C TORNADO PROJECT SUMMARY SHEET F=1 ONT

1. DATE AND TIME JUNE 23. 6. 1964.

2. LOCATION OR PATH (attach map) 30 mi N TIMMINS (W-E) 06964-01

FROM 260°.

3. PATH LENGTH ☐ NOT KNOWN ☐ <1mi; ☐ 1-4mi; ☐ 5-10mi; ☒ 104 Km ~~11-50mi~~; ☐ LENGTH IF>50mi

4. PATH WIDTH UNKNOWN 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.)

10. TOTAL DAMAGE ESTIMATE $UNKNOWN 11. TOTAL DEATHS NONE

12. TOTAL INJURED NONE 13. TOTAL HOMELESS NONE

14. LIST ALL REFERENCES

WIND FORCES - TIMMINS, JUNE 23
A FILING MEMORANDUM OF ONTARIO HYDRO
DATED JULY 10, 1964.

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

A LINE OF TREES BROKEN OFF IN VICINITY OF EHV HYDRO ELECTRIC LINE. EXAMINED BY HELICOPTER. CALCULATIONS INDICATE WINDS OF > 100 MPH NEEDED TO CAUSE THE DAMAGE OBSERVED AND BELIEVED TO BE A TORNADO.

WORKSHEET

IDTO 06964-01

(1) ORIGIN x 1746500

y 5415000

(5) Standard Error S_x C2000

(2) LIFT-OFF x_1 1747200

y_1 5415500

(6) Standard Error S_y C2000

(3) $(x_1 - x)$ = 10700

(4) $(y - y_1)$ = 500

(7) DAMAGE LENGTH

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

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

(3)+(4) $\boxed{\rightarrow r,\theta}$ = 10712 m

$\boxed{x \leftrightarrow y}$ = 30°

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

(5)+(6) $\boxed{\rightarrow r,\theta}$ = 2828 m

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

(7)+(9) $\boxed{\rightarrow r,\theta}$

$\boxed{x \leftrightarrow y}$ = 15°

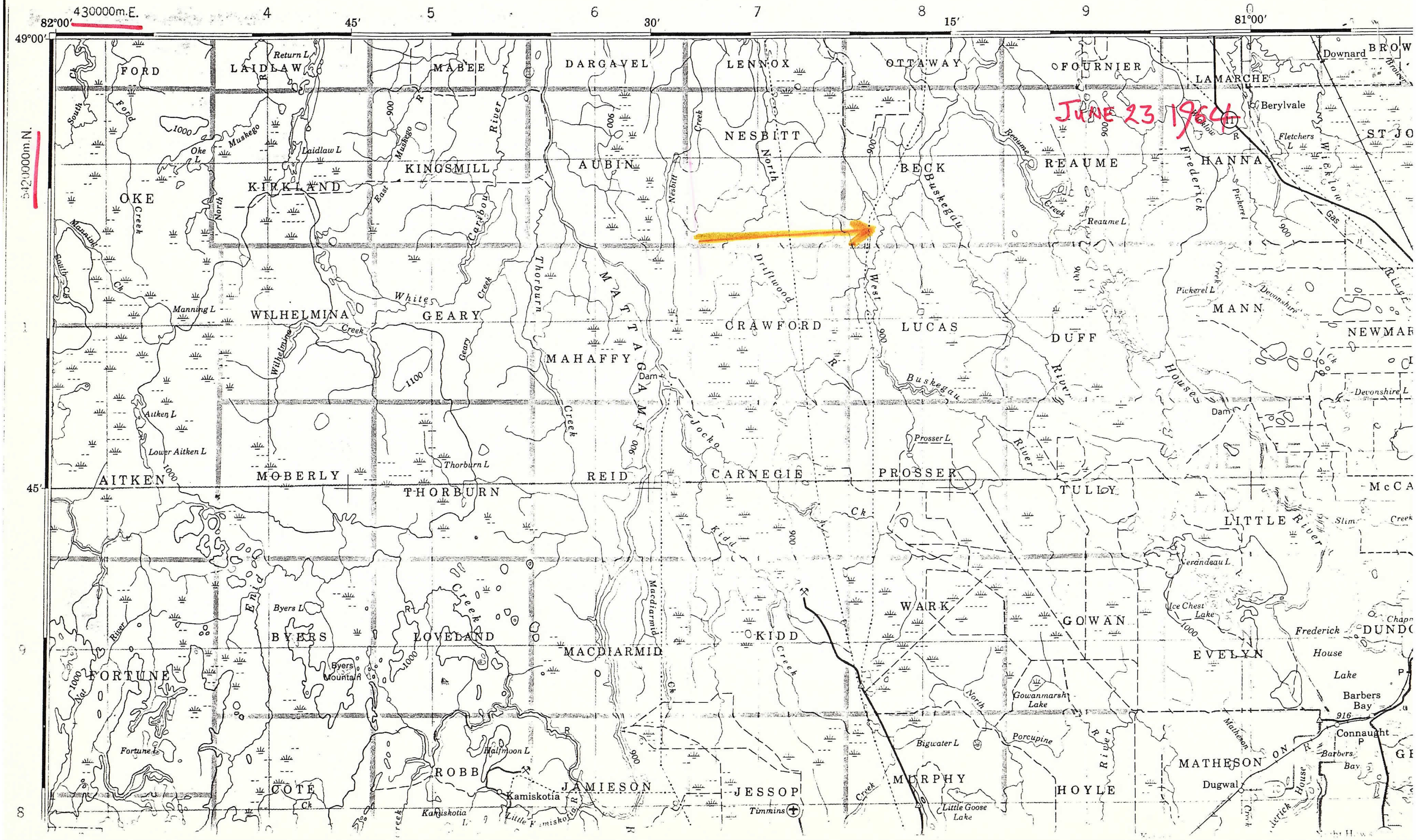
NE Quad $\phi = 90 - \alpha$

NW Quad $\phi = 270 + \alpha$

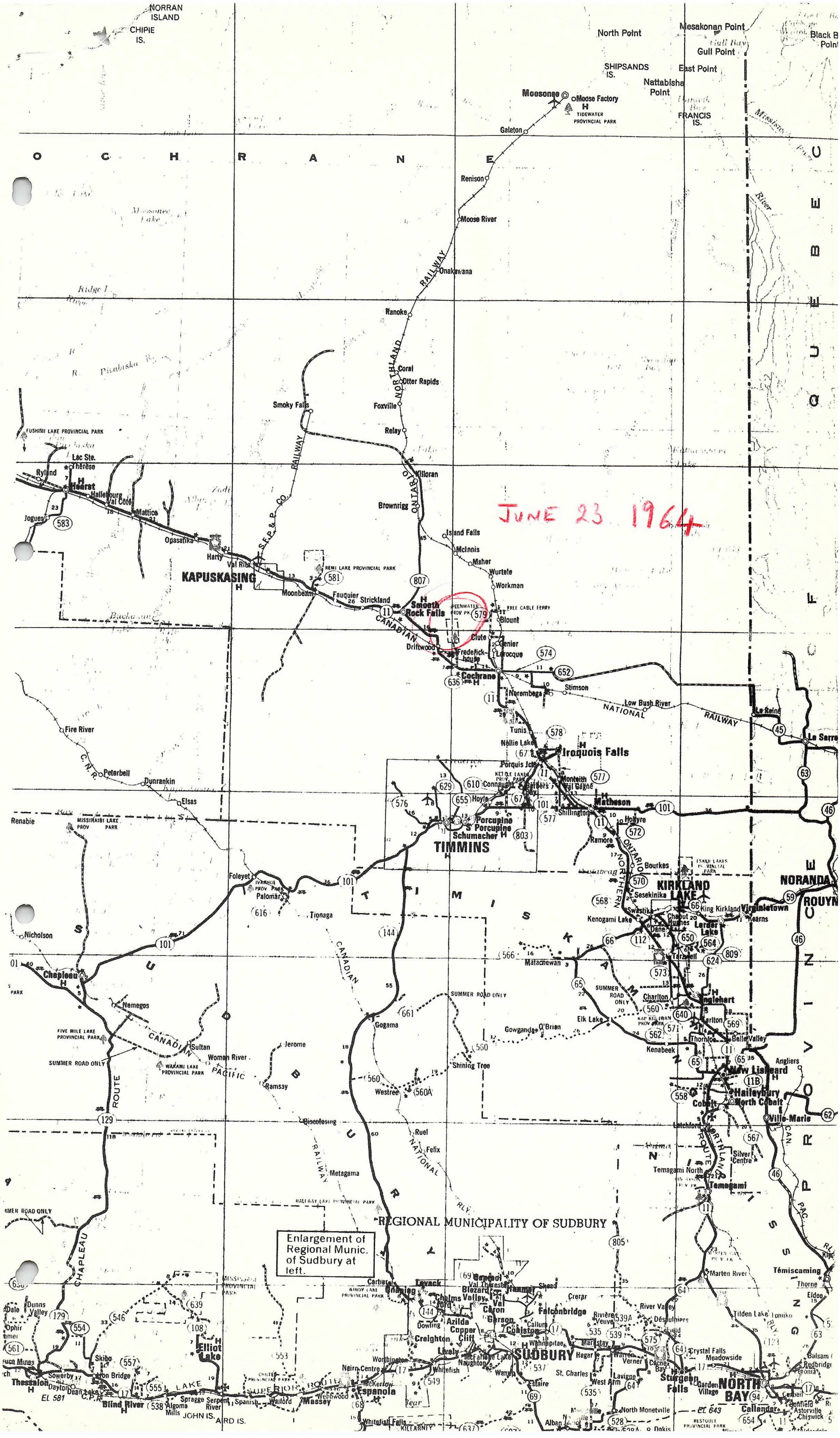
SW quad $\phi = 270 - \alpha$

SE quad $\phi = 90 + \alpha$

(11) ϕ = 267°



430000m.E.
