



**SEISMOLOGICAL SERIES**  
of the  
**DOMINION OBSERVATORY**

**1961-4**

**CANADIAN  
EARTHQUAKES  
1961**

**W. G. Milne  
and  
W. E. T. Smith**

**Seismological Service  
of Canada**

**OTTAWA, CANADA**

**Department of Mines and Technical Surveys**

**DOMINION OBSERVATORIES**

**1962**

# CANADIAN EARTHQUAKES - 1961

W. G. Milne and W. E. T. Smith

## SEISMOLOGICAL SERIES

of the

## DOMINION OBSERVATORY

1961 - 4

## CANADIAN EARTHQUAKES - 1961

W. G. Milne and W. E. T. Smith

Seismological Service of Canada

OTTAWA, CANADA

Department of Mines and Technical Surveys

DOMINION OBSERVATORIES

This document was produced  
by scanning the original publication.

Ce document est le produit d'une  
numérisation par balayage  
de la publication originale.



## CANADIAN EARTHQUAKES - 1961

W. G. Milne and W. E. T. Smith

### INTRODUCTION

The general program of the Seismological Service to catalogue all Canadian earthquakes, was outlined by Milne and Smith in "Canadian Earthquakes - 1960" (1960-2 of this Series). The present paper is another in the sequence enabling interested persons to receive currently available data without waiting for the completion of the whole project. These papers will not replace the more formal papers in the Publications, which will be produced only at intervals dictated by the seismic activity.

For the purpose of describing Canadian seismicity, Canada has been divided into four regions. The most northerly is the Arctic region, consisting of that part of Canada north of the 60th parallel. The area south of the 60th parallel is divided into three regions, a Western region lying west of the 113th meridian, an Eastern region lying east of the 85th meridian, and a Central region lying between the 85th and the 113th meridians.

During 1961 no earthquakes are known to have occurred in the Central region. The earthquakes of the other three regions are listed in Tables I, II and IV, and the epicentres are plotted in Figures 1, 4 and 5. In each of these maps the symbol representing an earthquake is related to its magnitude as indicated by a diagram in the legend.

### STATION CHANGES

It was announced in the paper on 1960 earthquakes that the Department had undertaken to expand the seismological network so that no point in the country would be more than 300 miles from a first-class seismograph station. At that time it had been intended that the installation of the network would proceed at the rate of two or three stations a year. As part of Canada's contribution to the Upper Mantle Project the rate of installation of these new stations is being stepped up so that five stations will be installed each year until the network has been completed by the end of 1964.

As part of this program the following network changes were made during the calendar year:

- (i) New standard instruments were installed at Penticton and began operation on February 20.
- (ii) New standard instruments were installed at Victoria, and the new station began operation on March 22.
- (iii) The station at Seven Falls ceased operation on May 3. The vault has been painted and prepared for the installation of the new instruments.
- (iv) The station at Ottawa was taken out of operation on November 13, to permit the construction of new vaults.

(v) The most northerly seismograph station in the world began operation at Alert, N.W.T., on September 29.

(vi) The station at Mould Bay, N.W.T., began operation on October 18. This station is not as far north as Alert, but is much more difficult of access and the successful installation is very gratifying.

(vii) Modern instruments were installed inside the Fanshawe Dam, near London, where they are being operated by personnel of the University of western Ontario. This was intended as a temporary installation, but the site seems sufficiently quiet for the station to be continued indefinitely.

#### POLICY CHANGES

In the past it has been the policy to list all earthquakes recorded, however small, and whether or not they could be located. As more is learned about the seismicity of Canada it appears that this policy is not a wise one. The very smallest earthquakes will only be recorded if they occur close to a sensitive seismograph station. It is also likely that a high percentage of the small events listed will be blasts rather than earthquakes. Strenuous efforts have been made to eliminate blasts from the lists but this obviously becomes increasingly difficult with smaller and smaller magnitudes. In this issue therefore the policy of omitting unlocated disturbances of magnitude 2 or less in the lists for Eastern and Western Canada has been initiated. It should be stressed that all events on the seismograph records are read and that records are maintained on these small events so that if a reconsideration of the small events becomes desirable for any reason it may be done without re-examining the records.

The number of disturbances in the Arctic region has continued to be much greater than anticipated. They cannot all be earthquakes, but there are no sources of blasts to explain them. All recorded disturbances will be listed until some explanation of their cause can be found.

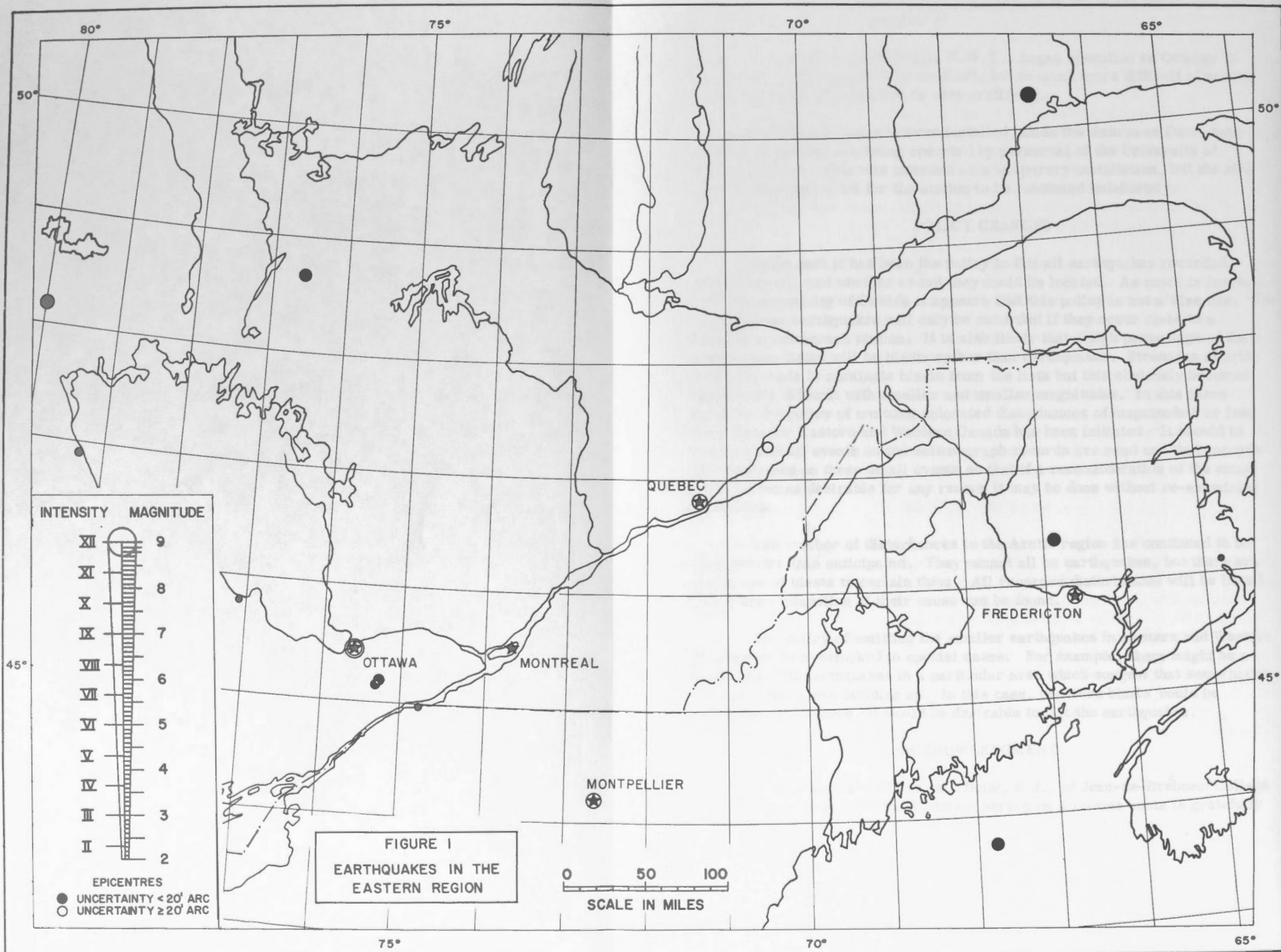
The policy of omitting the smaller earthquakes in Eastern and Western Canada may be overlooked in special cases. For example, there might be a series of small earthquakes in a particular area which suggest that some major seismic activity was building up. In this case, provided blasts could be eliminated as a source, it would be desirable to list the earthquakes.

