(1) A (3) C (1) F=4 (3) F= ONT
(2) (4) B (2) F=3 (4) F=

TORNADO PROJECT SUMMARY SHEET

DATE AND TIME TUE AUG 7, 1979 (1) 1850 TO APPROX 2050 EDT (3) V (2) 1830 EDT (4) 0950 EDT

2. LOCATION OR PATH (attach map)
(1) WOODSTOCK TO WATERFORD 0979-14
(2) S of STRATFORD TO E of BRIGHT 0979-15
(3) N of UXBRIDGE
(4) POWASSAN

3. PATH LENGTH ☐ NOT KNOWN ☐ <1 mi; ☐ 1-4mi; ☐ 5-10mi; ☒ 11-50mi (33 (1) 20 (2)); ☐ LENGTH IF>50m

4. PATH WIDTH UP TO 1 MILE 5. TORNADO PART OF SQUALL LINE? ☑ YES; ☐ NO; ☐ UNKNOWN:

6. ANY UNUSUAL COLORATION? ☐ YES; ☐ NO; ☑ UNKNOWN

7. ANY UNUSUAL SOUND? ☐ YES; ☑ NO; ☐ UNKNOWN

8. IF ANSWER TO 6 OR 7 YES, ELABORATE;

9. LIST ANY ASSOCIATED PHENOMENA (Such as hail, vivid lightning heavy rain, no rain, etc.) TENNIS BALL SIZED HAIL SE OF WATERFORD. EACH OF (1) + (2) HAD SECONDARY FUNNELS. 2 funnels seen at Toronto Int'l. airport, at 1255 EDT and waterspout reported off Oakville harbour.

10. TOTAL DAMAGE ESTIMATE $50 MILLION (1)+(2) 11. TOTAL DEATHS (1) 3 possibly 5 hundreds of cattle, pigs.

12. TOTAL INJURED 130 13. TOTAL HOMELESS 1000

14. LIST ALL REFERENCES

15. SUMMARIZE REMARKS PERTAINING TO (a) FUNNEL; (b) INTERESTING OR CAPRICIOUS EVENTS.

1(a) from photos, funnel calculated to be 170 m (±40m) high and 30 m (±7m) wide. Secondary funnel damage.

2(a) estimate of funnel width from the air about 10m wide.

3(b) no remarks

4(b) vortex seen in base of the understorm

1(b) Severe damage to hundreds of homes and and 2(b) farm properties. 28 hydro electric towers (each weighing about 8 tons toppled or thrown up to 250 m. The roof from one barn, full of hay, carried 100 ft without injury. Cars thrown through the air, one found in a farmers field, had never been seen before by the farmer. 4"x4" beams speared through cows. A pig found in the crotch of a tree. The community of Oxford Centre was almost completely demolished. It looked literally as if it had been bombed and shelled with the shredded remnants of trees festooned with debris. Whole acres of bush were felled.

3(b) Trees levelled

4(b) Crop damage, trees felled, doors blown out of steel barn.

WOODSTOCK – WATERFORD PRIMARY TRACK

WORKSHEET

IDTO 0697914

(1) ORIGIN x 17513450
y 4777600

(5) Standard Error S_x
C200

(2) LIFT-OFF x_1 17564650
y_1 4751650

(6) Standard Error S_y
C200

(3) $(x_1 - x)$ = 51200

(4) $(y - y_1)$ = 25950

(7) DAMAGE LENGTH

$$L = [(x_1 - x)^2 + (y - y_1)^2]^{1/2}$$

(3)+(4) [→r,θ] = 57400

(8) $\alpha = \tan^{-1} \frac{|y - y_1|}{|x - x_1|}$

[x↔y] = 26.9°

(9) Standard Error $S_L = (S_x^2 + S_y^2)^{1/2}$

(5)+(6) [→r,θ] = 283 m C

(10) $\beta = \frac{\tan^{-1} S_L}{L}$

(7)+(9) [→r,θ] [x↔y] = 0.6°

NE quad $\phi = 90 - \alpha$
NW quad $\phi = 270 + \alpha$
SW quad $\phi = 270 - \alpha$

SE quad $\phi = 90 + \alpha$

(11) ϕ = 297°

FLANNIGAN CORNERS — BRIGHT

WORKSHEET

IDTO 697915

① ORIGIN x 17.502300
y 4798750

⑤ Standard Error S_x
C 200

② LIFT-OFF x_1 1753130
y_1 4790900

⑥ Standard Error S_y
C 200

③ $(x_1 - x)$ = 29000

④ $(y - y_1)$ = 7850

⑦ DAMAGE LENGTH

$$L = [(x_1 - x)^2 + (y - y_1)^2]^{1/2}$$

③+④ [→r,θ] = 30044 m

⑧ $\alpha = \tan^{-1} \frac{|y - y_1|}{|x - x_1|}$

[x↔y] = 15.10

⑨ Standard Error $S_L = (S_x^2 + S_y^2)^{1/2}$

⑤+⑥ [→r,θ] = 283 m C

⑩ $\beta = \frac{\tan^{-1} S_L}{L}$

⑦+⑨ [→r,θ]
[x↔y] = 0.8°

NE quad $\phi = 90 - \alpha$
NW quad $\phi = 270 + \alpha$
SW quad $\phi = 270 - \alpha$

SE quad $\phi = 90 + \alpha$

⑪ ϕ = 285°

WOODSTOCK - WATERFORD SECONDARY TRACK

WORKSHEET

IDTO 0697914

(1) ORIGIN x 17529300
y 4768100

(5) Standard Error S_x
C200

(2) LIFT-OFF x_1 17554800
y_1 4753050

(6) Standard Error S_y
C200

(3) $(x_1 - x)$ = 25500

(4) $(y - y_1)$ = 15050

(7) DAMAGE LENGTH

$$L = [(x_1 - x)^2 + (y - y_1)^2]^{1/2}$$

(3)+(4) [→ r, θ] = 29610 m

(8) $\alpha = \tan^{-1} \dfrac{|y - y_1|}{|x - x_1|}$

[x ↔ Y] = 30.5°

(9) Standard Error $S_L = (S_x^2 + S_y^2)^{1/2}$

(5)+(6) [→ r, θ] = 28.3 m C.

