How about 1978 . . . wet, dry or more normal?

CONTINUED FROM PAGE 3

Q. Isn't it true that some scientists contend that patterns of urbanization, farming and forestry practices along with air pollution can all influence local weather?

A. That's right. It can locally. The big question of course is that it can change temperatures, but can it change rainfall. Some of the city areas seem to show a tendency for more rainfall because the pollution particles seem to act as the nuclei for clouds and they think that some of the large cities are showing abnormalities of rainfall because of the amount of pollution locally. But it is kind of hard to prove unless you look at the long time trend to see if it's peculiar for that city's area and not to the surrounding area.

Q. Any personal feelings about weather modification and "cloud seeding?"

A. Well, I think it's to be proved yet. I think the men are making an effort to find out. We just don't know enough about the clouds to be able to predict it. There's a lot to learn about clouds and it's a lot different out here in the plains than it is in the mountain area. There, where you have moisture going up slopes, you can seed it and the moisture increases because you do always have moisture available. But out here, it's a little different.

Q. What have the cloud seeders been able to prove?

A. The six percent increase which the weather modification division in Pierre said they had for the four years we had a state plan is rather a small amount compared to what they started out. They thought they could show 10 to 15 percent increase and I don't think that six percent shows up in crop increases or anything. Of course the seeding opportunities when you have drought your weather modification is not the answer because if you don't have clouds, there's no way weather modification can increase rain.

Q. If we had a weather modification plan this past year, they certainly would be heroes wouldn't they?

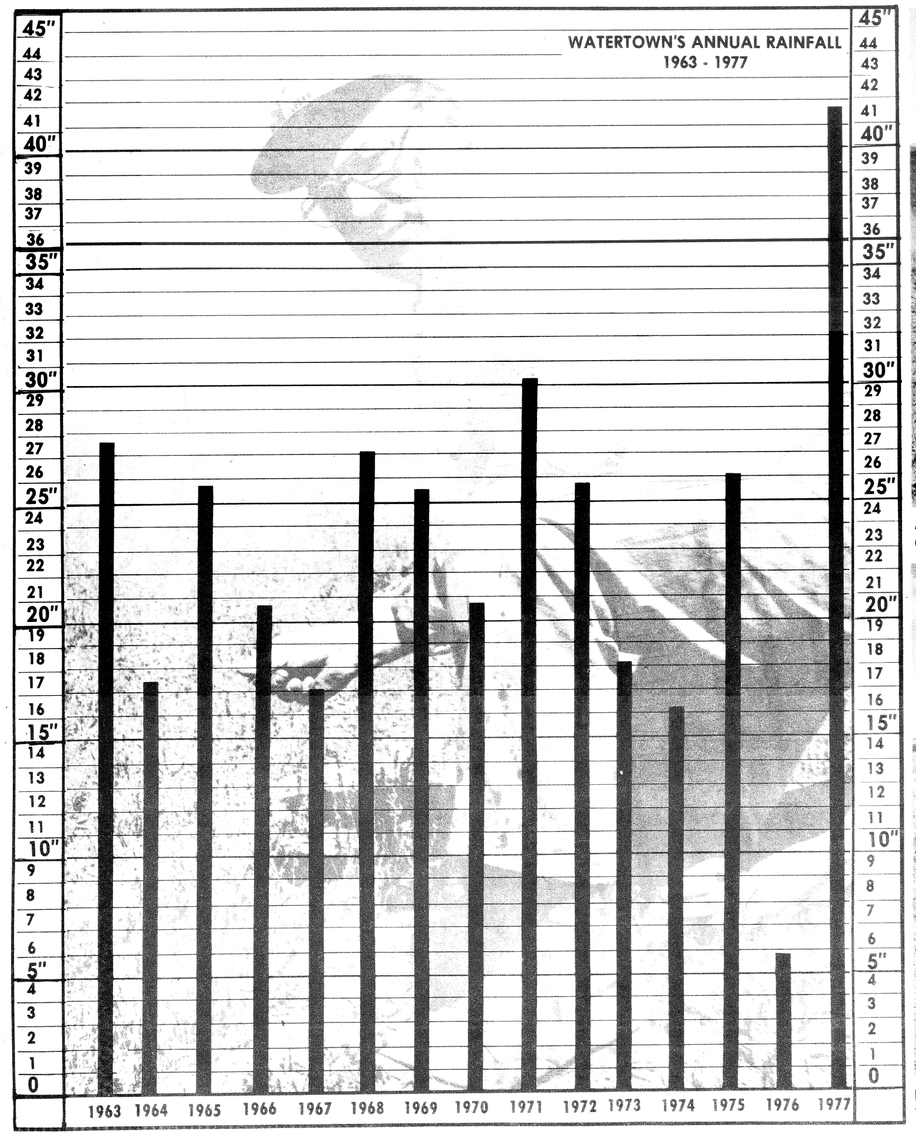
A. Yes, they would, but we didn't have any!

