(2) A
(1) C

TORNADO PROJECT SUMMARY SHEET

(2) F=0 plotted
(1) F=? ONT

1. DATE AND TIME 25·4·1854, (1) 1830 LOCAL (2) 1300 LOCAL

2. LOCATION OR PATH (attach map) (1) NIAGARA ON THE LAKE (compare "an abnormal wave on Lk Erie" H.S. Reed, The American Naturalist Vol 33 no 392)
(2) TORONTO (DUNDAS ST, 1/2 mi NW of Lunatic Asylum) NW-SE.

3. PATH LENGTH ☑ NOT KNOWN ☐ <1mi; ☐ 1-4mi; ☐ 5-10mi; ☐ 11-50mi; ☐ LENGTH IF>50mi

4. PATH WIDTH (2) 250 YARDS 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.) WAVE OFF LAKE ONTARIO 6 TO 8 FT HIGH

10. TOTAL DAMAGE ESTIMATE $ V 11. TOTAL DEATHS 2 (DROWNED BY WAVE) (1)

12. TOTAL INJURED NONE 13. TOTAL HOMELESS NONE

14. LIST ALL REFERENCES NIAGARA MAIL, MAY 3 1854
CANADIAN JOURNAL, VOL. II., page 278. JUNE 1854.
CANADIAN INSTITUTE, TORONTO.

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

(1)

It is a rather singular coincidence, that on the 25th of April, 1854, a storm somewhat similar in its effects to the hurricane of the 18th April, 1855, should have traversed nearly the same ground. Two persons were then drowned at Niagara by the sudden rise of the waters of the Lakes. At page 278 of the *Canadian Journal*, Vol. II., an account of this storm may be found, and the following extract from the *Niagara Mail* of May 3rd, 1854, giving a description of the rise in the Lake, may not inappropriately be introduced here:

"About a quarter or half-past six o'clock, p. m., a thunder storm came up from the north-west, with a few flashes of lightning and a heavy shower, accompanied by a strong squall of wind for a few minutes, the weather being quite calm just before the gust, and the same after it. The fishermen who were on the beach, seeing the squall coming on, hurried to get in their lines, when suddenly there appeared rolling in upon them an immense wave from the north-west. The height of this wave could not have been less, we judge, than from six to eight feet, although it is difficult to ascertain correctly. It came rolling on the smooth Lake with great velocity, carrying all before it, and sweeping some of the fishermen into the Two Mile Pond, and dashing others of them high up against the bank, by which, as we stated, two persons were unfortunately drowned. The water came and returned three times in succession, and then settled down quite calm as it had been before this commotion."

The late storm appears to have crossed the Indian Reserve Peninsula from Lake Huron, and passing over Georgian Bay it struck the main land of Canada in the township of St. Vincent, near the village of Meaford.

At Meaford the storm commenced about 4 a. m. "The wind blew a perfect hurricane." "Hailstones of very great size fell in a con-

2(a) "an enormous revolving inverted cone of air moving in an inclined direction with great rapidity and violence, from NW to SE, the apex of the inverted cone being of small diameter (about 200 yds), the base of far more imposing dimensions.