#### ACKNOWLEDGMENT

The cooperation of Rev. M. Buist, S. J., of Jean-de-Bréboeuf College in supplying records from the Montreal station on a routine basis is gratefully acknowledged.







## EASTERN CANADA

(East of 85° W, South of 60° N)

No major earthquakes occurred in Eastern Canada during 1961. Twelve small disturbances were recorded, eight of which were felt. They are listed in Table I and their epicentres are plotted in Figure 1. No numbers have, as yet, been assigned to these. In two cases, questionnaires were distributed and the results are summarized on the epicentral maps, shown as Figures 2 and 3.

Beginning with this list, the epicentral coordinates include the uncertainties. It should be clearly understood that these are not "probable errors" or any other statistical evaluations. They were assigned by the writer (Smith) after consideration of the number and quality of the seismic traces, the positions of the epicentres relative to the recording stations, etc., and are an indication of his confidence in the precision of the determinations. When both uncertainties in the coordinates are adjudged to amount to less than  $\pm 20'$  of arc, the epicentre is plotted as a filled circle in Figure 1; otherwise the circle is left open.

TABLE I

### EARTHQUAKES IN EASTERN CANADA

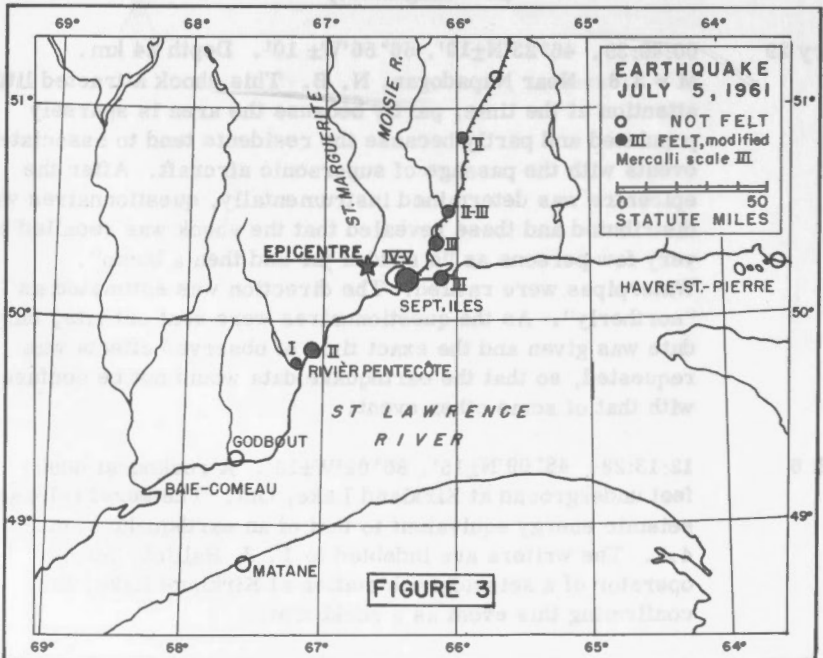
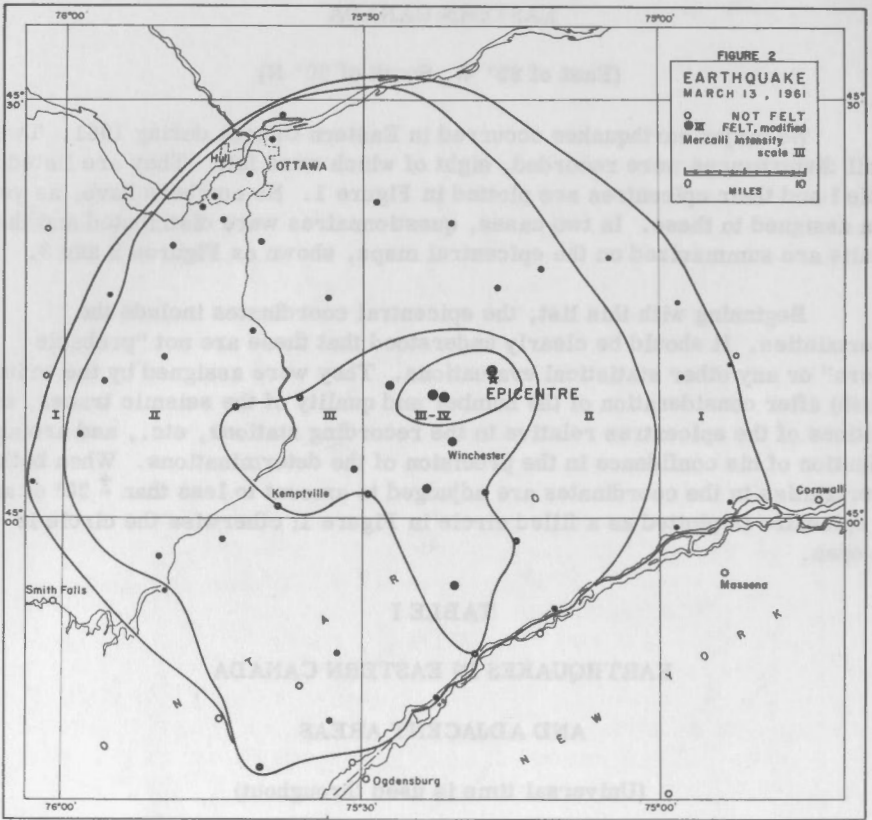
#### AND ADJACENT AREAS

(Universal time is used throughout)

(M = magnitude)

- January 29      00:49:39. 46° 23'N $\pm$ 10', 66° 56'W $\pm$  10'. Depth 24 km.  
M = 3.8. Near Napadogan, N. B. This shock attracted little attention at the time, partly because the area is sparsely populated and partly because the residents tend to associate such events with the passage of supersonic aircraft. After the epicentre was determined instrumentally, questionnaires were distributed and these revealed that the shock was recalled by a very few persons as "a sudden jar and then a bump". Waterpipes were rattled. The direction was estimated as "northerly". As the questionnaires were sent out late, only the date was given and the exact time of observed effects was requested, so that the earthquake data would not be confused with that of some other event.
- March 6        12:13:28. 48° 09'N $\pm$ 15'. 80° 02'W $\pm$ 15'. A rockburst 6000 feet underground at Kirkland Lake, Ont. The burst released seismic energy equivalent to that of an earthquake of magnitude 4.8. The writers are indebted to F. J. Hallick, former operator of a seismograph station at Kirkland Lake, for confirming this event as a rockburst.