(10) $\beta = \dfrac{\tan^{-1} S_L}{L}$

(7)+(9) [→ r, θ]
[x ↔ Y] = 0.8°

NE quad $\phi = 90 - \alpha$
NW quad $\phi = 270 + \alpha$
SW quad $\phi = 270 - \alpha$

SE quad $\phi = 90 + \alpha$

(11) ϕ = 301°

To Environment Canada

From Mark Bourrie, London Free Press

re: Woodstock Tornado Aug 7/79

The account below may be of use in your research on tornadoes.

The tornado that hit Woodstock began about a half hour after a violent electrical storm. I watched the storm from its outset.

The cloud formations during the thunderstorm were standard for a convectional storm. The day was muggy and increasingly humid. A cool wind preceded the storm. The clouds were very low and formations and movements were distinctive. The storm was rapidly moving in a NW-SE direction.

The cloud surrounding the funnel appeared at the height of the electrical storm. It was considerably lower than the thunderstorm clouds and much darker. It moved in a clockwise direction, while the storm clouds continued to move in the direction previosly noted.

As the cyclonic cloud moved in and covered the town the lightning tapered off and the rain tapered off to a drizzel. The funnel touched down due west of the fairgrounds (near highway2) and as it hit it looked like a dust storm. The funnel was evident very quickly.

more...

The funnel appeared to be one twister, although I later heard reports from people actually in the tornado that there were as many as four distinct twisters making up the funnel. It did not appear to me that there was more than one twister and no hard evidence of multiple funnels has been produced to me.

The funnel remained fairly rigid as it passed through the city. It did not change shape or course very often and it made no noise.

Near the top of the funnel parts of the cyclonic cloud were sucked into it, giving the funnel its grey-black colour. Surrounding the funnel, swirling clear air carried debris almost directly overhead when the tornado was at its closest. I was about 2,000 feet from the funnel at its closest approach.

The tornado moved SE, then NE for a short time, and then turned SE again. A rough estimate of five minutes through the city and my calculations of distance makes me believe the ground speed of the twister was between 140 and 180 miles per hour.

An area of damage of about .25 miles wide showing near total property destruction and a perimetre of about the same width suggests the width of the funnel at ground level. Photographs of the tornado were taken by Dominic Scalisi of Woodstock and a film of it is in possession of CFTO-TV Toronto.

After the storm, heavy rainfall for about 5 minutes and tapered off.

END

WEEKLY HORT REPORT, JUNE 7, 1981

STORM DATE: AUG 7, 1979

OXFORD, ELGIN Cont'd

OTHER COMMENTS

After effects of the 1979 tornado: Some semi-dwarf apple trees which were badly shaken and sometimes left badly leaning or even with some roots torn are looking extremely well this year. The better looking ones have good leaf colour and the fruit load runs from very light to adequate. However, some 20 year-old standards which originally had only a few broken limbs are now exhibiting areas on the trunk where the bark has lifted. The bark is still alive but the physical separation from the wood is evident. A cracking of the bark on the trunk that must have occurred during the twisting effect of the tornado is evident now. Damage from lifted bark is worse at the base of the trunk bu is sometimes seen as strips running higher up on the trunk. McIntosh much worse than Delicious or Spy. I expect these trees will deteriorate quickly...another example of hidden and non-assessed damage which will have to be accepted by the growers.

Woodstock Tornado Film

taken by Dr. Dafoe at 38 Chaucer, Woodstock looking towards the SW from his front window. Taken on super 8 mm film, camera speed 18 F.P.S. (Bauer, zoom lens 6 mm to 60 mm rated F=1:2), with lens at 6 mm.

Present address (he moved shortly after taking the movie);

VESUVIUS BAY
SALT SPRING ISLAND
B.C.

Continued from page 6
Suite de la page 6

The system includes a network of weather offices that supply data to central offices like the Ontario Weather Centre, one of six major weather stations in Canada, and about 2,000 volunteer weather watchers across Ontario who have been trained to detect weather systems in the making. The central offices issue "severe weather watches" and "severe weather warnings" based on the information collected from these sources.

Tuesday's tornado was the first one in Southwestern Ontario to kill someone since 1974, when a tornado touched down in the Windsor area. Eight people were killed when that tornado ripped apart an arena during the middle of a curling bonspiel.

Vancouver Sun - 9/8/79

Tornado phone alert unanswered

WOODSTOCK, Ont. (CP) — Environment Canada says it tried to warn radio station CKDK Woodstock that a severe storm would hit the city about 30 minutes before a tornado ripped through the area Tuesday, killing two persons and injuring about 130 others.

Gordon Gee, senior meteorologist at Toronto International Airport, said today the office issued a severe weather warning at 6:15 p.m. Tuesday, then tried to telephone radio station CKDK in Woodstock, but could not get a long-distance connection.

He said his office did not know that the storm would turn into a tornado when radar showed there was a huge storm mounting at 6 p.m., but minutes later it issued the warning which predicted severe thunderstorms and winds of up to 75 kilometres an hour, then tried to advise radio station.

Brad Finch, a spokesman for the Environment Canada bureau in London, Ont., said his office also tried to telephone but failed to get through to the radio station.

CFTO CTV National News 14/8/79

HARVEY KIRCK: THERE WAS NO WARNING WHEN A SEVERE WINDSTORM HIT REGINA LAST WEEK. ENVIRONMENT MINISTER JOHN FRASER SAID TODAY THAT IT IS AN INTOLERABLE SITUATION, AND HE BLAMED IT ON GOVERNMENT RESTRAINT. MICHAEL BENEDICT REPORTS.

BENEDICT: THIS IS THE DAMAGE CAUSED BY THE 117-KILOMETRE-PER-HOUR WINDS THAT HIT REGINA LAST WEDNESDAY. MOBILE HOMES WERE FLIPPED OVER, AND ROOFS RIPPED OFF DURING THE 20 MINUTE STORM THAT CAUSED MILLIONS OF DOLLARS WORTH OF DAMAGE. BECAUSE REGINA HAS NO WEATHER RADAR SYSTEM, THE STORM HIT WITHOUT WARNING. THERE HAVE BEEN PLANS FOR YEARS TO PROVIDE THE CITY WITH SUCH A WARNING SYSTEM, BUT GOVERNMENT CUTBACKS HAVE KEPT THOSE PLANS ON THE DRAWING BOARDS. FRASER SAYS THAT'S NOT GOOD ENOUGH, AND IF HE HAS TO DEMAND MORE MONEY, HE'LL DO IT.