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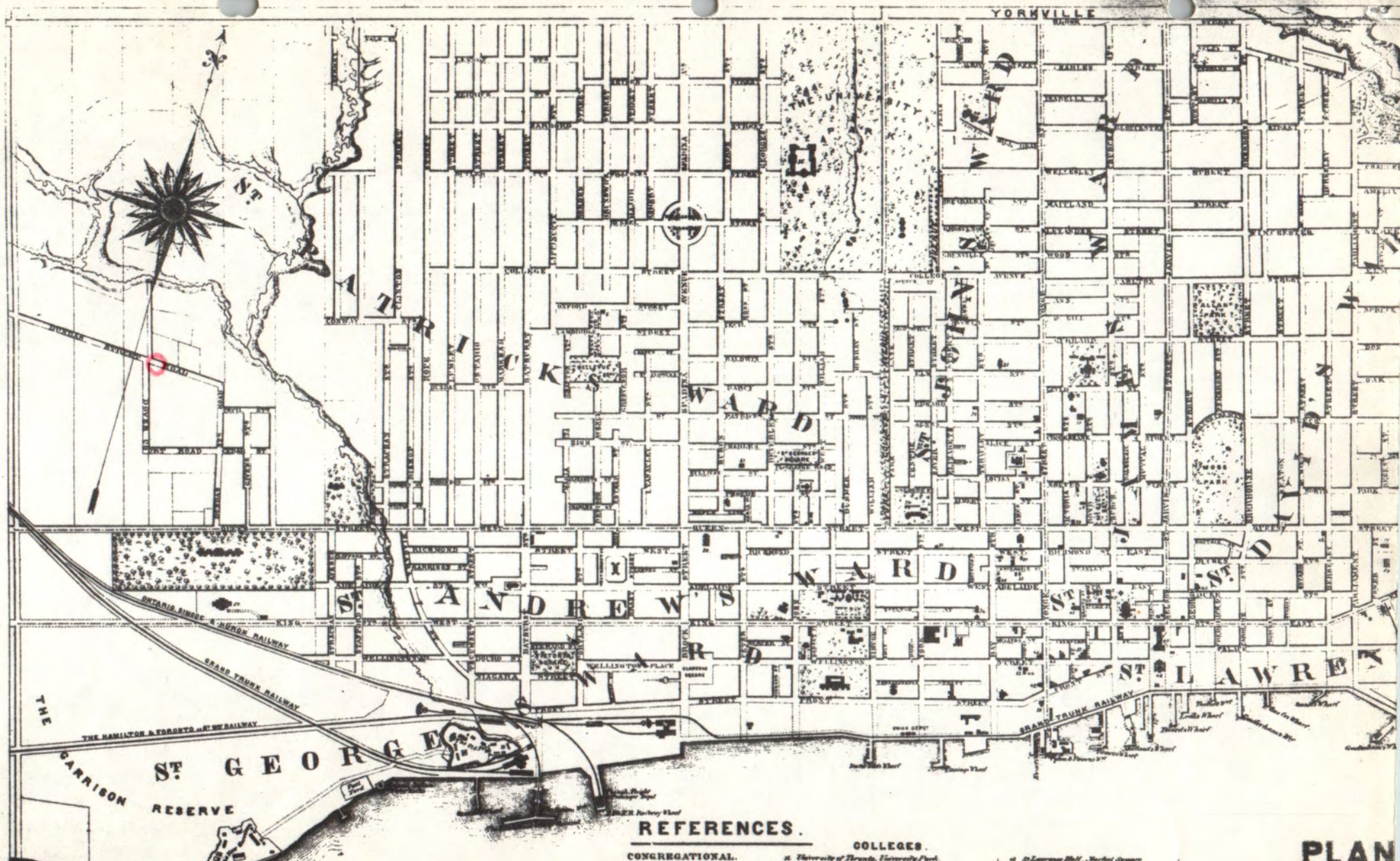

REFERENCES.

CHURCHES.

CHURCH OF ENGLAND.
1. St. James' Cathedral, King & Church Sts.
2. Holy Trinity, West of Yonge Street.
3. St. George's (Memorial Square), N. of Queen St.
4. Trinity, King & Trinity Streets.
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7. St. Mary, Portland & Stewart Streets.

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C. Cooke's, Free Ch. of Canada, Queen & Mutual Sts.
D. Bay Street (U.P.), Bay and Richmond Streets.
E. Gould Street (U.P.), Gould and Victoria Streets.
F. Richmond Presbyterian, Louisa West of Yonge St.

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b. St. Paul's, Power st. between Queen & King St.
c. St. Mary's, Adelaide & Bathurst Streets.
d. St. Basil's, Corner Bond, & Yonge St.

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d. Elm Street
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g. Albert Street, Philadelphia.
h. Asbury Street, Queen Square.
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a. Zion, King & Adelaide Streets.
b. 2nd Congregational, Richmond, W. of Yonge St.

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d. Custom House, Cor. Front & Yonge Sts.
e. Exchange, Wellington Street.
f. Court House, Adelaide St.
g. County Registry Office, Toronto St.
h. Osgood Hall, Queen Street.
i. General Hospital, Seaman St.
j. Provincial Lunatic Asylum, Queen St.
k. Provincial Exhibition Building, King St.
l. Normal School, Gould Street.
m. House of Industry, Elm Street.
n. House of Providence, Power St.
o. Orphans' Home, Sullivan St.
p. Orphans' Home, St. Joseph's, Nelson St.
q. City Registry Office, Wellington St.

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CANADIAN INSTITUTE TORONTO, CANADIAN JOURNAL, JUNE 1854. PAGE 278.

STORM DATE. APRIL 25TH. 1854.

A LAKE PHENOMENON. ALSO, A WHIRLWIND IN TORONTO.