- March 13 10:55:45.  $45^{\circ}10'N \pm 10'$ ,  $75^{\circ}17'W \pm 10'$ .  $M = 3.2$ . About 27 miles southeast of Ottawa, Ont. It was felt within a radius of about 30 miles. The epicentral intensity was III - IV. A field trip into the affected area was made during the three following days. Persons in about 60 communities were interviewed. From this the extent of the area over which the shock was felt was determined and the places most strongly affected were found. The results of the trip are summarized on the map shown as Figure 2. The limits of the felt area are quite precisely determined except perhaps to the north where the line is based on voluntary reports received by the news services at Ottawa. The higher isoseismal lines are less definitive.
- March 22 12:02:56.  $45^{\circ}50'N \pm 10'$ ,  $77^{\circ}05'W \pm 10'$ .  $M = 2.2$ . Recorded only at Ottawa. Intensity II - III was felt in Pembroke, Ont.
- April 20 13:13:00.  $45^{\circ}00'N \pm 5'$ ,  $74^{\circ}47'W \pm 5'$ .  $M = 2.0$ . Between Cornwall, Ont., and Massena, N.Y. Felt at intensity II at both places.
- July 5 22:43:44.  $50^{\circ}15'N \pm 15'$ ,  $66^{\circ}41'W \pm 10'$ .  $M = 5.0$ . About 17 miles west by north of Sept-Îles, Que. Felt generally in Sept-Îles but most strongly in the north and west part of town. Pictures, chairs and chandeliers were moved. It was felt in a moving automobile. The direction was estimated as NW to SE. The shock attracted considerable attention even though the people were conditioned to frequent blasting. A number believed that their furnaces had exploded. Felt also at Rivière-Penticôte, Port Cartier, Moisie, along the Moisie River and north to Tika, over 50 miles from the epicentre. Questionnaires were distributed through the courtesy of R. W. Pryer, Soils Engineer, Quebec North Shore and Labrador Railway Co., Sept-Îles. Fifty-five replies were received. The results are summarized on the map in Figure 3. Because the population is concentrated at points along the shore and the railway, it was impractical to draw isoseisms.
- August 22 18:55:51.  $47^{\circ}20'N \pm 20'$ ,  $70^{\circ}30'W \pm 30'$ .  $M = 3.4$ . In the St. Lawrence River south of Ile aux Coudres, Que.
- September 12 09:54:23.  $45^{\circ}12'N \pm 10'$ ,  $75^{\circ}15'W \pm 10'$ .  $M = 2.8$ . About 27 miles southeast of Ottawa at about the same place as the shock of March 13 at 10:55:45. Felt at South Mountain, Ont., and vicinity. The felt reports were supplied through the courtesy of Radio Station CJSS, Cornwall, Ont.
- October 7 22:36:51.  $48^{\circ}40'N \pm 12'$ ,  $76^{\circ}35'W \pm 12'$ . Some indication that the depth was 8 km.  $M = 3.8$ . About 40 miles east northeast of Senneterre, Que.

- October 31 23:50.  $46^{\circ}06'N$ ,  $64^{\circ}47'W$ . (Moncton, N.B.)  $M = 1.7$ . Radio Station CKCW, Moncton, N.B., reported hundreds of calls from persons who felt a shock - "like a baby falling out of bed" etc. The disturbance was not recorded 120 miles away on the seismographs at Halifax, N.S. If the event were actually seismic, it must have been of magnitude 1.7 or less to be undetectable at Halifax.
- November 1 03:41:21.  $46^{\circ}55'N \pm 15'$ ,  $79^{\circ}15'W \pm 15'$ .  $M = 2.9$ . Near Tee Lake, about 17 miles northwest of Timiskaming, Ont. Felt at Timiskaming and in the vicinity but most strongly around Tee Lake. The epicentre was near that of the Timiskaming earthquake of November 1, 1935, at 01h 30m. The shock was recorded only at the Ottawa seismograph station. The writers are indebted to Wm. Irwin, Mayor of Timiskaming, for supplying data about the affected area, from which the above estimate of the epicentral position was made.
- December 14 01:49:35.  $43^{\circ}50'N \pm 18'$ ,  $67^{\circ}49'W \pm 18'$ . Depth 25 km.  $M = 3.9$ . In the Atlantic ocean about 40 miles from the New England coast and about 85 miles due west of Yarmouth, N.S.

#### THE CANADIAN ARCTIC

(North of  $60^{\circ}N$ )

Sixty-nine seismic disturbances were recorded in the Arctic region during 1961. They are listed in Table II without numbers, pending further research to eliminate those not connected with the seismicity of the area. No major earthquakes occurred, although one small earthquake was felt at Whitehorse. Six epicentres were located instrumentally and are plotted in Figure 4. Uncertainties were assigned to the epicentral coordinates in the same manner as for Eastern Canada. It is possible that these uncertainties are too conservative, for in each instance few stations could be used and their distances were comparatively great.

During 1960, only one Arctic earthquake was located and no map was published. Therefore this single earthquake, which occurred on September 6, has been plotted on the 1961 map and labelled "1960".

As mentioned in a previous section, Mould Bay is difficult of access, and as a consequence only readings sent by wireless had been received by the time the Seismological Bulletin October-December 1961 had gone to press. Since then the records have been examined with the result that a number of inconsequential events have been omitted from this list and more accurate epicentral coordinates determined for some of the earthquakes.