5420000m.N.
82°00′
45′
30′
15′
81°00′
49°00′
JUNE 23 1964
FORD
LAIDLAW
MABEE
DARGAVEL
LENNOX
OTTAWAY
FOURNIER
LAMARCHE
BROWN
Return L
Downard
Berylvale
Fletchers L
NESBITT
ST JO
Laidlaw L
Oke L
Muskego
KINGSMILL
AUBIN
BECK
REAUME
HANNA
OKE
KIRKLAND
Reaume L
Pickerel L
MANN
WILHELMINA
GEARY
CRAWFORD
LUCAS
DUFF
NEWMAR
Manning L
White
MAHAFFY
Dam
Devonshire L
MATTAGAMI
Aitken L
Lower Aitken L
Prosser L
Thorburn L
AITKEN
MOBERLY
THORBURN
REID
CARNEGIE
PROSSER
TULLY
McCA
LITTLE
Verandeau L
Ice Chest Lake
Byers L
WARK
GOWAN
Frederick House Lake
BYERS
LOVELAND
MACDIARMID
KIDD
EVELYN
DUNDO
Byers Mountain
FORTUNE
Gowanmarsh Lake
Barbers Bay
Connaught
Porcupine
Bigwater L
Fortune L
Halfmoon L
ROBB
MATHESON
COTE
JAMIESON
JESSOP
MURPHY
HOYLE
Dugwal
Kamiskotia
Timmins
Little Goose Lake



JUNE 23 1964
NORRAN ISLAND
CHIPIE IS.
North Point
Mesakonan Point
Gull Point
SHIPSANDS IS.
East Point
Nattabisha Point
FRANCIS IS.
Moosonee
Moose Factory
TIDEWATER PROVINCIAL PARK
Galeton
C O C H R A N E
Renison
Moose River
Onakawana
RAILWAY
Ranoke
NORTHLAND
Coral
Otter Rapids
Foxville
Relay
ONTARIO
Killoran
Brownrigg
Smoky Falls
S.F.P. & P. CO. RAILWAY
FUSHIMI LAKE PROVINCIAL PARK
Lac Ste. Thérèse
Ryland
Hearst
Hallebourg
Val Côté
Mattice
Jogues
Opasatika
Harty
Val Rita
KAPUSKASING
REMI LAKE PROVINCIAL PARK
Moonbeam
Fauquier
Strickland
Smooth Rock Falls
Island Falls
McInnis
Maher
Wurtele
Workman
FREE CABLE FERRY
Blount
Clute
Genier
Driftwood
Frederickhouse
Larocque
Cochrane
CANADIAN
Stimson
Norembega
Low Bush River
NATIONAL
RAILWAY
La Reine
La Sarre
Fire River
C.N.R.
Peterbell
Dunrankin
Elsas
Tunis
Nellie Lake
Iroquois Falls
Porquis Jct.
Monteith
Val Gagné
Connaught
Hoyle
Matheson