The "NIAGARA MAIL" of May 3rd., describes at some length a remarkable phenomenon which occurred on the 25th. April at the head of LAKE ONTARIO, near the mouth of the NIAGARA RIVER. Below is the "MAIL'S" description of this singular occurrence: "In alluding in our last to the remarkable case of two persons being drowned (one of whom was JAMES FOSTER, an old sailor, and not a pensioner, as we heard), we had not time to do more than chronicle the bare fact, without enlarging on the singular phenomenon which caused their death.—Since then, however, we have made minute inquiries into the circumstances, and remain satisfied that the sudden and extraordainary overflow of the Lake, which occurred on the 25th. ult., originated in some subaqueous convulsion, which took place in the bed of the Lake.

The facts of the event of the 25th., as far as noticed, seem to be as follows:—About a quarter or half past six o'clock, p.m., a thunder storm came up from the Northwest, with a few flashes of lightning, and a heavy shower, accompanied by a strong squall of wind for a few minutes, the weather being quite calm just before the gust, and the same after it. The fishermen who were on the beach, seeing the squall come on, hurried to get in their seine, when suddenly there appeared, rolling in upon them, an immense wave from the Northwest. The height of this wave could not have been less, we judge, than from six to eight feet, although it is difficult to ascertain correctly. It came rolling on the smooth lake with great velocity, carrying all before it, and sweeping some of the fishermen into the TWO MILE POND, and dashing others of them high up against the bank, by which, as we related, two persons were unfortunately drowned.The water came and returned three times in succession, and then settled down quite calm, as it had been before this commotion. It was noticed, moreover, that the wave brought up and cast upon the beach a quantity of logs and sunken drift wood, which had apparently lain long at the bottom of the lake, showing clearly that the movement must have come from the bottom. There was no wind blowing to cause such an unprecedented and rapid swell of the water, the like of which had never been seen on this side of the lake, although something similar occurred at COBOURG some couple of years ago, and a similar phenomenon is related as having taken place in MUD LAKE within a few years.

It is evident to us that there has been a earthquake in the bed of the Lake, at no great distance from land, although there was not the slightest tremour noticed on shore. These occurrences, taking place as they do, would seem to indicate that the bed of the Lake is nearer the seat of subterranean disturbance than the main land, and may undergo agitation at times, without the fact being noticed by dwellers on its margin; but when the earthquake was felt here about eighteen months ago, the rush of wave upon the shore for a short time was tremendous. But the disturbance in that case being, in all probability, further off, prevented a great and sudden rise of water like that on the 25th.

It has been shown, in support of a certain theory, that by far the greatest number of earthquakes have occurred about the new or full of the moon. This theory may receive another case in its support, by the consideration that the event above recorded took place within thirty-one hours of the new moon. We leave the matter as one worthy of philosophical consideration."

The subject of lake convulsions is one of acknowledged difficulty, and in the present state of our knowledge of these phenomena, we need not hesitate to record all events which may have some connection with such mysterious visitations, or in submitting to the consideration and discussion of scientific men theories which appear to involve the true explanation of their origin and recurrence.

As having a possible bearing upon the late lamentable event, we record the occurrence of a whirlwind which was observed in the neighbourhood of TORONTO, at a few minutes after one o'clock p.m., on the same day the 25th. April.

Attention was first drawn to the whirlwind by the falling of a vast number of dead leaves, on DUNDAS STREET, about half a mile north-west of the Lunatic Asylum. A narrow belt of air, apparently not exceeding two hundred and fifty yards in width, was first observed to be filled, as it were, with innumerable dead leaves, tumultuously tossed about, chiefly in an upward direction, and at a considerable elevation. Above this moving stratum of leaves several yellowish coloured detached clouds, apparently of fine particles of sand and dust, were whirled on in the same direction as the leaves, which was from the north-west to the south-east. The leaves and clouds of dust had been noticed for three or four minutes before any signs of wind at the surface appeared. The first indication of the approaching vortical shaft of air was seen in the topmost branches of a number of

large pine trees west of the HON. S.B.HARRISON'S house, near DUNDAS STREET. The motion produced in the uppermost branches was very violent, but it did not appear materially to affect the lower branches or smaller trees. The tops of small pines and cedars, two or three hundred yards east of the tall pines before noticed, were much twisted, but still comparatively little effect was observed at the surface until the chief force of the whirlwind had passed over the spot where these observations were made. The effect of the whirlwind was not distinguishable for a greater breadth at the surface than between two and three hundred yards; at a considerable elevation, however, after the passage of the vortical shaft at the surface, the air above seemed filled for a much greater breadth, and to a great altitude, with detached cloud masses of dust and leaves. The idea conveyed by the whole phenomenon was that of an enormous revolving inverted cone of air moving in an inclined direction with great rapidity and violence from north-west to south-east, the apex of the inverted cone being of small diameter(about 200 yards), the base of far more imposing dimensions.