TABLE II  
EARTHQUAKES IN THE CANADIAN ARCTIC

(Universal time is used throughout)

(M = magnitude)

January 3	12:05:25. M = 3.4. 342 miles from Resolute, N.W.T.
January 3	20:47:48. M = 4.3. 777 miles from Resolute, N.W.T.
January 3	23:30:45. M = 2.7. 130 miles from Resolute, N.W.T., at a depth of about 4 km.
January 20	11:30:26. M = 1.0. 30 miles from Resolute, N.W.T.
January 31	04:09:01. M = 1.7. 68 miles from Resolute, N.W.T.
February 1	10:43:56. M = 3.2. 145 miles from Resolute, N.W.T., at a depth of about 29 km.
March 24	06:04:28. M = 2.5. 36 miles from Resolute, N.W.T.
March 31	00:57:57. M = 1.6. 69 miles from Resolute, N.W.T.
April 3	08:42:43. M = 3.6. 565 miles from Resolute, N.W.T.
April 4	17:37:54. M = 4.5. 1149 miles from Resolute, N.W.T.
April 5	01:13:08. M = 1.4. 20 miles from Resolute, N.W.T.
April 9	16:40:50. M = 2.3. 30 miles from Resolute, N.W.T.
April 13	06:33:11. M = 1.8. 83 miles from Resolute, N.W.T.
April 15	10:36:10. M = 3.9. 558 miles from Resolute, N.W.T.
April 16	20:42:45. M = 2.5. 58 miles from Resolute, N.W.T.
April 23	07:25:16. M = 0.9. 24 miles from Resolute, N.W.T.
May 9	13:04:01. M = 1.6. 85 miles from Resolute, N.W.T.
May 19	22:00:21. M = 4.4. 684 miles from Resolute, N.W.T.
May 21	11:56:02. M = 1.1. 21 miles from Resolute, N.W.T.
May 22	21:05:30. M = 2.6. 142 miles from Resolute, N.W.T., at a depth of about 9 km.

- May 23 11:30:11. M = 3.9. 450 miles from Resolute, N.W.T. This is believed to be a foreshock of the earthquake that follows. The seismic traces are very similar.
- May 23 12:02:28. M = 4.5. 450 miles from Resolute, N.W.T. This earthquake is believed to have had one foreshock and one after-shock.
- May 23 12:45:04. M = 4.0. 450 miles from Resolute, N.W.T. Believed to be an aftershock of the preceding earthquake.
- June 8 05:48:20. M = 1.4. 51 miles from Resolute, N.W.T.
- June 8 22:04:06. M = 0.8. 18 miles from Resolute, N.W.T.
- June 17 07:38:49. M = 1.3. 33 miles from Resolute, N.W.T.
- June 29 19:31:19. M = 1.3. 25 miles from Resolute, N.W.T.
- July 1 02:06:28. M = 1.4. 25 miles from Resolute, N.W.T.
- July 3 22:57:07. M = 1.9. 31 miles from Resolute, N.W.T.
- July 4 04:49:06. M = 1.5. 66 miles from Resolute, N.W.T.
- July 4 05:39:38. M = 1.5. 66 miles from Resolute, N.W.T.
- July 4 06:17:57. M = 1.4. 66 miles from Resolute, N.W.T.
- July 4 07:17:56. M = 1.8. 66 miles from Resolute, N.W.T.
- July 4 10:20:42. M = 2.1. 66 miles from Resolute, N.W.T.
- July 10 05:06:11. M = 2.4. 114 miles from Resolute, N.W.T.
- July 19 02:59:29. M = 1.9. 144 miles from Resolute, N.W.T., at a depth of about 33 km.
- July 22 13:01:09. M = 2.1. 58 miles from Resolute, N.W.T.
- July 25 22:35:29. M = 1.7. 51 miles from Resolute, N.W.T.
- August 7 12:55:51. M = 3.1. 156 miles from Resolute, N.W.T., at a depth of about 27 km.
- August 15 12:26:09. 61°N+1°, 135°W+1°. M = 5.3. Near Whitehorse, Yukon Territory. Felt by various residents of Whitehorse. Reported by the Whitehorse detachment RCMP as consisting of two distinct shocks.

- August 16 07:51:45. M = 3.2. 194 miles from Resolute, N.W.T.
- September 20 06:54:46. M = 2.2. 71 miles from Resolute, N.W.T.
- September 22 03:44:18. M = 2.2. 38 miles from Resolute, N.W.T.
- October 4 04:33:42. M = 3.1. 275 miles from Resolute, N.W.T., at a depth of about 20 km.
- October 5 06:33:40. M = 2.1. 41 miles from Resolute, N.W.T.
- October 11 19:47:17. M = 3.1. 77 miles from Resolute, N.W.T.
- October 11 23:58:46. M = 2.3. 77 miles from Resolute, N.W.T. Believed to be an aftershock of the previous earthquake.
- October 14 18:18:20. M = 4.8. 746 miles from Resolute, N.W.T.
- October 16 17:54:12. M = 4.0. 459 miles from Resolute, N.W.T.
- October 31 18:18:09. M = 1.6. 137 miles from Resolute, N.W.T.
- November 1 About 21h 00m. M = 2.4. 143 miles from Alert, N.W.T.
- November 3 00:27:07. M = 2.4. 143 miles from Alert, N.W.T.
- November 4 10:44:21. M = 1.3. 51 miles from Resolute, N.W.T.
- November 9 16:34:19. M = 2.4. 57 miles from Resolute, N.W.T.
- November 10 05:31:52.  $73^{\circ}3' N \pm 1^{\circ}0'$ ,  $71^{\circ}8' W \pm 0^{\circ}5'$ . M = 4.1. In Baffin Bay about 130 miles east - northeast of Pond Inlet, Baffin Island, N.W.T.
- November 10 19:23:34.  $76^{\circ}4' N \pm 0^{\circ}5'$ ,  $106^{\circ}8' W \pm 0^{\circ}5'$ . M = 4.0. In Weatherall Bay about 20 miles north of Melville Island, N.W.T.
- November 10 22:43:29.  $62^{\circ}5' N \pm 1^{\circ}0'$ ,  $124^{\circ}4' W \pm 1^{\circ}5'$ . M = 5.0. About 110 miles west northwest of Fort Simpson, Mackenzie, N.W.T.
- November 11 02:11:50.  $76^{\circ}4' N \pm 0^{\circ}5'$ ,  $106^{\circ}8' W \pm 0^{\circ}5'$ . M = 3.9. Believed to be an aftershock of the earthquake at 19:23:34 November 10.
- November 22 19:56:25.  $80^{\circ}0' N \pm 0^{\circ}4'$ ,  $111^{\circ}7' W \pm 1^{\circ}5'$ . Depth 30 km. M = 4.0. Arctic ocean, 100 miles north of Borden Island in the Queen Elizabeth Islands, N.W.T.
- November 26 19:07:38. M = 2.0. 171 miles from Resolute, N.W.T.



- November 30 08:41:08.  $M = 2.0$ . 39 miles from Resolute, N.W.T.
- December 17 09:24:43.  $M = 2.4$ . 134 miles from Resolute, N.W.T., at a depth of about 25 km.
- December 19 06:19:42.  $M = 2.5$ . 89 miles from Resolute, N.W.T.
- December 21 20:03:38.  $M = 1.5$ . 112 miles from Resolute, N.W.T.
- December 22 22:55:46.  $M = 2.7$ . 79 miles from Resolute, N.W.T.
- December 25 19:58:28.5.  $63^{\circ}0' N \pm 1^{\circ}$ ,  $92^{\circ}0' W \pm 1.5^{\circ}$ .  $M = 5.1$ . 50 miles west southwest of Chesterfield Inlet, N.W.T.
- December 26 05:21:26.  $M = 3.0$ . 261 miles from Resolute, N.W.T.
- December 26 14:54:09.  $M = 4.5$ . 806 miles from Resolute, N.W.T.
- December 31 20:11:15.  $M = 3.5$ . 419 miles from Resolute, N.W.T.

