.0	12.5
Kuujjuarapik	-23	0	- 3	-39	4.5	21.0	22.5
Maniwaki	-11	2	2	-28	9.4	53.0	23.0
Mont-Joli	-11	0	4	-22	9.8	38.0	9.6
Montréal	- 9	0	3	-21	11.4	19.0	18.5
Natashquan	-13	0	0	-31	23.2	56.0	M
Nitchequon	-24	- 1	- 4	-36	9.3	42.0	M
Québec	-12	0	3	-24	23.3	98.0	15.5
Schefferville	-23	1	- 7	-40	13.4	62.0	16.9
Sept-Iles	-15	- 1	0	-26	8.9	62.0	17.9
Sherbrooke	- 9	2	5	-24	15.2	39.0	M
Val-d'Or	-16	1	- 1	-34	10.4	74.0	18.5
NEW BRUNSWICK							
Charlo	-13	- 2	1	-26	13.7	74.0	19.2
Fredericton	- 9	- 1	5	-24	12.2	19.0	M
Saint John	- 6	2	6	-24	57.6	12.0	20.4
NOVA SCOTIA							
Greenwood	- 3	2	9	-15	8.4	3.0	M
Shearwater	- 3	1	8	-16	45.5	12.0	24.9
Sydney	- 5	0	7	-16	61.4	21.0	17.7
Yarmouth	- 2	1	7	-13	35.2	1.0	23.8
PRINCE EDWARD ISLAND							
Charlottetown	- 6	1	5	-18	22.1	22.0	M
Summerside	- 7	0	4	-17	19.0	27.0	17.3
NEWFOUNDLAND							
Gander	- 7	0	6	-17	43.7	24.0	27.4
Port aux Basques	- 5	0	4	-14	47.0	13.0	M
St. John's	- 5	0	9	-20	34.1	3.0	27.5
St. Lawrence	- 3	0	8	-12	59.4	12.0	M
Cartwright	-15	- 1	- 1	-27	63.3	150.0	12.5
Goose	-17	0	- 5	-31	40.2	100.0	34.9
Hopedale	-18	- 1	- 8	-28	24.6	99.0	M

Av = weekly mean temperature (°C)
Mx = weekly extreme maximum temperature (°C)
Mn = weekly extreme minimum temperature (°C)
Tp = weekly total precipitation (mm)
Dp = Departure of mean temperature from normal (°C)

SOG = snow depth on ground (cm), last day of the period
H = weekly total bright sunshine (hrs)

X = not observed
P = extreme value based on less than 7 days
M = not available at press time

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ACID RAIN REPORT ISSUED BY ENVIRONMENT CANADA FOR JAN. 22-28, 1984

LONGWOODS NEAR LONDON ONTARIO

The region received strongly acidic snow on four occasions last week. The snow which fell Jan. 23 and 26 with pH readings of 4.1 and 3.9 respectively, was produced in air passing over the U.S. industrial midwest. Air which came from the northwest through Wisconsin and Michigan brought snow to the region on Jan. 25 with a pH reading of 3.9 and Jan. 27 with a pH value of 3.8.

DORSET MUSKOKA ONTARIO

Strongly acidic snow fell in the Dorset area Jan. 22 with a pH reading of 4.1. The snow was produced in air which had passed over Wisconsin, Michigan and Lake Huron. Air which passed over the U.S. industrial midwest brought strongly acidic snow to the region on Jan. 23 with pH 4.3 and slightly acidic snow on the following day, Jan. 24, with pH 4.7. Dorset received strongly acidic snow Jan. 25 with a pH reading of 4.1 and moderately acidic snow and rain Jan. 26, with a pH reading of 4.3. These events were associated with air coming from northwestern Ontario and passing over the Sudbury region.

CHALK RIVER OTTAWA VALLEY ONTARIO

Chalk River received strongly acidic snow on three days last week. The snow which fell on Jan. 22 had a pH reading of 4.0 and was associated with air that came from the west over the Sudbury region. Snow produced in the air which passed through the U.S. industrial midwest on the following day, Jan. 23, had a pH value of 3.9. The snowfall on Jan. 26 was formed in air which came from the northwest over the Sudbury region and had a pH reading of 4.2.

MONTMORENCY QUEBEC CITY QUEBEC

Air which passed through Wisconsin and northern Ontario produced moderately acidic snow Jan. 23, with a pH reading of 4.5. The snow which fell in the region Jan. 24 and 25 was strongly acidic with pH reading of 3.9 both days. The snow on Jan. 24 was produced in air which came from the southwest through the Ohio Valley, Pennsylvania and New York. The snow on Jan. 25 was associated with air which had passed over the U.S. industrial midwest and moved across the Sudbury area to Montmorency. The region received very acidic snow with a pH reading as low as 3.6 on Jan. 26. This snow was produced in air which came from northern Ontario and passed over the Rouyn/Noranda area.

KEJIMIKUJIK SOUTHWESTERN NOVA SCOTIA

Air which passed over southern Ontario, New York and the New England states produced strongly acidic snow on Jan. 22 and 23 with pH readings of 3.9 on both days. On Jan. 24 the region received slightly acidic snow with a pH value of 5.0. The air associated with this event had passed over the east coast of North America. The strongly acidic snow and rain which fell the following day, Jan. 25, with a pH value of 3.8 was produced in air which had passed through the Ohio Valley, Pennsylvania, New York and New England.

*Data supplied by the Ontario Ministry of the Environment.

Environmental damage to lakes and streams is usually observed in sensitive areas regularly receiving precipitation with pH less than 4.7.

This report was prepared by the Federal Long Range Transport of Air Pollutants (LRTAP) Liaison Office. For further information, please contact Dr. H. C. Martin at (416) 667-4803.