This phenomenon, although frequent in Canada during the summer months, aquires interest when considered in connection with the occurrence recorded by the editor of the "NIAGARA MAIL," and if followed at a later hour of the day by another whirlwind of greater dimensions, might also afford an explanation of the remarkable and disastrous event which caused the death of two persons near the mouth of the NIAGARA RIVER. We have not as yet heard of any other occurrence of a whirlwind or notable local variation in atmospheric pressure on the same day, and as the difference in point of time between the lake convulsion and the phenomenon just noticed, exceeds five hours, it seems scarcely probable that a seiche, produced by sudden variation in atmospheric pressure, could have connected the events. (see CANADIAN JOURNAL. VOL.11, p.29, for an interesting paper on the seiches of Lakes, by COLONEL JACKSON)(In A.E.S. Library). We are indebted to the DIRECTOR of the PROVINCIAL MAGNETIC OBSERVATORY for the following abstract from the Meteorological Journal of that establishment.

APRIL 25TH 1854

Hour of observation.	Observed barometer.	Barometer reduced to 32°F.	Difference of Barometer from normal reading.	Pressure of dry air.	Humidity.	Temperature.	Difference of Temperature from normal	Direction of Wind.	Velocity of wind in miles per hour.	Direction of motion of clouds from	Cloudiness.	Remarks.
6 A.M.	29·584	29·509	—0·150	29·260	88	45·4	+6·7	SSW	2·4	None.	0·0	Hazy round horizon.
8 ,,	·574	·501	—0·177	·175	79	54·2	+10·6	ESE	2·9	W	0.4	Cirro-cum. generally dispersed.
2 P.M.	·514	·434	—0·205	·168	43	65·1	+13·9	SE by E	5·2	W	1·0	Overcast and hazy.
4 ,,	·470	·390	—0·236	·103	51	63·2	+12·3	SE by E	7·8	W	1·0	Do., heavy thunderstorm, with rain, from 5·50 to 6.45.
10 ,,	·436	·353	—0·287	·046	91	48·5	+7·0	NE by E	3·2	NW	1·0	Densely overcast.
Midnight	·452	·396	—0·263	·053	94	48·5	+8·0	NE by E	4·1	Not per.	1·0	Do., very dark, spitting rain occasionally.

Two interesting circumstances appear upon an examination of the above table—the first being the sudden diminution in the degree of humidity of the atmosphere; at 6a.m., the humidity was represented by 83, the point of saturation being 100, at 2p.m.—after the passage of the whirlwind—the humidity was reduced to 43; at 10p.m.—after the thunderstorm—it rose, as might have been anticipated, to 91. At 2p.m. the wind was S.E. by E.; at 10p.m. from N.E. by E., the direction of the motion of the clouds being, at 2p.m., west, and at 10p.m. northwest.

Two nearly opposite currents of air are thus recorded as having been observed about the time of the whirlwind, and when these facts are associated with the very gradual fall of the barometer, we arrive at the conclusion that the whirlwind was the result of the meeting of the opposing currents of air—probably of different temperatures and different degrees of humidity—and did not exercise an appreciable influence a mile on either side of its track—the distance of the observatory from the line of its passage rather exceeding a mile.

By reference to the quotation from the "NIAGARA MAIL", it will be seen that the editor of that paper considers the cause of the Lake convulsion to have been an earthquake, which is inferred "to indicate that the bed of the Lake is nearer the seat of subterranean disturbance than the mainland, and may undergo agitation at times without the fact being noticed by the dwellers upon its margin." In addition to this hypothesis, we may call attention to two geological features of this part of North America, which are not devoid of interest, and to say the least, afford material for speculation as to the connection with recent events of forces which operated with wonderful energy in times very remote from us now.

On page 27 of the Geological Report of Canada for 1845, the distinguished director of the Survey, in speaking of the origin of the Apalachian chain of mountains and the quiescent conditions of the Illinois and Michigan coal fields, as compared with the disturbed condition of some portions of the Pennsylvanian deposits, remarks—"It does not seem improbable, however, that the broad low anticlinal arch which separate these two from the other (the Michigan and Illinois from the Pennsylvanian), may have some relation to the expiring effort of those forces; for, although its axis cannot be called precisely parallel to the Apalachian undulations, there are yet bends in it that seem to correspond with some of the curves of the chain of mountains. From Monroe County, in Kentucy, this axis takes a gently sinuous course, running under [redacted] Cincinnati on the Ohio,

to the upper end of Lake Erie; thence it curves to the upper end of Lake Ontario, where my assistant, Mr. Murray, has observed its influence in deflecting the strike of the strata in the neighborhood of Burlington Bay. It then enters the Lake under the waters of which it probably dies away towards the north shore."