#### ADDENDUM

The following shock, which occurred in 1956, was inadvertently omitted from the 1961-2 number of this series entitled "Earthquakes of the Canadian Arctic 1956-1959".

- November 3 05:26:02.  $M = 5.7$  (Ott.) Epicentre (USCGS)  $61^{\circ}N$ ,  $139^{\circ}W$ . Southern Yukon Territory. An official report from the Haines Junction detachment of the RCMP stated that this shock was felt there (at 8:15 p.m. local time Nov. 2, 1956) and that it lasted two or three minutes, shaking the earth and rattling windows. Buildings trembled but no damage was caused. It further stated that this shock was reported from Destruction Bay and the Quill Creek area, as more pronounced. There, men were roused from their beds and a 1,500-gallon tank of oil was moved back and forth on its base but did not fall. No damage occurred.

#### WESTERN CANADA

(West of  $113^{\circ}W$ , south of  $60^{\circ}N$ )

Table IV lists numerically all earthquakes recorded in the Western region of magnitude greater than 2 and the epicentres of these earthquakes are plotted in Figure 5. In this figure the size of the point indicates the magnitude of the earthquake, and the character of the point (open or closed circle) represents the quality of epicentre. Classes "a" and "b" epicentres are shown with closed dots; "c" epicentres are shown with open circles; and "d" epicentres are not plotted. The description of the quality of an epicentre is available in the paper on 1955-1959 epicentres.\*

---

\*Milne, W. G. and Lucas, K. A. Seismic Activity in Western Canada 1955-1959 inclusive Publications of the Dominion Observatory, v. 26, no. 1, 1-23, Ottawa, 1961.

During 1961 there were fewer earthquakes than in recent years. None were felt in the vicinity of Vancouver Island or along the northern coast; a small event was felt near Kamloops in September and one other earthquake was felt southwest of Penticton in May.

A report has recently been prepared\* reviewing the work which has been done on the seismicity of Western Canada to the end of 1960. This paper suggests that earthquakes in the Puget Sound basin of the United States north of latitude  $47^{\circ}$  are related to the seismicity of the Vancouver Island region while those south of this latitude are not. For this reason the present catalogue lists only those earthquakes of the Puget Sound basin north of latitude  $47^{\circ}$ .

In the paper on the 1960 earthquakes it was reported that the new station at Penticton was recording a very large number of earthquakes, most of them too small to be recorded at the coast stations, so that they couldn't be located. In order that some of the more frequent groups of these earthquakes might be located it was decided that temporary stations should be established to cooperate with the Penticton Station. C. D. Hemmings set up a station at Needles, on Lower Arrow Lake, which operated from late July until the first week in September and a station at Vernon, at the north end of Okanagan Lake, which operated from late July until the last week in August. The British Columbia Power Commission were most helpful with the details of arranging for these two stations. At each there was a Willmore vertical seismograph operating into a Willmore recorder. Radio time signals were difficult to receive in these valley stations, which made the problem of time control very difficult.

There were only a few earthquakes with origins in Canada recorded on the three stations. All of these occurred near Merritt, B. C., and surrounding areas with the exception of one in the Crowsnest Pass region of Alberta. The Merritt series of earthquakes may yet turn out to be blasts at a copper mine recently opened there. The other earthquakes recorded on the stations during this interval had origins in the United States, south and east of Penticton. Magnitudes of all these tremors were less than 3, and usually less than 2.

The earthquakes recorded by this system of stations are listed in Table III. Some of these are included as well in the longer list of 1961 earthquakes (Table IV). Others are omitted from the main list because their locations are outside the Canadian area of interest.

---

\*Milne, W. G. Seismicity of Western Canada, Bibliographical Bulletin of American Geophysics and Oceanography, in press.

TABLE III

July 23	Approx. 0 hours. 134 miles south of Penticton, B.C. in U.S.A.
July 25	02:33:21. 49.6N, 114.4W. Needles recorded this earthquake which was in the Crowsnest Pass area.
July 28	22:48:03. 118 miles from Penticton, B.C. in U.S.A.
July 29	13:00:15. 350 miles from Penticton, B.C. in U.S.A.
July 30	01:57:52. This epicentre is near Kamloops, B.C., and probably represents an earthquake rather than blasting.
July 31	23:29:50. 89 miles south of Penticton, B.C. in U.S.A.
August 3	21:31:08. Probably near Merritt, B.C.
August 8	18:23:03. 100 miles from Penticton, B.C. in U.S.A.
August 9	19:26:34. 82 miles from Penticton, B.C. in U.S.A.
August 10	23:01:41. 103 miles from Penticton, B.C. and probably near Merritt.
September 1	00:10:55. 230 miles from Penticton, B.C. and in U.S.A.

TABLE IV

Earthquakes in Western Canada or Adjacent Areas

(Unless otherwise indicated, all times are Greenwich time)

(M = magnitude)

January 2 1600	05:54:36. 46°2' N, 122°7' W. Q = b. M = 2.9. Near Longview, Washington.
January 4 1601	01:53:04. M = 3.1. Approximately 265 miles from Penticton, B.C.
January 4 1602	07:26:04. 50°55'N, 124°52'W. Q = a. M = 3.3. At the head of Bute Inlet.
January 4 1603	10:00:57. 48°3' N, 121°6' W. Q = c. M = 1.8. South of Mount Baker, Washington.
January 4 1604	20:34:29. M = 2.6. 78 miles from Penticton, B.C.

January 5 1605	06:20:06. M = 1.8. 35 miles from Victoria, B.C.
January 7 1606	19:31:04. M = 2.7. 166 miles from Penticton, B.C.
January 8 1607	11:46:15. M = 3.3. 220 miles from Penticton, B.C.
January 9 1608	08:40:48. M = 2.6. 192 miles from Penticton, B.C.
January 9 1609	23:24:56. M = 2.0. 105 miles from Penticton, B.C.
January 13 1610	00:44:36. M = 2.0. 80 miles from Penticton, B.C.
January 14 1611	06:44:26. M = 2.7. 98 miles from Alberni, B.C.
January 17 1612	11:27:50. 51°8 N, 125°5 W. Q = c. M = 3 to 3.5. Northwest of Mount Waddington, B.C.
January 18 1613	09:14:25. M = 2.7. 77 miles from Alberni, B.C.
January 20 1614	21:40:27. M = 2.0. 90 miles from Penticton, B.C.
January 21 1615	09:01:34. M = 2.1. 112 miles from Penticton, B.C.
January 24 1616	17:13:00. M = 2.0. 165 miles from Penticton, B.C.
January 25 1617	08:45:12. M = 2.2. 180 miles from Penticton, B.C.
January 26 1618	04:21:57. Q = c. M = 2.3. This earthquake occurred under Barkley Sound.
January 28 1619	11:52:18. Q = c. M = 2.8. Under Puget Sound, Washington.
January 30 1620	08:17:22. M = 2.0. 165 miles from Penticton, B.C.