Shillington
Porcupine
South Porcupine
Schumacher
TIMMINS
Holtyre
Ramore
Renabie
MISSINAIBI LAKE PROV PARK
Foleyet
IVANHOE PROV PARK
Palomar
Tionaga
T I M I S K A M I N G
Bourkes
ESKER LAKES PROVINCIAL PARK
KIRKLAND LAKE
Sesekinika
Swastika
King Kirkland
Virginiatown
Kearns
Kenogami Lake
Dane
Larder Lake
Tarzwell
NORANDA
ROUYN
Nicholson
Chapleau
S U D B U R Y
Matachewan
Charlton
Englehart
SUMMER ROAD ONLY
Nemegos
FIVE MILE LAKE PROVINCIAL PARK
CANADIAN PACIFIC
Sultan
Woman River
WAKAMI LAKE PROVINCIAL PARK
Jerome
Ramsay
Gogama
Gowganda
O'Brien
Elk Lake
Earlton
Thornloe
Belle Vallee
Kenabeek
Shining Tree
Westree
New Liskeard
Angliers
Haileybury
Cobalt
North Cobalt
Ville-Marie
ROUTE
Discofasing
Ruel
Felix
NATIONAL
Latchford
NORTHLAND
Silver Centre
Metagama
Temagami North
Temagami
RAILWAY
HALFWAY LAKE PROVINCIAL PARK
REGIONAL MUNICIPALITY OF SUDBURY
Enlargement of Regional Munic. of Sudbury at left.
CHAPLEAU ROUTE
Marten River
Témiscaming
Thorne
Eldee
Cartier
WINDY LAKE PROVINCIAL PARK
Onaping
Levack
Chelmsford
Blezard Valley
Val Thérèse
Hanmer
Capreol
Val Caron
Garson
Falconbridge
Coniston
Dowling
Azilda
Copper Cliff
Creighton
Lively
Naughton
SUDBURY
Wahnapitae
Markstay
Hagar
Warren
Verner
River Valley
Desaulniers
Tilden Lake
Crystal Falls
Meadowside
Dunns Valley
Ophir
Skibo
Elliot Lake
Thessalon
Sowerby
Dayton
Dean Lake
Iron Bridge
Blind River
Algoma Mills
Spragge
Serpent River
Spanish
Walford
Massey
LAKE SUPERIOR ROUTE
Nairn Centre
Worthington
Whitefish
Espanola
Webbwood
St. Charles
West Arm
Estaire
Wanup
Lavigne
Sturgeon Falls
Cache Bay
Garden Village
NORTH BAY
Callander
Chiswick
Astorville
Corbeil
Whitefish Falls
Alban
North Monetville
Noëlville
JOHN IS.
KILLARNEY