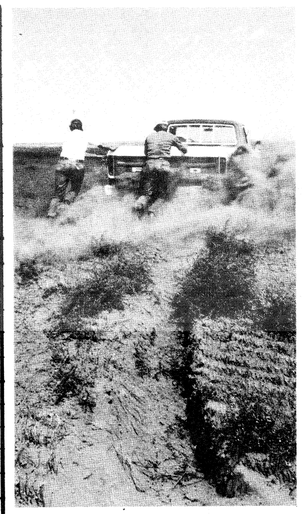
Q. 1976 was the driest year on record and 1977 was the wettest on record — what do you forecast for 1978?

A. It looks from the way the pattern continues to be opened up, we would have somewhere near normal rainfall or above. But for the whole season that's really an estimate. I can say up until next spring it looks good, but we really just don't know enough about forecasting a year ahead of time to have any confidence in it.

Thank you Mr. Lytle, and a happy 1978.

THINK RAIN
SD. DEPT. OF AG.





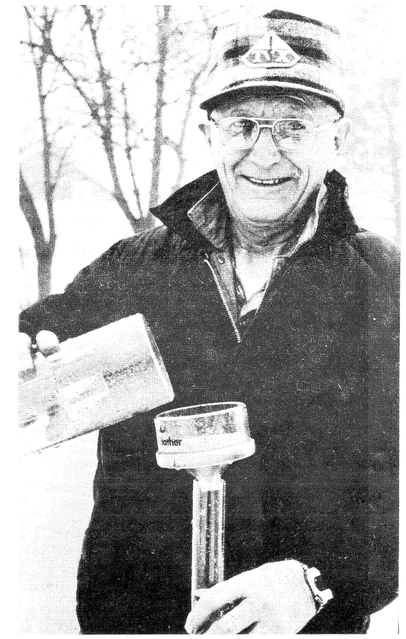
A flax field produced only "clouds of dust" in 1976 . . .

Plowing up the "crumbled dust" in this 1976 wheat field.

Back to back records . . . 1976=10.74. 1977=41.76 . . .

Is The Drought Broken?

PO Special Feature by John Lowrie



Perhaps it's too early to say.

But what a glorious, God given year was 1977. Time to give thanks for the most abundant moisture in our recorded history. A year that injected new life, a new spirit, new confidence and a new belief in positive thinking for all.

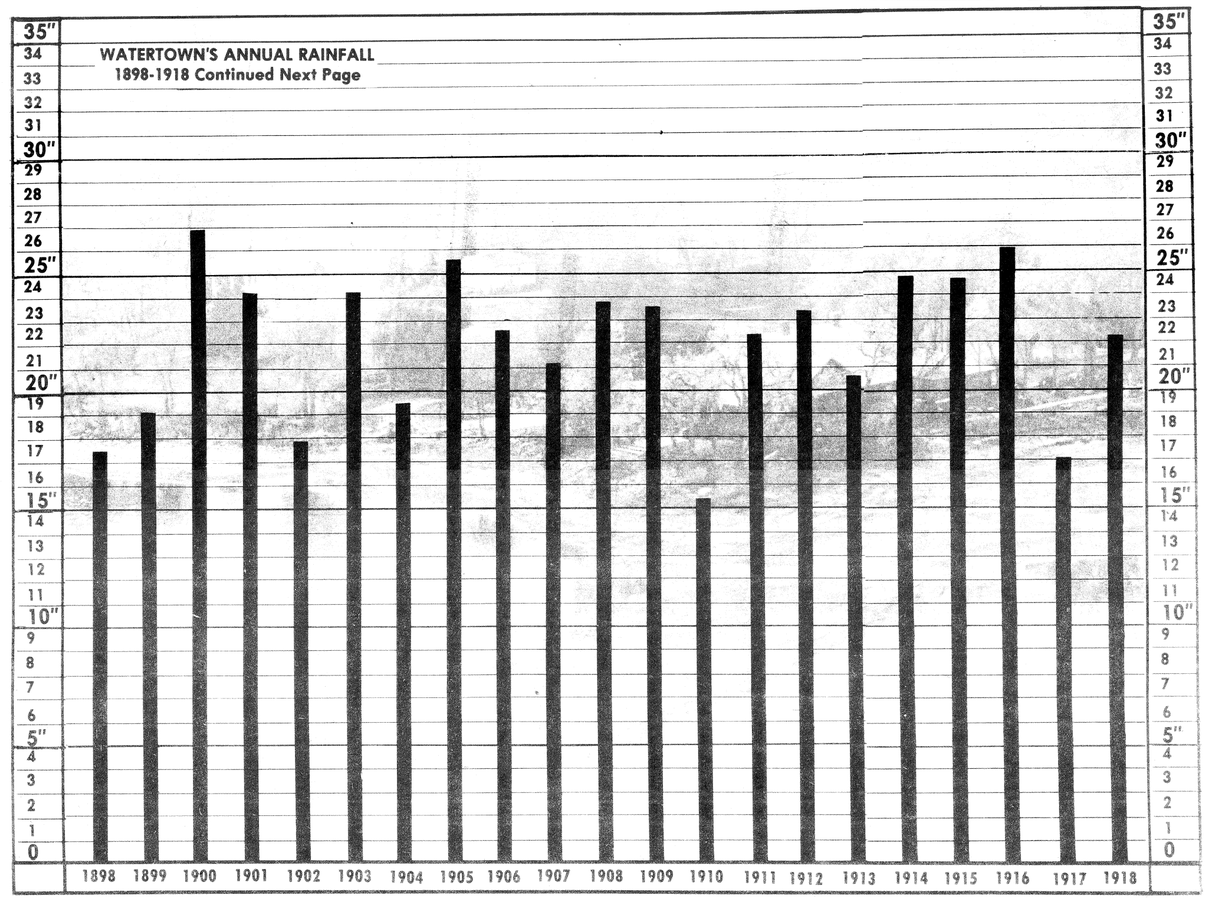
You will recall the flowers rejoiced in their most colorful outfits . . . the trees and the lawns sparkled in emerald dress . . . the rich, full crops were bursting as they said "thanks" and produced record yields.