February 1 1621	00:31:43. M = 2.0. 35 miles from Penticton, B.C.
February 1 1622	00:36:00.3. 50°2 N, 129°7 W. Q = a. M = 3.9. The U.S.C.G.S. epicentre, and that determined by the Victoria Observatory place this earthquake west of Vancouver Island.
February 2 1623	05:50:16. 46°8 N, 121°5 W. Q = c. M = 3.1. This position is near Mount Ranier, Washington.
February 2 1624	17:07:55. M = 2.4. 168 miles from Penticton, B.C.
February 6 1625	05:19:23. 47°5 N, 126°9 W. Q = c. M = 3.3. The epicentre is off the coast of Washington.
February 7 1626	06:08:31.2. 48°8 N, 129°3 W. Q = b. M = 3. The U.S.C.G.S. have placed the epicentre west of Vancouver Island.
February 8 1627	16:34:14. M = 2.3. 52 miles from Alberni, B.C.
February 11 1628	01:02:26. M = 2.1. 109 miles from Penticton, B.C.
February 12 1629	01:58:58. M = 2.5. 200 miles from Penticton, B.C.
February 13 1630	10:05:58. M = 2.8. 156 miles from Penticton, B.C.
February 14 1631	14:27:19. M = 2.2. 117 miles from Penticton, B.C.
February 15 1632	21:18:00. M = 2.3. 149 miles from Penticton, B.C.
February 16 1633	00:47:42. M = 2.5. 88 miles from Penticton, B.C.
February 19 1634	02:55:00. M = 2.6. About 65 miles from Alberni, and 165 miles from Victoria, B.C.
February 23 1635	12:48:56. M = 2.5. 146 miles from Penticton, B.C.
February 24 1636	11:22:08. M = 2.2. 46 miles from Alberni, B.C.
February 25 1637	12:03:21. M = 2.4. 165 miles from Penticton, B.C.

- February 27 18:50:21.  $M = 2.6$ . 54 miles from Victoria and 127 miles from  
1638 Alberni, B.C.
- March 4 09:44:12.  $48^{\circ}57'N$ ,  $125^{\circ}26'W$ .  $Q = a$ .  $M = 2.7$ . Under Barkley  
1639 Sound.
- March 4 09:50:50.  $48^{\circ}57'N$ ,  $125^{\circ}30'W$ .  $Q = a$ .  $M = 2.4$ . This is probably  
1640 an aftershock of the previous earthquake.
- March 4 18:04:51.  $M = 3.4$ . 234 miles from Penticton, B.C.  
1641
- March 6 21:30:07.  $M = 2.0$ . 101 miles from Penticton, B.C.  
1642
- March 8 23:17:02.  $M = 2.3$ . 34 miles from Penticton, and 136 miles from  
1643 Victoria, B.C.
- March 10 00:35:06.  $M = 2.4$ . 92 miles from Penticton, B.C.  
1644
- March 10 07:13:33.  $M = 2.1$ . 165 miles from Penticton, and 116 miles  
1645 from Victoria, B.C.
- March 10 21:35:55.  $M = 2.0$ . 94 miles from Penticton, B.C.  
1646
- March 11 06:26:13.  $M = 2.1$ . 120 miles from Penticton, B.C.  
1647
- March 11 07:06:10.  $48^{\circ}8'N$ ,  $122^{\circ}4'W$ .  $Q = c$ .  $M = 2.2$ . A location east  
1648 of Bellingham, Washington, fits this earthquake.
- March 14 15:02:17.  $M = 2.3$ . 156 miles from Penticton, B.C.  
1649
- March 14 19:48:13.  $M = 2.4$ . 152 miles from Penticton, B.C.  
1650
- March 14 23:22:45.  $48^{\circ}8'N$ ,  $122^{\circ}4'W$ .  $Q = c$ .  $M = 1.9$ . Near Bellingham,  
1651 Washington.
- March 15 07:24:25.  $M = 2.6$ . 182 miles from Penticton, B.C.  
1652
- March 21 05:49:32.  $M = 3.1$ . 262 miles from Penticton, B.C.  
1653
- March 23 23:54:46.  $M = 2.1$ . 34 miles from Alberni, B.C.  
1654



March 25 1655	12:25:59. M = 3.0. 238 miles from Penticton, B.C.
March 29 1656	21:30:01. 48°2' N, 124°1' W. Q = c. M = 2.6. The epicentre lies under the Olympic Mountains, Washington.
March 31 1657	03:09:56. 48°7' N, 124°8' W. Q = c. M = 2.5. This position is near Cloose Bay, on the west coast of Vancouver Island.
April 1 1658	01:01:19. 48°4' N, 122°2' W. Q = b. M = 2.9. East of Mount Vernon, Washington.
April 1 1659	01:02:57. 48°7' N, 122°3' W. Q = b. M = 2.5. East of Bellingham, Washington.
April 1 1660	01:07:35. 48°4' N, 122°1' W. Q = c. M = 2.2. East of Mount Vernon, Washington.
April 1 1661	15:25:24. M = 2.3. Probably just east of Bellingham, Washington.
April 1 1662	16:10:20. 48°9' N, 122°2' W. Q = b. M = 2.3. Northeast of Bellingham, Washington.
April 2 1663	23:32:57. 47°6' N, 121°7' W. Q = c. M = 2.0. East of Seattle, Washington.
April 11 1664	20:33:48.9. 50°0' N, 128°6' W. Q = c. M = 3.6. The U.S.C.G.S. has determined this epicentre, which is west of Vancouver Island.
April 13 1665	13:08:01. 49°9' N, 120°6' W. Q = c. M = 3.0. This may be a blast near Merritt, B.C.
April 16 1666	12:22:47.1. 51°6' N, 130°6' W. Q = c. M = 4.2. The U.S.C.G.S. has determined this epicentre, which is off the north west coast of Vancouver Island.
April 22 1667	16:03:55. 49°0' N, 119°7' W. Q = c. M = 3.3. Southwest of Penticton, B.C.
April 26 1668	08:06:34. 48°2' N, 124°9' W. Q = c. M = 2.7. This location is west of Washington State.
May 2 1669	05:37:27. 48°8' N, 124°7' W. Q = c. M = 2.4. On southwest Vancouver Island.
May 22 1670	01:57:55. M = 2.6. 150 miles from Victoria, and 97 miles from Penticton, B.C.

May 26 1671	06:27:57. M = 2.1. 94 miles from Penticton, B.C.
June 1 1672	16:26:07. 48°6' N, 128°1' W. Q = c. M = 3.2. West of Vancouver Island.
June 1 1673	18:53:02. 48°6' N, 128°1' W. Q = c. M = 3.2. This earthquake is a repeat of the previous event.
June 2 1674	13:56:56. M = 2.3. 170 miles from Penticton, B.C.
June 3 1675	08:20:46. M = 1.5. 16 miles from Victoria and 79 miles from Alberni, B.C.
June 3 1676	21:36:07. M = 2.3. 37 miles from Alberni.
June 4 1677	16:40:45. 47°8' N, 123°8' W. Q = c. M = 2.9. In the Olympic Mountains, Washington.
June 5 1678	01:03:43. M = 2.8. 214 miles from Penticton, B.C.
June 10 1679	23:39:22. M = 2.3. 103 miles from Penticton, B.C.
June 15 1680	12:18:12. M = 2.6. 160 miles from Penticton, B.C.
June 15 1681	19:14:01. M = 2.0. 83 miles from Penticton, B.C.
June 15 1682	21:58:27. 48°2' N, 122°7' W. Q = c. M = 2.2. Entrance to Puget Sound.
June 16 1683	07:15:29. M = 2.1. 89 miles from Penticton, B.C.
June 16 1684	08:17:26. 49°0' N, 121°6' W. Q = c. M = 2.0. South of Hope, B.C.
June 17 1685	03:17:58. M = 3.3. 282 miles from Penticton, B.C.
June 19 1686	11:46:51. 49°0' N, 121°5' W. Q = c. M = 2.8. South of Hope, B.C.