FRASER: FRANKLY, WHEN YOU CAN'T..WHEN YOU CAN'T WARN A COMMUNITY THAT THEY'RE GOING TO BE HIT WITH A STORM LIKE THAT, THEN WE'VE GOT INADEQUATE WEATHER SERVICES, AND I JUST FIND THAT INTOLERABLE

BENEDICT: WITH A PROPER WEATHER RADAR SYSTEM, THE PEOPLE OF REGINA COULD HAVE BEEN TOLD ABOUT THE STORM AN HOUR BEFORE, AND FRASER PROMISES LAST WEEK'S FAILURE TO WARN WILL NEVER HAPPEN AGAIN.

MICHAEL BENEDICT, CTV NEWS, OTTAWA.

TWICE IN A LIFETIME

Another tornado slams Bickle family orchard

by JILL CLEAVER
Cambridge District Reporter

They say lightning never strikes the same place twice, but the same rule must not apply to tornadoes.

Just ask Frank Bickle.

Back on Aug. 7, 1979 a tornado destroyed approximately seven acres of his apple orchard north of Woodstock near Tavistock.

Just over eleven years later, Mother Nature played another nasty trick on Bickle by unleashing what he believes was a twister on the family orchard. While the most recent storm (on Aug. 28) wasn't nearly as severe as the one in 1979, it did destroy about 25 per cent of his crop.

The hardest part of the whole ordeal says Bickle is to "see your crop totally destroyed in a matter of a few minutes." Everything you have worked for slips away in the blink of an eye. Other farmers say that it is "just like a death in the family."

In some respects Bickle was fortunate, as 11 years ago, and again this year none of his buildings was damaged. However, buildings can be replaced faster than an apple orchard, yet a feeling of loss prevails.

At the time of the 1979 tornado, Bickle had standard size apple trees in his orchard. Standard apple trees are four times larger than the semi-dwarf trees that are used today, and grow close to 25 feet. Bickle says he lost 200 to 300 trees of this size to the tornado. Most orchards at that time consisted of the standard size trees, which allow for approximately 28 to 30 trees per acre.

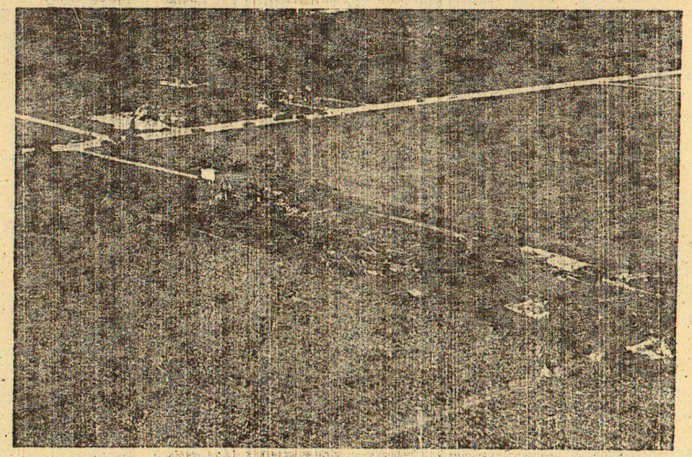
The semi-dwarf trees which are more commonly used today, allow for 100 trees per acre, and can be reached by the use of a small ladder.

When the 1979 tornado struck Bickle's orchard, he not only lost hundreds of trees, but the rest of his crop on the remaining trees was also destroyed. This meant his income for the entire year was destroyed in only a few seconds.

According to Bickle, insurance covered loss of the crops but not the trees. Back then there was no such thing as tree insurance, but now it is available to most farmers. However, Bickle did receive donations for tree replacement from a tornado disaster fund.

Despite the tragedy, Bickle decided to continue on and replant the lost trees. But it wasn't simply a matter of replanting in the spring and seeing a new crop in production immediately. By the time Bickle got his orchard cleared of debris and ready for replanting, it was the spring of 1981 — two years after the tornado hit.

Bickle ended up replacing more trees than he originally intended, because many more suffered damage from the high winds and were no longer productive.



A severe storm that ripped through southwestern Ontario spawned several tornadoes. One of the hardest hit areas was Komoka where a church and several farms were heavily damaged. This aerial photo shows damage to a tobacco farm in Komoka.
Staff photo by JILL CLEAVER

Bickle replaced his standard size trees with semi-dwarfs, which is common practice today. But once apple trees have been planted, depending on the variety, it takes anywhere from five to seven years before they begin to produce apples again.

Therefore, it's between seven and nine years before an orchard is productive again. And as Bickle says, there is a lot more to orchard farming, than meets the eye.

Today, Bickle is continually removing orchards and replanting with semi-dwarf trees, and moving on with the operation.

However, if a tornado the magnitude of the one 11 years ago struck again, he doesn't know if he would replant. "I don't know if it would be worth it," he said.

In his current position, he says it is just too hard to say for sure. But he knows one thing; it would be even more costly to begin again in today's difficult financial times.

Success in Thailand!

Canadian mission penetrates Asian dairy market

by SUSAN McCONNELL
St. Thomas District Reporter

ST. THOMAS — A mission led by Shore's Holsteins' International Ltd., has penetrated the dairy cattle market in Asia for the first time.

Shore's, north of here, with two other Canadian agricultural institutions, was successful in selling Canadian cows and establishing a demonstration herd with the Department of Livestock Development of Thailand.

The $5.2 million budget, including $2.1 million from the Canadian International Development Agency, involved the sale of 45 purebred registered Holstein bred heifers, 65 open heifers, one bull, 100 embryos and an extensive training program bot[illegible] in Thailand.

The de[illegible]d by Valerie [illegible]

mex Canada of Guelph (internationally recognized for embryo sales) and the International Livestock Management School of Kemptville, where 15 Thais will have completed an extensive 12-week course in herd health, embryo transfer, pasture management, basic dairy herd management and veal/calf operation.