But can we honestly say the drought has been broken?

We suffered through a record bone-dry '76 when only 10.74 inches of rain fell. Then 1977 . . . with its 41.76 inches of record producing moisture.

What do the experts say? We contacted William F. Lytle, South Dakota State University Climatologist.

We asked about the drought . . . about our lakes . . . about possible flooding this fall . . . about crop prospects for '78 . . . and much more. We believe you'll enjoy the interview that follows on these pages. And another plus for our readers . . . we have charted year by year the annual moisture totals from 1898 through the record breaking year 1977. The bar graphs on this and the following pages show a history of abundant moisture for this productive agricultural area.



Exclusive Public Opinion Interview with . . .

Bill Lytle, State Climatologist

Q. Can you say positively that the severe drought in this area is over?

A. Well, it's relieved certainly temporarily. The fact that we have soil moisture stored up this fall as we haven't had for a long time and that the soil moisture is above the 30 year average means we have a little extra to go on. The pattern of blocking highs through California has been broken up and we're getting low pressure areas coming through which is all for the good.

Q. Has the subsoil moisture been replenished throughout South Dakota?

A. In general, the amount of soil moisture is anywhere from 40 to 200 percent above normal and the Southwest area is just a little bit below normal, but the rest of the state all has an excess of moisture.

Q. Has the moisture been the greatest through the Northeast area of South Dakota, Watertown, Sisseton, Milbank, etc.?

A. Yes, there has been more moisture through the Northeast and the North Central areas.

Q. Has South Dakota been blessed with more precipitation than other states throughout the Midwest?

A. I haven't kept track specifically, but I know there was an area from Ames all the way to Des Moines that had quite a lack of moisture, but Minnesota is up and North Dakota has been good and they had some lack of moisture in the spring. But they did come through with good moisture, but I don't think they had quite as much moisture as they did last year because they had it easy last year (1976).

Q. As far as this complete turn around from 1976...scientifically what caused this abundance of moisture?

A. Well, the thing is that extremes seem to go together, we're having a lot more variation in climate. If you look at the average percips we had in the 1960's they were all up there pretty good, but now in the 70's, we're getting this variation from drought to excess and this is true all around the world and that seems to be the characteristic of the cycle.

Q. The Watertown weather station leads the state in total precipitation, what area ranks second?

A. Well, you've had over 40 inches and the only area that comes near it is Winner and they've had 38 inches down there and that's a record for Winner. Next of course comes Milbank and they've had about 34 inches up there. But you had the most moisture of any place in the state.

Q. Can you tell us what this abundance of moisture is going to mean to the South Dakota farmer?

A. It means no question about it, that there is a good start for the spring grains to have something to go on.

Q. We had a story in last week's paper that there is an area five miles north of Summit where the drifts are up to 250 to 300 feet long and measure up to 15 feet in depth. And of course there are other areas similar to this. Because of this heavy snowfall, do you foresee extreme flooding conditions this coming April?