June 24 1687	22:47:26. M = 2.1. 37 miles from Alberni, B.C.
June 25 1688	19:10:28. M = 2.1. 103 miles from Penticton, B.C.
June 25 1689	23:04:10. M = 2.8. 120 miles from Penticton, B.C.
June 26 1690	01:26. A report was received that this very small earthquake was felt at Kamloops, B.C.
June 27 1691	18:40:03. M = 2.5. 123 miles from Penticton, B.C.
June 27 1692	21:49:28. M = 2.3. 82 miles from Penticton, B.C.
June 29 1693	23:53:26. M = 2.3. 91 miles from Penticton, B.C.
July 1 1694	08:59:59. 47°9 N, 123°7 W. Q = c. M = 2.2. Olympic Mountain region, Washington.
July 1 1695	09:24:36. 47°8 N, 123°8 W. Q = c. M = 2.3. Olympic Mountain region, Washington.
July 2 1696	07:28:28. M = 2.5. 208 miles from Penticton, B.C.
July 4 1697	03:04:41. M = 2.5. 172 miles from Penticton, B.C.
July 8 1698	23:58:58. M = 1.9. 37 miles from Alberni, and 100 miles from Victoria, B.C.
July 9 1699	07:44:49. 48°32'N, 122°25'W. Q = a. M = 2.7. Near Anacortes, Washington.
July 11 1700	23:53:06. M = 2.5. 222 miles from Penticton, B.C.
July 11 1701	07:57:43. M is less than 2. 66 miles from Victoria, and 56 miles from Alberni, B.C.
July 16 1702	00:47:53.5. 58°6 N, 137°2 W. h = 44 km. The U.S.C.G.S. place this epicentre in southeastern Alaska.
July 16 1703	01:40:51. 49°44'N, 124°55'W. Q = c. M = 2.8. This epicentre is near an area where blasting occurs on Texada Island, but since there are small aftershocks at 01:56; 01:58 there is a strong possibility this was an earthquake.

- July 24 10:39:23.7 50°6' N, 128°9' W. Q = c. M = 3.9. The U.S.C.G.S.  
1704 place this earthquake west of Vancouver Island.
- July 25 02:33:21. 49°6' N, 114°4' W. Q = b. M = 3.2. Crowsnest Pass  
1705 area of Alberta.
- July 30 01:57:52. 50°8' N, 119°9' W. Q = c. M = 2.1. Near Kamloops,  
1706 B.C.
- August 3 02:16:43. M = 1.8. 107 miles from Penticton and 112 miles  
1707 from Victoria, B.C.
- August 3 21:31:08. M = 2.0. This epicentre appears to be northwest of  
1708 Merritt, but data for a complete epicentral determination are  
lacking.
- August 3 21:43:30. M = 2.0. 165 miles from Penticton, B.C.  
1709
- August 3 21:59:09. M = 1.8. 25 miles from Banff, Alta.  
1710
- August 5 01:33:12.2. 49°4' N, 129°0' W. Q = c. M = 3.3. The U.S.C.G.S.  
1711 place the epicentre west of Vancouver Island.
- August 5 03:49:02. M = 2.7. Possibly a blast near Texada Island.  
1712
- August 7 16:30:20. M = 2.1. 162 miles from Penticton, B.C.  
1713
- August 10 23:01:41. M = 1.6. Possibly northwest of Merritt, B.C.  
1714
- August 19 04:56:12. 49°8' N, 130°0' W. Q = c. M = 4.3. West of Vancouver  
1715 Island.
- August 21 03:26:02. 48°45'N, 122°44'W. Q = a. M = 2.3. North of  
1716 Bellingham, Washington.
- August 22 19:41:16. 49°22'N, 123°37'W. Q = a. M = 2.6. Strait of Georgia.  
1717
- August 27 02:23:16. M = 1.4. 18 miles from Victoria.  
1718
- September 2 23:22:33. M = 2.0. 100 miles from Victoria.  
1719
- September 3 01:38:34. M = 2.0. 107 miles from Victoria.  
1720

- September 4 20:00:00. 47°32'N, 122°57'W. Q = b. M = 2.7. Puget Sound  
1721 basin, Washington.
- September 7 18:11:17. 48°09'N, 122°56'W. Q = b. M = 2.0. Entrance to  
1722 Puget Sound, Washington.
- September 8 04:52:10.3. 51°8 N, 131°2 W. Q = c. M = 5. The U.S.C.G.S.  
1723 place this epicentre south of the Queen Charlotte Islands.
- September 12 22:11:48. M = 2.7. 225 miles from Penticton, B.C.  
1724
- September 13 13:54:46. M = 2.4. 180 miles from Penticton, B.C.  
1725
- September 15 19:57:33. M = 2.4. 180 miles from Penticton, B.C.  
1726
- September 18 02:25:19.3. 48°8 N, 128°9 W. Q = c. The U.S.C.G.S. place  
1727 this epicentre west of Vancouver Island.
- September 18 12:32:38. 160 miles from Alberni, B.C.  
1728
- September 18 19:29:06. 28 miles from Victoria, and 72 miles from Alberni,  
1729 B.C.
- September 18 21:35:17.2. 48°9 N, 128°4 W. The U.S.C.G.S. place this  
1730 epicentre west of Vancouver Island.
- September 20 23:18:03. M = 1.5. 42 miles from Penticton, B.C.  
1731
- September 21 23:11:05. M = 2.5. 183 miles from Penticton, B.C.  
1732
- September 23 00:08:12. M = 2.4. 168 miles from Penticton, B.C.  
1733
- September 23 08:06:50. 48°1 N, 124°5 W. Q = c. M = 2.1. Olympic  
1734 Mountain region, Washington.
- September 26 12:15:47. M = 2.7. 168 miles from Penticton, B.C.  
1735
- September 26 13:38:06. M = 2.5. 85 miles from Penticton, and 192 miles  
1736 from Victoria, B.C.