In addition, a four-year demonstration farm was set up in northern Thailand and the services of Canadian experts will be used, including a stint by veterinarian Dr. David Hall of Guelph.

Cron, who will return to Thailand in November to help with policy decisions, said she was pleased the deal (after two years of set-up) had come together. Originally, the Thais considered purchasing Australian cows.

"It's a first for Canada, a first for Shore's...it's exciting."

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STORM DATE :
TUE AUG 28, 1990.

PREVIOUS STORM EXPERIENCED ON AUG 7, 1979

TIME HASN'T HEALED WOODSTOCK'S WOUNDS

Tornado fears still strong

By MICHAEL SMEE
Staff Writer

WOODSTOCK — The dog days of August bring a special fear to this community, ravaged five years ago by a killer tornado.

"When we get this humid weather and the wind comes up, I get scared," resident Margaret Herwig said yesterday on the fifth anniversary of the tornado that swept through her Bridlewood subdivision, killing three, injuring scores and leaving $5 million in damage.

"Sometimes I go down into the basement. I'm very careful now."

Woodstock Mayor Wendy Calder agreed that although the physical scars have healed, most residents still remember the trauma — and fear another disaster.

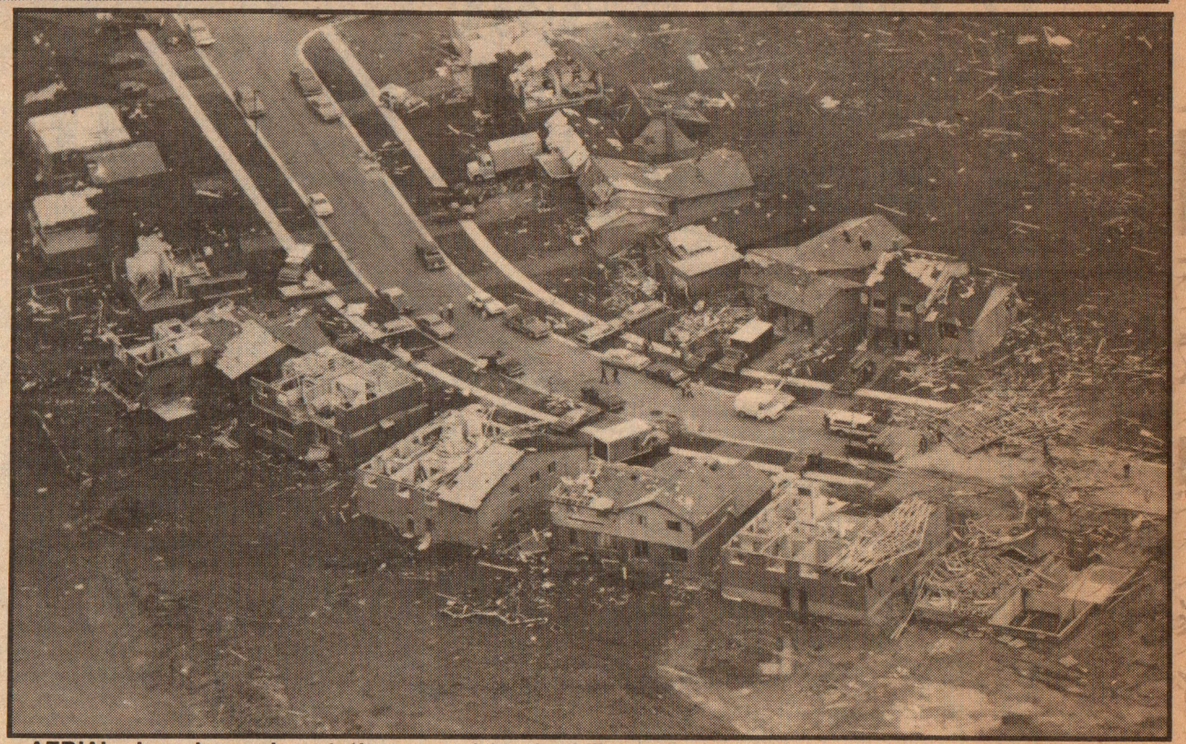
For months after the twister hit, schoolchildren in the Bridlewood area were given psychiatric treatment in the classroom because, as Calder says, "whenever they saw a black cloud or a thunderstorm, were extremely upset."

Even now, Sonya Swart, 11, says she "still gets scared at night when it's thundering and lightning."

When the tornado struck, Sonya and her sister Anita, now 12, cowered with their parents in the basement of their new home.

"Sonya and I were screaming downstairs, crying and praying. I had nightmares for a couple of months afterwards," said Anita.

Deputy Police Chief Joe Moses, who was on duty that night and viewed the devastation, is convinced that even now, "the whole community is very, very conscious of it. Every thunderstorm that comes up after a hot day in the summer, the majority of people think 'tornado.' "



AERIAL view shows devastation caused by the killer tornado which hit Woodstock in August 1979.

Toronto Star - 8/8/79

Twister toll in $millions

Toronto Star special

WOODSTOCK — Still reeling from last night's five minutes of horror, tornado-shattered southwestern Ontario pleaded today for massive government aid as a disaster area.

Hit-and-run twisters slashed through Woodstock and surrounding communities, killing at least two people, injuring more than 130 and leaving hundreds of homeless.

Late this morning the Ontario cabinet declared the region a disaster area.

In one 15-block area of southwestern Woodstock, 75 homes were destroyed and 250 badly damaged, along with eight factories.

No one could estimate the destruction in millions of dollars.

A government official suggested the cabinet would go beyond a promise by Tom Wells, the intergovernmental affairs minister, of dollar-for-dollar aid to every community that sets up a relief fund.

Surveys havoc

Environment Minister Harry Parrott flew here to survey the havoc in his riding and confer with Woodstock Mayor Wendy Calder, who asked Queen's Park to proclaim her city a disaster area.

Three howling, black tornadoes, spinning at 120 miles (200 kilometres) per hour, blasted through Woodstock and surrounding communities about 7 p.m. while most of the victims were at the dinner table.

Power lines snapped and blackouts hampered police searching the rubble for more victims.

The "monstrous, swirling, black cloud," as eyewitness Mark Bourrie of Woodstock described it, even rolled over a big moving van and dumped a trailer on the hood of a smaller truck.