July 10, 1964

FILING MEMORANDUM

Wind Forces - Timmins, June 23

An inspection of the area of damage near the EHV line about 30 miles north of Timmins was made by the writer on July 3. An area from the west edge of Nesbitt Township, about 3½ miles west of the EHV line eastward to the 115 kv line which runs south-southwestward towards Timmins about 3 miles east of the EHV line was observed from the helicopter at a height of about 250 feet (just at the bottom level of the clouds at that time). The presence of a steady rain did not improve visibility and made ground inspection extremely difficult.

The following was observed:

In a direction running about 260° from the EHV line a series of clumps of poplar (aspen) were noted to be broken off at their fulcrum point about 20 feet from the ground. These trees appeared sound in growth with clumps of green leaves near their tops which would present an area on which strong winds might act. They appeared to have been bent over until they broke and did not appear to be twisted off as normally occurs in a classical-type tornado. The fact that several trees suffered similar destruction partially rules out the suggestion that these trees may not have been sound in structure. A black spruce tree about 50' high located adjacent to the EHV line was broken off about 15 feet from the ground. No accurate assessment of the limbs growing out of the tree in the vicinity of the break was made; however, the diameter was about 10 inches.

Mr. J. Platt, Research Division, studied the forces which would be required to break structurally sound trees of the type noted above with the following results.

Assuming a projected area of spruce bows which would be affected by the wind above the break-line as 140 square feet, the following forces and velocities have been calculated; poplar was assumed to have an effective area of 40 square feet.

Spruce	Tree Diameter at break point	8"	10"	12"
	Force (lbs/ft²)	12.0	30	43
	Velocity (mi/hr)	71	105	128

Poplar (Aspen)	Tree Diameter	8"	10"	12"
	Force (lb/ft²)	65	110	190
	Velocity (mi/hr)	148	207	273

It is acknowledged that the trees may have broken at a point of weakness or that the assumption of effective area of tree branches may be somewhat incorrect; however, it is apparent that the velocities involved are considerably above 100 mph.

Meteorological Summary

The instability of the air which is a measure of the air to produce storms was sufficiently severe as to indicate that a tornado was possible. The location of a strong low-pressure area moving just to the north of Timmins which became warm and humid with heavy thunderstorms in the vicinity during the late afternoon are further evidence that this weather situation had the ability to provide singularly powerful thunder and wind storms. This evidence was confirmed by the damage to trees in this area.

Summary

It is suggested that the forces required to break 10 inch trees (at break point) which give a range of velocities from 100-200 mph are the best estimate of winds for this storm. This value agrees reasonably well with a Bayesian analysis of past storms including that at Courtright in 1960.

D.K.A. Gillespie
Meteorologist
Estimates and Resources Section

DKAG:BJT

cc Mr. R.H. Hillery
Mr. F.C. Lawson
Mr. T.J. Burgess
Mr. A.A. Polson
Mr. W.H. Winter
Mr. M. Fraresso
Mr. N. McMurtrie
Mr. J. Platt
Mr. K. Walkerdine

P.S. It is an interesting point that the flimsy buildings owned by the pulp company were not blown down nor was the roof removed as often occurs under the pressure discontinuity associated with a tornado. It is possible that the buildings were well enough vented (with open doors and windows) that a pressure differential would be quickly equalized without any explosion occurring. Also, the presence of several cables draped over the buildings may have held them down.

TIMMINS - JUNE 23 1964

July 10, 1964

[illegible] OF [illegible]

[illegible] Forces - Timmins, June 23

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