The depth of Lake Ontario, between Toronto and the mouth of the Niagara river, exceeds 400 feet, and, in some parts of that line, is stated by mariners to be much greater. The bed of the lake, west of the Niagara river, is excavated in the Medina sandstone, which is known to be far thicker at the western extremity of the Lake than in its south-eastern development. Its thickness in the Niagara District is upwards of 600 feet, and borings have been made in this rock at St. Catherines to a depth of 480 feet below the level of Lake Ontario. It thins out and disappears in Oneida County, in the State of New York. The formations below the Medina sandstone, known by the name of Oneida Conglomerate and Grey sandstone, do not appear on the north side of the Lake. It is probable in the supposed absence of the undulation described by Mr. Logan, that the Hudson River group would form the floor of the Lake a few miles north of a line drawn between Oswego and the Credit.This would be succeeded by a narrow band of the Utica slate, and then by the Trenton limestone and its associated rocks, reposing upon the metamorphic series displayed at the east end of the Lake. The existence, however, of the undulation before alluded to would have the effect of changing, in some measure, the subaqueous outcrop of these rocks. We may, perhaps, connect the phenomenon which has recently occurred at Niagara, with others of the same class recorded as having been witnessed at PORT HOPE, COBOURG, and RICE LAKE, if we suppose that the anticlinal axis spoken of by Mr. Logan-persisting in those sinuosities which had already distinguished its progress-trended to the south shore, and died away in the direction of the middle of the Lake. The effect of this undulation would be to bring the Utica slate within the excavating influence of the waters of the Lake south of Niagara. An inspection of a chart of Lake Ontario shows how unequally this excavating process has gone on. Between Toronto and the Niagara river we find on Lieut Herbert's chart the following depths:- At about 5 miles south of Toronto, 180feet; 14 miles, 402 feet; 22 miles 210 feet. In other parts of the Lake still greater unevenness in its floor occurs, which is scarcely to be explained by tertiary formations. Now, when we consider that the phenomenon at GRAFTON was accompanied by the "water boiling, as you see in the lesser rapids of the ST. LAWRENCE," (see CANADIAN JOURNAL, VOL.11., page 63.)

the hypothesis becomes well grounded that these Lake convulsions arise from the sudden liberation of vast masses of carburetted hydrogen and other gases which result from the decomposition of immense accumulations of vegetable and animal remains, which distinguish the black bituminous shales of the Utica slate. The Niagara river daily exhibits the vast supply of carburetted hydrogen which the Niagara Limestone and other rocks over which it flows near the Falls, is capable of producing, and the Utica slate is especially distinguished by the presence of this gas in vast abundance.

The phenomena at PORT HOPE, RICE LAKE, GRAFTON, and NIAGARA become at once connected, if it be true that the Utica slate forms a portion of the bed of the Lake a few miles north of the mouth of the NIAGARA RIVER, and that the suddenly liberated gases from that rock are capable of producing the effects observed. It is clear that, under such circumstances, the earthquake which occurred on MARCH 13TH. 1853, which was felt at TORONTO, NIAGARA, etc., would assist the escape of the pent-up gases, and might, therefore, play a secondary part in occasioning the rush of waves on the shores noticed at NIAGARA, but not be the actual cause of the phenomenon.

The boiling appearance of the Lake produced off GRAFTON, in 1847, is precisely what would be observed as the effect of the escape of gas from the floor of the Lake; and it is well known that deep wells and shafts sunk in the Utica slate in its exposures in the TOWNSHIP of WHITBY are rapidly filled, when left in a state of repose, with light carburetted hydrogen mixed with sulphuretted hydrogen. The same phenomena are observable in deep wells sunk in the Hudson river group at TORONTO, and during the last summer a constant bubbling up of carburetted hydrogen occurred during many weeks in a well on QUEEN STREET. The Utica slate, however, from its remarkable bituminous character, is particually distinguished by the emission of gases when its strata are penetrated, and thus affords reasonable ground for the hypothesis that many violent Lake convulsions are caused by the sudden liberation of pent-up gases, resulting from the decomposition of the carbonaceous accumulations which characterize it.