Van pounded

William Ozra Snyder, 51, of R R 3, Norwich, was killed when a tornado sucked up his van, then pounded it into a field north of Burgessville.

Mrs. Corrie Ryksen, 33, died when her house collapsed in the Burford Township village of Harley.

There were reports of three other deaths in Hickson, Oxford Centre and New Durham, but Ontario Provincial Police could not confirm them today.

Commissioner Harold Graham dispatched two OPP helicopters from Toronto to survey the widespread destruction and decide whether reinforcements were needed to search through debris and fend off looters.

Chaos reigned in the city and countryside, with little co-ordination of operations and poor communications because of toppled power and telephone lines.

The OPP dispatched a huge tractor-trailer from Toronto to act as a communications centre for the whole area.

Graham also sent in 48 OPP reinforcements and appealed to people to stay away from the nightmarish scenes unless they had to be there.

Awesome swath

Woodstock General Hospital became the emergency centre for the whole area. More than 130 people were treated for injuries. About 30 of them were kept in the hospital, including a baby and 10 older children.

Three elderly patients were reported in critical condition.

Volunteers swarmed to the hospital to help make beds, comfort victims awaiting treatment or assist in any other way they could.

Every ambulance from London to Kitchener was pressed into service as rescue workers clambered over uprooted trees and unrecognizable rubble looking for trapped survivors by moonlight and flashlight. The emergency operation was also hampered by downed telephone lines.

The hit-and-miss tornadoes chopped an awesome swath of destruction up to half a kilometre wide wherever they touched down. Then they would rise only to strike again in a new spot.

In southwestern Woodstock, hundreds of houses and other buildings were damaged.

Three separate twisters ripped off scores of roofs in the dinner hour.

Southside Public School and St. Patrick's Separate School were badly damaged. A Dominion store on Ingersoll Rd. lost its entire roof. Some houses were blown off their foundations.

Cars were overturned or smashed by big trees that had been plucked out by the roots.

Trees left standing were festooned with debris and shreds of clothing and bedding.

In Vanessa, a village of about 100 in the rich tobacco country 35 kilometres (22 miles) south of Brantford, at least a dozen stone and brick houses worth more than $100,000 each were levelled to the ground.

Vanessa's other houses were badly damaged, but police said everyone apparently got out alive to spend the night with friends and relatives.

The worst damage at Vanessa appeared to be on Gerald Dierick's 200-acre tobacco farm, with the wreckage of his buildings

Continued on page 2
Suite à la page 2

Continued from page 1
Suite de la page 1

and machinery scattered across the $1.5 million property.

Looting was reported in several of the devastated areas.

Gordon Finlay of Royal Insurance said his firm has sent teams to Woodstock and Simcoe areas to assess damage.

He said tornado and other windstorm damage is generally covered by most home and auto policies.

Globe and Mail - 8/8/79

Villages flattened, more than 100 injured

3 die in Woodstock-area tornado

Special to The Globe and Mail

WOODSTOCK — At least three people were killed, two were missing and many others were injured when a tornado touched down in this Oxford County community last night, tearing apart the southern part of the city and smashing nearby villages.

Police were conducting a door-to-door check in the damaged area. Twenty-six people were kept overnight at Woodstock General Hospital and at least 120 others were treated for minor injuries.

Hospital comptroller Arthur Boghtflower said all staff had been called in and the hospital worked for two hours on emergency power during the storm. All ambulances from London to Kitchener were pressed into service to handle the injured.

The twister swung in a C shape, striking a 15-block area in the southwest corner of Woodstock but leaving much of the rest of the town undamaged, although telephone and power wires, plus downed trees, choked many streets.

Police found one badly mutilated body in what was left of a farmhouse near Burgessville, a community south of Woodstock that was hard hit. The police said they could not identify the body because of its condition. Others were found dead in New Durham, near Brantford, and Oxford Centre, south of Woodstock. A 16-year-old and a baby were reported missing north of Woodstock.

At Oxford Centre, a community of 100, Angus Mowat lost his house and two cars to the storm.

"The village was wiped out," he said. "I've never seen anything like it."

The hamlet of Vanessa was also flattened and the area for 10 miles around the village of Hickson suffered severe damage.

The storm centre was just north of Woodstock, but communities in the area bordered by Woodstock, Simcoe, Brantford and Tillsonburg were affected.

Delores Sibley of Woodstock heard the rolling thunder and headed for her basement with her family. Minutes later she emerged to find her house flattened.

"I couldn't stop screaming because I was afraid we would get trapped in the basement," she said. "All of the windows came crashing in and we could hear trees hitting the roof. It was gone when we came outside."

On the street, live wires flared and spat sparks across the pavement.

Large blocks of Southwestern Ontario were blacked out when the storm knocked out Ontario Hydro's main transmission line to the area.

A Hydro spokesman said the main line, which runs from Hamilton to Buchanan station near London, was hit about 6:30 p.m. The station feeds smaller stations in surrounding Middlesex, Elgin and Oxford counties.

Power was restored to almost all customers about 3½ hours later when power was rerouted, but about 2,000 residents in Oxford were expected to remain blacked out until this morning.

In the village of Kelvin, near Brantford, most large trees had been uprooted and one wall of the United Church was knocked down. Other communities reported similar damage: rooftops ripped off, buildings reduced to rubble and cars and trucks being tossed around in the wind like toys.

The junction of Highways 401 and 59 was closed for several hours after the high winds left a tangle of cars and trucks in the roadway.

At Hobart Brothers of Canada Ltd., just south of the junction, workers clung to steel girders and the concrete walls when the winds hit. "I was hanging on to the guy next to me for dear life," one worker said. Although the roof was ripped off and the second-floor brick crumbled, no one was hurt.

In Hickson, north of Woodstock, Dorothy Middleton said she dove into her bathroom just as the door and front window of her home exploded.

"I really didn't have any idea what happened," she said. "I knew something was happening because the house was falling apart. It was like a bomb."

Mary Fulton and her family emerged from their basement in Woodstock to find all the windows of their house blown out and a huge chunk of the roof missing.

Across the street, three homes were flattened. Furniture and cars were littered across a nearby field.

Ken McLelland, who lives near Burgessville, saw the storm coming and his family of six headed for the barn where 60 head of cattle are kept.