A. It could be with the amount of moisture and the amount of snowfall, that we've had already, it's a question of how it melts in the spring. But certainly the potential is there. We may have some spring floods.

Q. Lake Kampeska and other lakes throughout the Glacial Lakes are down about three feet. Do you predict lakes throughout the area will be recharged to their full levels come spring and summer?

A. It looks like there's a chance this year. Before there hasn't. What it takes is a real early spring run-off from the melting snow. Later on, even if you get some of those good spring rainstorms, it doesn't seem to fill up. If we're going to have a good snow pack this year, it looks like a very good possibility that we're going to regain all that moisture in our lakes.

Q. Is the ground frozen sufficiently so we can expect adequate run-off.

A. The ground is really just barely frozen at the surface according to our soil temperatures we have. It's running 29 to 30 degrees at the 2 to 4 inch level and it hasn't frozen below that yet, because of course where you receive the snow cover, it's slow in freezing.

Q. So we have the moisture, but the snow has insulated the frost line?

A. Yes, that's right. So the frost hasn't gone down very deep. Often times I know with our soil temperatures out at the ag engineering farm we found it was often the end of January or February when we got the maximum frost depth. But actually under a snow bank it doesn't get down to the six foot level.

Q. So that again could further assist the subsoil factor, but possibly not fill the lakes?

A. Yes, that's right.

Q. Can you explain the high and low pressure systems that are always responsible for the wet and dry conditions?

A. Well, the high pressure system you have a down motion of air in the center of a high pressure system which means the air is descending and is warming up and going out from the high pressure area so it's diverging so you don't have storms in the high pressure area. While in the low pressure area you have the air converging into it and an upward motion in the center of the low pressure area so it's pulling in the moisture from the surface and pulling it up. That's why around a low pressure area we have vertical motion upwards and it tends to build up the cloud depth and that's where we get our storms and moisture.

Q. Based on that, what caused the high system that was perched for several months over our area in 1976 blocking virtually all moisture generating low systems?

A. Well, they don't know all about it. They know what some of the contributing factors are. Dr. Jerome Namais in California has been studying the sea surface temperatures and last year when we had that blocking high pressure area out there the sea surface temperatures were colder than normal along the California coast. That contributed to the build up of cold air above it which became a blocking high. So it sent the systems that were coming in off the Pacific north towards Alaska and then coming across the mountains rather than coming directly across. Well, this year he says the sea surface temperatures off the coast of California are now warm and it's been evident already that we have received some rain in the mountains and Washington and Oregon and Northern California. We are getting some storms so it seems to be open then that the warm surface temperatures allow low pressure areas to form and come right through the mountains. It is going to take a while to verify this, but that is one of the things that he's been able to detect.

Q. Is there any way subsoil moisture availability can be measured?

A. Oh yes, that's one thing we really need to do to get into more measurements of soil moisture. A lot of the figures I have had to use are based on a computation of the Palmer Drought Index where they try and get an index, but they don't go into a lot of measurements. That index does apply, but we need to get into more soil measurement data. I hope we can get a system developed so we can check the soil moisture at a number of places across the state in the fall and early in the spring. We then can get a start on what the actual conditions are and that would probably be more useful information if we knew what we had to start out with. Then we would know something about the rate which the crops use moisture.

Q. This would be a good year to conduct that study, wouldn't it?

A. Yes, I'm going to see what I can get done here before long on getting a series of measurements started this spring.

Q. In your experience and your studies, are we experiencing a cooling trend throughout South Dakota?

A. Well, we have been up until '74 or '75. Since then it's been turning around a little bit so we're not sure about whether it's a long time cooling trend. This is one of the arguments that's going on. Dr. Bryson at the University of Wisconsin, has said we are on a long time cooling trend and he's expecting an "ice age" in 200 years.

Q. What do you think?

A. Well, that's a little beyond our limit, but it takes that long to change. It's hard to tell right now whether this is a long time trend — whether it's established or not — or whether we just have another cycle.

Q. What determines the so called approach to another "ice age?"

A. Well, it's the expansion of the polar air, the ice pack, etc. around the North Pole. It begins to grow, and cools more air and spreads cool air farther south and so we have a gradual cooling of temperatures.