- September 27 20:20:54. M = 2.3. 104 miles from Penticton, B.C.  
1737
- September 28 23:27:25. M = 2.2. 97 miles from Penticton, B.C.  
1738
- September 30 06:49:59. M = 2.4. 82 miles from Penticton, B.C.  
1739
- October 2 12:52:26. 49°7' N, 118°6' W. Q = c. M = 2.0. Between  
1740 Okanagan Lake and Lower Arrow Lake, B.C.
- October 3 17:34:08. M = 2.1. 155 miles from Penticton, B.C.  
1741
- October 4 23:43:42. M = 2.0. 146 miles from Penticton, B.C.  
1742
- October 5 01:10:30. M = 2.6. 177 miles from Penticton, B.C.  
1743
- October 11 22:20:55. M = 2.3. 202 miles from Penticton, B.C.  
1744
- October 12 23:50:54. M = 2.2. 103 miles from Penticton, B.C.  
1745
- October 13 16:33:37. M = 2.1. 113 miles from Penticton, B.C.  
1746
- October 15 04:53:13. 47°12'N, 123°14'W. Q = c. M = 2.7. This is  
1747 probably a foreshock of the earthquake felt at Sheldon,  
Washington.
- October 15 12:34:46. M = 2.5. 56 miles from Victoria, B.C.  
1748
- October 18 13:45:59. 48.9N, 122.3W. Q = c. M = 2.2. Near Mount Baker,  
1749 Washington.
- October 18 21:32:57. M = 2.0. 94 miles from Penticton, B.C.  
1750
- October 18 21:47:23. M = 2.2. 98 miles from Penticton, B.C.  
1751
- October 19 19:34:43. M = 2.0. 87 miles from Penticton, B.C.  
1752



October 19 1753	20:37:49.6. 47°5 N, 122°9 W. Q = b. M = 3.0. This is in the Olympic Mountains, southwest of Seattle, Washington. It was felt at Sheldon, B.C.
October 22 1754	10:36:58. M = 2.1. 47 miles from Victoria, and 142 miles from Penticton, B.C.
October 27 1755	00:55:20. M = 2.0. 93 miles from Penticton, B.C.
October 27 1756	19:55:03. M = 2.2. 91 miles from Penticton, B.C.
October 27 1757	23:37:46. M = 2.0. 120 miles from Penticton, B.C.
October 28 1758	00:14:34. M = 2.1. 122 miles from Penticton, B.C.
October 29 1759	09:12:15.7. 49°0 N, 128°7 W. Q = c. M = 4.8. The U.S.C.G.S. have determined this epicentre to be west of Vancouver Island.
October 29 1760	11:11 ca. This appears to be an aftershock of number 1759.
October 29 1761	14:00:12.0. 49°4 N, 127°6 W. M = 3.2. West of Vancouver Island.
October 29 1762	14:47:18.3. 48°7 N, 128°3 W. M = 3.8. West of Vancouver Island. The following are also considered to be aftershocks of this series: 18:28; 19:29; October 30. 01:46; 02:18.
October 31 1763	23:24:44. M = 2.2. 90 miles from Penticton, B.C.
November 1 1764	21:24:36. M = 2.3. 156 miles from Penticton, B.C.
November 4 1765	23:22:48. M = 2.4. 125 miles from Penticton, B.C.
November 8 1766	00:38:07. M = 2.0. 100 miles from Penticton, B.C.
November 8 1767	20:58:35. M = 2.5. 133 miles from Penticton, B.C.
November 9 1768	18:22:17. M = 2.2. 100 miles from Penticton, B.C.

- November 9 22:28:50.  $M = 2.1$ . 101 miles from Penticton, B.C.  
1769
- November 10 22:32:45.  $M = 2.5$ . 119 miles from Penticton, B.C.  
1770
- November 11 15:22:28.  $M = 2.3$ . 123 miles from Penticton, B.C.  
1771
- November 12 17:51:10.  $M = 2.1$ . On southern Vancouver Island approximately  
1772 70 miles from Victoria, B.C.
- November 13 23:53:21.  $M = 2.5$ . 127 miles from Penticton, B.C.  
1773
- November 14 23:05:54.  $M = 2.4$ . 100 miles from Penticton, B.C.  
1774
- November 14 23:17:12.  $M = 2.5$ . 178 miles from Penticton, B.C.  
1775
- November 15 01:39:57.  $M = 2.5$ . This earthquake appears to be centered  
1776 under the Strait of Georgia.
- November 15 06:47:09.  $47^{\circ}9'N$ ,  $123^{\circ}2'W$ .  $Q = c$ .  $M = 2.2$ . Olympic  
1777 Mountains, Washington.
- November 15 17:27:07.  $48^{\circ}52'N$ ,  $121^{\circ}53'W$ .  $Q = b$ .  $M = 2.2$ . Mount Baker  
1778 area, Washington.
- November 18 23:11:27.  $M = 2.5$ . This earthquake was probably centered 22  
1779 miles south west of Victoria, B.C.
- November 21 01:49:13.  $M = 2.1$ . 32 miles from Alberni, B.C.  
1780
- November 21 21:25:30.  $M = 2.5$ . 170 miles from Penticton, B.C.  
1781
- November 22 16:40:12.  $M = 2.1$ . 91 miles from Penticton, B.C.  
1782
- November 24 00:57:20.  $M = 2.5$ . 60 miles from Alberni, B.C.  
1783
- November 26 00:01:33.  $M = 2.2$ . This earthquake was probably centered  
1784 under the Strait of Georgia about 30 miles from Alberni, B.C.

- November 27 04:00:57.  $M = 2.2$ . This earthquake was about 44 miles from  
1785 Alberni, B.C.
- November 28 03:07:56.  $47^{\circ}1' N$ ,  $122^{\circ}5' W$ .  $Q = c$ .  $M = 2.5$ . Puget Sound  
1786 Washington.
- November 30 08:12:50.  $47^{\circ}2' N$ ,  $122^{\circ}1' W$ .  $Q = c$ .  $M = 3.1$ . East of Seattle,  
1787 Washington.
- December 2 00:18:39.  $M = 2.4$ . 110 miles from Penticton, B.C.  
1788
- December 5 00:52:31.  $M = 2.0$ . 34 miles from Alberni, B.C.  
1789
- December 5 03:13:49.  $M = 2.9$ . 190 miles from Penticton, B.C.  
1790
- December 6 07:45:22.  $47^{\circ}1' N$ ,  $121^{\circ}7' W$ .  $Q = c$ .  $M = 2.1$ . East of Seattle,  
1791 Washington.
- December 6 22:52:28.  $M = 2.2$ . 100 miles from Penticton, B.C.  
1792
- December 14 20:45:49.  $48^{\circ}9' N$ ,  $125^{\circ}4' W$ .  $Q = c$ .  $M = 2.0$ . Barkley Sound.  
1793
- December 18 07:15:58.  $48^{\circ}7' N$ ,  $128^{\circ}0' W$ .  $Q = c$ .  $M = 3.0$ . West of  
1794 Vancouver Island.
- December 18 22:08:36.  $48^{\circ}50' N$ ,  $122^{\circ}48' W$ .  $Q = b$ .  $M = 2.7$ . Northwest of  
1795 Bellingham, Washington.
- December 25 12:27:44.  $48^{\circ}0' N$ ,  $122^{\circ}4' W$ .  $Q = c$ .  $M = 2.2$ . Near Whidbey  
1796 Island, Washington.