The storm tore away the house and flattened the barn, but the family escaped injury because of the high barn foundation. After the storm passed, the family fled to town, driving across fields when they could not get through rural roads.

"The cattle were alive when we left. I don't know what will happen to them. Maybe the neighbors will help," Mr. McLelland said at Woodstock General Hospital.

He feared the animals would panic and trample each other in the bottom of the barn where they were trapped. Other farmers were forced to kill their injured cattle.

In Woodstock, about half way between London and Kitchener just off Highway

Continued on page 3
Suite à la page 3

Continued from page 2
Suite de la page 2

401, City Council was meeting when the tornado touched down and the meeting continued even though the lights went out. Councillors learned of the storm from a reporter.

The Church of the Nazarene in Woodstock was badly damaged and three schools were reported to have been hit hard. A supermarket on old Highway 2 was torn apart and the parking lot was littered with groceries. Late last night there had been no looting but police were on the lookout.

Traffic was either slowed or brought to a halt in much of the community by downed wires, poles and trees. Several cars were overturned on streets and in driveways.

Police blocked many thoroughfares to give Hydro and telephone crews a chance to clean up and restore service.

Brenda Swears was visiting a friend when the tornado hit at the dinner hour.

"My friend (Mrs. Barry Scott) went to the window and said for us to come and see this cloud swirling around," she said later last night. "Her husband said 'Oh, yeah, there's three or four of them out there doing that,' but after it was all over and he went out to see the damage, he believed us."

Brenda, 16, lives in the east end of Woodstock, which escaped most of the damage. Last night she described the scene as "a lot of disaster."

Both the Catholic and public primary schools were flattened, she said, and the storm wiped out Southside Park, a recreation area. It also tore through a new housing development in the south side of the community, Innis Place, injuring occupants of some of the houses.

Evelyn Brown of West Hill, returning home from London with her husband Bill, said Highway 401 was littered with bits of trees and fencing, and she saw three transports overturned. She said she was surprised there were not more accidents.

The tornado was not expected by weather officials in the area, even though the Ontario Weather Centre at Malton had issued a tornado warning for Toronto six hours earlier.

The Toronto bulletin, at 12:55 p.m., came as the warm front of yesterday's storm began passing over the city, when airport weather officials spotted funnel clouds several thousand metres from the ground.

No sign of a tornado, however, was spotted when the storm's cold front moved over Southern Ontario in the early evening, and radar soundings indicated only that a severe thunderstorm was approaching.

Norman Barber, supervisor of the Ontario Weather Centre, said in an interview last night that the tornado warning for the Toronto area had been cancelled at 1:50 p.m., after the warm front passed by safely.

Later, when the cold front moved in from the northwest, residents of Perth, Waterloo and Oxford counties were only told to expect heavy rain, hail and winds gusting to 75 kilometres per hour.

"We have a problem here," Mr. Barber said. "We like to have some confirmation of a tornado before we start throwing the word around. I tried to call the OPP in Woodstock to find out if there were any damaging winds, but I couldn't get through. All the other OPP stations were on the periphery of the storm.

"Unfortunately, it's almost impossible to tell from radar echoes whether a tornado is in the area. Sometimes all we get is a big blob indicating some tupe of major storm."

Floyd Rader, a meterological technician at the London weather office, said officials will not know how severe the tornado was until the damage can be assessed. Tornadoes occur when warm, moist air on the ground is drawn upward by cooler, dry air higher in the atmosphere, he added.

"It happens pretty quickly. We still don't know just how fast the winds were or whether it was a major tornado."

Mark Bourrie of Woodstock considered it a major storm when he saw a "monstrous swirling black cloud. As it moved closer we could see shingles, branches and birds being sucked toward the centre," he said. Several smaller funnels touched the ground as it passed.

Toronto Sun - 8/8/79

Killer twisters strike!

Tornadoes ripped through several southwestern Ontario communities early last night, killing at least three and spreading massive destruction.

Police in several communities reported many injuries in areas near Tillsonburg, Woodstock, Brantford, Simcoe, New Durham, Oxford Centre and Waterford.

Late last night, police in those areas were still sifting through debris, downed power lines and trees scattered by the tornadoes.

Police said one person was killed at Oxford Centre, one near Brantford and another at New Durham. There were no details available on the deaths. Dozens of others were reported injured.

A twister devastated a large area of Woodstock about 7 p.m., snapping off trees and hydro poles. Eyewitnesses said homes were levelled, cars tossed around and roofs blown off.

A twister also touched down briefly in Brantford and nearby Vanessa.

In addition to the three deaths, there was an unconfirmed report of a death in Vanessa.

Haldimand-Norfolk regional police said the Waterford area near Nanticoke was hit by a tornado that flattened homes, blew in storefronts and knocked down trees and hydro poles. Only minor damage was reported in nearby Hagarsville.

Late last night, regional cops were slowly fighting their way into beleagured Waterford past the downed trees and hydro wires to help locals with the cleanup.

In Waterford, a fireman said it will be some time before a damage estimate is available but "it's hurricane-force stuff here."

Deborah Walker of CKDK Radio in Woodstock said she and other staffers cowered in the newsroom watching as the tornado thundered past within 20 feet of the station while cutting a wide swath through the southeastern part of the city.

"You couldn't even begin to estimate the

Continued on page 4
Suite à la page 4

Continued from page 3
Suite de la page 3

damage," she said. "A lot of buildings and homes were ripped down. A church was torn down."

"I saw a funnel cloud come in," said OPP Cpl. Ron Thompson in Woodstock. "I could see water falling down and debris being sucked up ... The city called us for all the help we could give them."

Shortly after the twister moved out, John Deboer of Woodstock said "hundreds of people were out sightseeing.

"There are quite a few trees down over the streets," he said.

"There were some fires here and there. It's a real mess. There are hydro poles snapped off all over the place."

Iris Atkinson of Vanessa said last night "there are hydro lines down everywhere with trees and greeenhouses uprooted. We haven't heard of anyone hurt so far."

Vanessa officials reported some people were struck in the face by glass and one person suffered a broken leg.

Constable Craig said the huge storm caused "very extensive damage to property."