Q. What do you predict as to snow and temperatures for the remaining months of winter in our area?

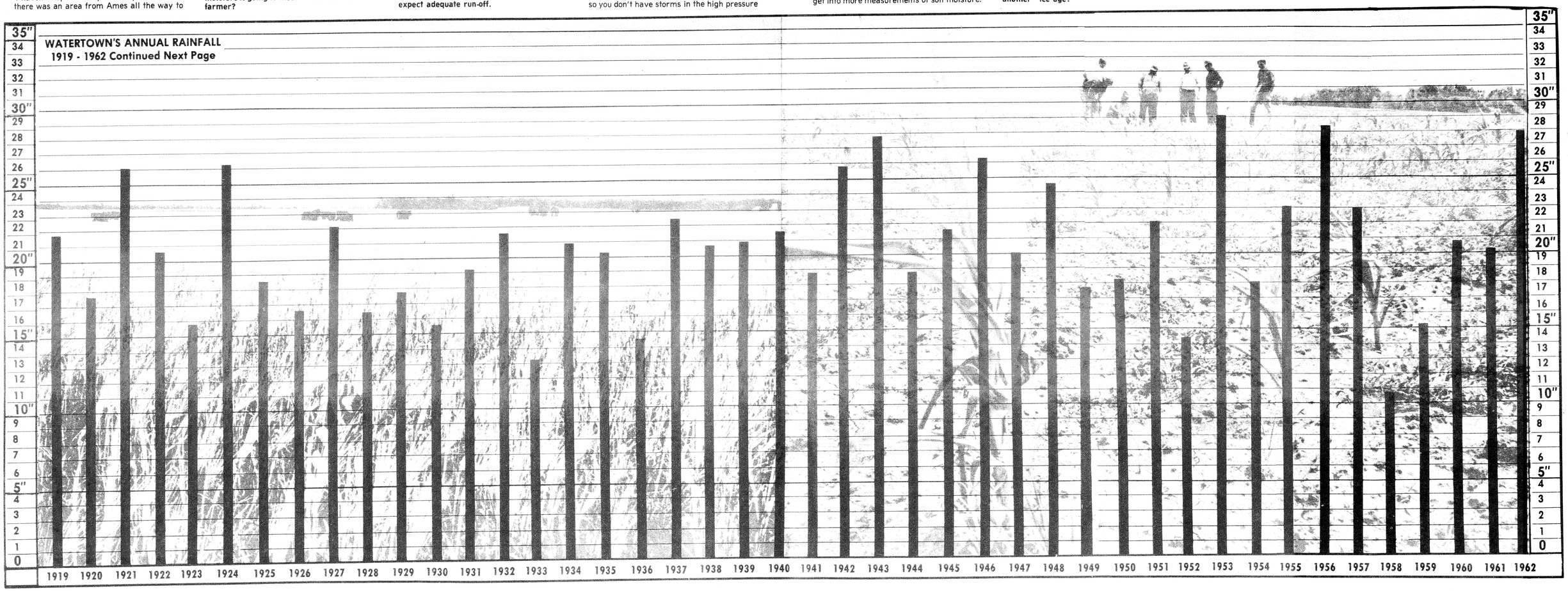
A. Well, the national weather service prediction is for below normal temperatures in our area and our December temperatures were about 6 degrees below normal. Now the precip they say looks like — both November and December were well above normal — and if the gateway has opened over the mountains, we're going to get above normal precip for the winter months unless we get a change in patterns.

Q. Is human activity in any way responsible for the kind of erratic weather that has hit the U.S. in the last year or so?

A. No, I don't think so. The cities modify it locally, but that doesn't change the climate over a very large area. The potential for the future is something that it could within the realm of the next 20 years or so. If we keep on growing and getting larger areas in the city and more pollution, the potential is there. But I don't think it has actually affected it yet over any large area.

CONTINUED ON PAGE 4

12 Month Precipitation Total

MAJOR TOWNS	1976	1977
Aberdeen	7.88	23.84
Brookings	13.26	30.25
Huron	10.97	23.14
Mitchell	13.63	30.04
Pierre	7.12	24.87
Rapid City	15.20	19.41
Sioux Falls	11.42	31.62
Watertown	10.82	40.04
Yankton	16.27	27.72

AREA TOWNS	1976	1977
Britton	9.43	23.14
Bryant	12.72	37.95
Castlewood	9.86	34.02
Clark	10.59	30.78
Clear Lake	11.30	36.66
De Smet	11.91	33.82
Flandreau	10.15	31.18
Madison	13.63	30.43
Milbank	11.04	34.51
Raymond	8.76	28.09
Redfield	12.96	24.31
Sisseton	8.66	31.47
Summit	9.71	33.68
Victor	7.66	30.55
Waubay	7.00	28.06
Webster	7.72	29.91
Wilmot	9.93	35.22