CKDT Radio worker Craig Pepplar in Tillsonburg said a tornado touched down at the village of Bright, cut through the southeast corner of Woodstock and blew through the villages of New Durham, Vanessa and Waterford.

"Buildings were blown right in, houses were blown down and the (Highway) 401 is littered with cars and trucks, and so are the fields around the 401," he said.

London OPP said Highway 401 was closed near Woodstock because of downed power lines after the storm disrupted traffic and caused numerous accidents.

Earlier, two children were injured when lightning struck at Chinguacousy Secondary School in Peel region. Both were conscious when taken to hospital.

Toronto Star - 18/8/79

Twister

An ordinary tornado generally packs more punch than an atomic bomb, as residents of Woodstock can testify. Southwestern Ontario is the worst tornado area in Canada.

By Hanoch Bordan Toronto Star

Of all the furies of the skies, the tornado is the most sudden, most frightening, most devastating and the most awesome — as the people of Woodstock found out last week.

Its cumulative fury is such that science can't exactly estimate it. But most meteorologists agree that even an ordinary "garden-variety" thunderstorm packs more punch into a concentrated area than an atomic bomb, minus the nuclear effects.

Since this the most violent of storms strikes so suddenly, so often without warning, its effects are doubly terrifying.

Eyewitnesses often describe it as "a monstrous swirling black cloud" or as "a chimney of clouds" that can pluck giant trees by the roots and send them flying or lift cars, even trucks, buses and streetcars up into the air.

A tornado is characterized by "uncanny blackness" — a black funnel of spinning winds roaring down, rotating at 100 to 300 miles an hour, from clouds as high as 60,000 feet. It can cut a swath from a few yards to a mile. It can last a few minutes or hours. And as it comes howling down, it drowns out human screams for help.

More in the U.S. than in Canada

The tornado that struck the Woodstock area — killing two, injuring 130 and causing more than $20 million damage — probably had swirling winds in the range of 200 to 250 miles an hour, says Theodore Fujita, University of Chicago professor and acknowledged world authority on tornadoes.

There was so much havoc that Woodstock and Northern Oxford County are barely emerging from its devastating effects. It took an all-out community effort to clear away the rubble and fallen trees. It has taken more than a week to restore phone service, that too to only 90 per cent of the residents, in the 60-mile (100-kilometre) corridor the storm swept across.

Fujita says that southwestern Ontario is actually "the worst Canadian tornado

Continued on page 5
Suite à la page 5

Continued from page 4
Suite de la page 4

area," along with the Manitoba-Saskatchewan prairies.

Gordon Gee, this area's chief meteorologist, agrees that we live in "tornado country."

Tornadoes are five times more prevalent in the United States and Canada than anywhere else in the world because of the peculiar geographical and meteorological conditions of the continent, which is relatively flat in the centre, allowing warm moist air from the Gulf Coast to come into contact with cooler air from the Canadian north.

Tornadoes form from "rotating thunderstorms," Fujita says. And the rotating motion causes air to rush into the centre.

Weather office had issued a warning

The dynamics of the atmosphere can be compared to an ice skater turning with arms outstretched and then suddenly pulling them in close to the body to spin swiftly. The same effect can be seen with water rotating when it goes down a bathtub drain. Rotating thunderstorm are then "like an upside-down bathtub," Fujita says.

"Ideal tornado weather" is moving into Metro and southwestern Ontario this weekend again, with warm moist air from the United States coming in to end the current cold spell.

This produces the kind of weather conditions that breed the kind of thunderstorms that can spawn tornadoes. But the presence of such conditions doesn't Mmean there'll be one.

When the weather office sees the possibility of severe thunderstorms, hail or tornadoes hitting an area in three to six hours, Environment Canada issues a *severe weather watch* to notify people "that something might happen."

The "watch" is cancelled if no storm develops. If severe thunderstorms, perhaps accompanied by tornadoes, are "either occurring or expected within the hour," a *warning* is issued.

Although a "watch" would usually be for a large area, a "warning" is localized as much as possible.

In the case of the Woodstock tornado, a "watch" was issued at 3.40 p.m. and a "warning" at 6.15 p.m. There was, however, no mention of tornadoes.

One tornado touched down at 6.30 p.m. and the other at 6.50 p.m.

To avoid panic, Environment Canada does not issue a "warning" unless a tornado is actually identified on radar — only about one in five shows up on the screen — or someone actually sees one.

Gee says that 30 minutes is "close to the average warning time" for any weather service in the world.

The problem is that tornadoes are "very capricious. You can't predict them. They may touch down in a matter of seconds. All you can do is detect rather crudely those areas that are suspect."

Radio stations are asked to broadcast the warnings. But that has limited value, Gee admits, because no one can pinpoint exactly where a tornado may strike and, even if there is a visual sighting, no one can predict how long the tornado will stay on the ground or if it will maintain its course.

Tornadoes come in all shapes and sizes; some touch down for only minutes, others can last hours. Their swirling winds can be anywhere from 100 to 300 miles, although some meteorologists estimate them as even higher.

On average, there are about 675 tornadoes in the midwest U.S. each year, killing about 120 people and causing about $1.5 billion damage, says Fred Ostby of the U.S. National Severe Storms Forecast Centre in Kansas City.

There are no official records of tornadoes in Canada. But, according to meteorologist Mike Newark, who has made a special study of the subject, there were 77 last year, 44 of them in Ontario.

But this may be just the tip of the tornado iceberg in Canada, says Newark, because the only time anyone knows there has been a tornado is when one is seen by someone. And since the U.S. is 7.5 times more settled than Canada, he calculates the frequency of tornadoes in Canada at about 75 per cent that of the U.S.

"Easily the worst in Canada," Newark says, was the 1912 tornado that hit Regina killing 30 people.

Uprooted home and blew it off

The worst in American history was in 1925 when 689 people died in Missouri, Illinois and Indiana.

One of the most memorable in recent years was the tornado that ripped the roof off a curling rink in Windsor in April 1974, killing 9 and injuring 30. That was one of series of 148 tornadoes that buffeted nine American states and Ontario, killing 337 people.

In the 1974 Windsor tornado, the sound of the whirling wind was described by someone as the same as that of "10,000 freight trains."

In 1972, the Maniwaki, Que., a mother and son were killed when their 50-foot mobile home smashed against another trailer, 250 feet away.

In 1972, four Jacksonville, Fla., children escaped injury when the tent they were in was tossed by a tornado 350 feet away over the roof of their house.

In 1975, a Georgetown couple miraculously escaped injury when their car was lifted five feet in the air, spun around and thrown into another car.

In 1977, a couple was killed when a tornado tore their frame home off its foundations and carried it 150 yards down the road.

In last week's tornado, a car was slammed through the garage wall, into the kitchen of the house and then dumped in the backyard swimming pool.

The day after the Woodstock storm, a tornado hit Regina, causing $11 million damage.

In 1792, in the first tornado Newark has been able to find records of in Canada, the twister cut a swatch through a forest in the Welland area that did the residents a favor. They built a road there and named it simply "Hurricane Rd.," which still exists.

A couple of centuries before that, in 1577, in Bungay, Suffolk, England, a tornado ripped through the middle of a church during a Sunday morning service, killing two kneeling men. It was described by eyewitnesses as "a black devil in likeness" and a "wonderful example of God's wrath."

According to Thorn Won, of Environment Canada, the chances of a tornado hitting any one location are about 1 in 10 million, or, to put it another way, there is a chance that there will be 2 per year in every 10,000 square miles.

In the unlikely event that a tornado would hit a large city lirke Metro, for instance, the chances are that the buildings would remain standing but the windows would be blown out, he says.

As for the CNE tower, the worst that could happen is that part of its mast may go but its structure would stand intact.

Won says he's doing a study for the Atomic Energy Control Board on safety standards for nuclear power stations to ensure they're "tornado-proof."

They already are, say spokesmen for Ontario Hydro and the Atomic Energy of Canada Ltd.

Hugh Irvine, Hydro's manager for nuclear design and development, says that "although in the past, tornadoes weren't considered as thoroughly as they're today," the design of our nuclear stations is such that they can withstand any force that a tornado could conceivably produce.

The concrete structures at Pickering, for instance, can withstand a missile of 12,000 pounds going at 400 m.p.h. on the roof and 1,000 m.p.h. on the walls, he says. "There's lots of protection there."

About the only sure thing that can be said about a tornado is that it is unpredictable.

Although there is a loss of air pressure in the centre of the tornado, the major

Continued on page 6
Suite à la page 6

Continued from page 5
Suite de la page 5

damage comes because of the high winds which, because of their high speed, can actually suck people out of buildings.

What to do in a tornado

And since winds can lift a car off the ground, "all surface transportation must stop," when there's storm warning, Fujita says.

Fujita feels there should be "more public education" in southern Ontario of what to do in the event of a tornado

One should keep away from arenas, because roofs can easily come off, imperilling the structure, as happened to the Windsor curling rink.

In a large building, one should keep away from windows and go to a small room in the centre of the floor; a bathroom is ideal.

If you're on the road, the best advice is to get off it and seek shelter, preferably in a strong building but if necessary, in a ditch or culvert. But you shouldn't be in a location where your car can be blown onto you. If it's also raining, you should also look out for the anger of flooding in ditches.

In private homes, get into the basement, in the centre if possible, or in a closet or under a stairwell, not only to avoid missiles but because these places are structurally the strongest.

These are all good rules, Gee agrees, and gives them himself. But he points out that in the Woodstock tornado, one woman who did take refuge in a closet was killed. In another case, a car fell into a basement and could have killed anyone who was there.

These precautions give the best chances of survival, he says. "But nothing is guaranteed. We're really dealing with something made by God."

Tornado's a twister, hurricane a typhoon

Tornado—The most violent and unpredictable of storms, it forms out of giant thunderstorms and has rotating winds up to 300 miles a hour. Can last a few minutes or hours. Erratic.
Twister—Another name for tornado.
Waterspout—A tornado over water, usually not as strong.
Hurricane—A giant tropical storm hundreds of miles wide, with winds in excess of about 75 m.p.h. Easily trackable by forecasters.

Typhoon—Name used in the Pacific for a hurricane. Known as willy-willy in Australia.
Cyclone—A large scale storm, usually in winter. But the term has been used inaccurately and colloquially when people mean to say hurricane or tornado.
Whirlwind—A rotating mass of air, less violent than a tornado, usually over open or desert country, known also as Dust Devil or Dust Whirl.

Globe and Mail- 9/8/79

More tornadoes likely would hit if not for cool Great Lakes wind

By WAYNE GOODING

If it weren't for the Great Lakes, Southwestern Ontario would probably be hit by many more tornadoes than the dozen or so that touch ground in the area each year.

Pat Pender, the officer in charge of the Ontario Weather Centre at Toronto International Airport, said in an interview yesterday that cool air off the lakes tends to protect the area from tornadoes by inhibiting the buildup of the turbulent masses of warm and very humid air associated with the destructive tornadoes.

"A tornado is basically a violently rotating column of air below a thunderstorm," Mr. Pender said. "There's a potential tornado in any major thunderstorm.

"What happens is that a jet stream moving at up to 300 nautical miles an hour high in the atmosphere draws the humid air violently upward. The air condenses as it moves upward, forming the thunderstorm, and if the air is turbulent enough as it rises, it can produce the tornado."

He said that tornadoes are "small-scale things," which can occur in Southwestern Ontario between early April and late fall. A tornado rarely lasts more than 30 minutes, its destructive centre is usually less than one kilometre wide and it travels a path that can be as small as a few metres or as big as dozens of kilometres, Mr. Pender said.

He said Tuesday's tornado in the Woodstock area came at the end of a day that saw two violent storm systems blow over Southern Ontario.

He said that the first, which did not develop into a tornado, originated around Sault Ste. Marie and travelled down through Georgian Bay and the Metro area before dissipating over Lake Ontario.

"The second was an explosive development that got going at about 6 p.m. over Perth, Waterloo and Oxford counties," he said.

A severe-weather watch was issued for the three counties earlier in the afternoon and later was changed to a severe-weather warning about 45 minutes before the weather centre had first reports that a tornado had touched ground at about 7 p.m.

He said that the centre was unable to warn the area about the tornado because telephone lines already had been blown down.

Mr. Pender said Environment Canada introduced a tornado warning system in Ontario for the first time this year.

Continued on page 7
Suite à la page 7