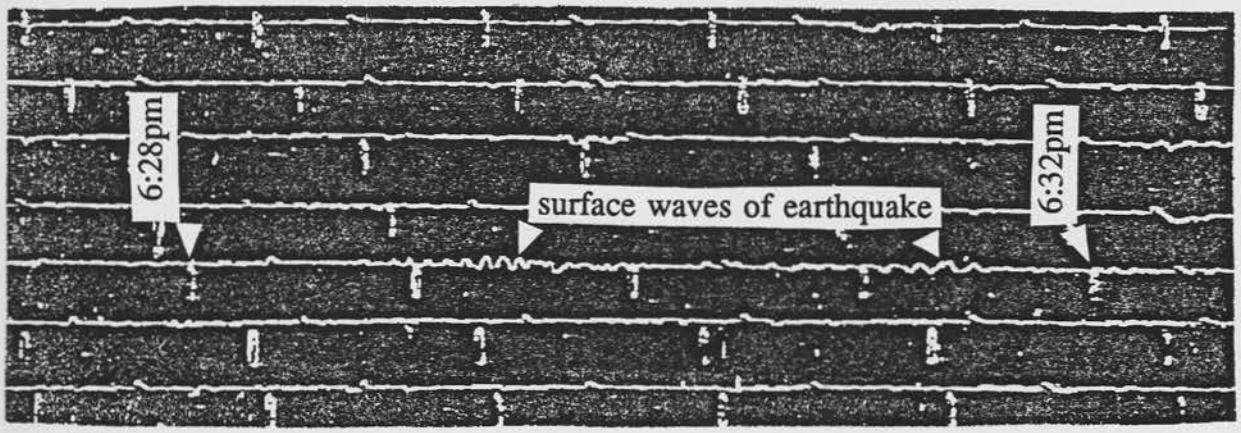
reprint: June 30, 1992

IDAHO EARTHQUAKES OF 1905, 1913, AND 1916:

INTENSITY, LOCATION, AND MAGNITUDE INFERRED FROM NEWSPAPER ACCOUNTS

by

*Lynda Koll Harpham**



Frontispiece: Earliest known extant seismograph record of an Idaho earthquake. The recording was made at the University of California at Berkeley on a smoke drum recorder with the Bosch-Omori NS seismograph on May 12, 1916. Marks on the chart are spaced one minute apart. The oscillations of the seismograph are of surface waves from the earthquake discussed in this report. Time notation is for 6:28 pm, Pacific Standard Time, which is about two minutes after the event was noted in western Idaho. Two minutes is the expected time of travel of a western Idaho event at Berkeley. Magnitude is estimated at about 6.0 based on comparison to the July 12, 1944 western Idaho earthquake recorded at Berkeley on the same seismograph (information courtesy of J. E. Zollweg, Boise State University).

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August 1991

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A thesis
submitted in partial fulfillment
of the requirements for the degree of
Master of Earth Science Education
Boise State University

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ACKNOWLEDGEMENTS

I wish to thank the following people for their help and cooperation in the course of this investigation: Terry Kuroda for typing assistance, Gwen Pittam for filling numerous interlibrary loan requests, Drew Clemens for research assistance, Dechen Wang for drafting assistance, and Jim Zollweg for critically reviewing the manuscript and offering helpful suggestions. I am grateful to Dr. Spencer Wood for his support and assistance. This project was partially supported by a 1989 BSU Faculty Research Grant.

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PURPOSE OF THE PROJECT

The purpose of this project is to better understand the epicentral location, magnitude, and effects of three southern Idaho earthquakes which occurred in 1905, 1913, and 1916. The three earthquakes are of considerable interest to seismologists owing to their reported proximity to large power dams, multistory buildings, and the nuclear facilities at Idaho National Engineering Laboratory (INEL) in south-central Idaho. Structures were built in previous years without assessment of the potential for earthquake damage. Therefore, an understanding of these three earthquakes is important for future development, and for the reevaluation of potential earthquake hazard and adequacy of building codes.

The 1905 earthquake is reported to have occurred near the town of Shoshone, on the Snake River Plain. It caused significant damage in Shoshone and was felt throughout the southern half of Idaho and into parts of Utah. This epicentral location has caused considerable interest due to the relative aseismicity of the Snake River Plain (Figure 1) (Pelton, et. al., 1990). Some facilities at INEL, also located on the plain, were built with design criteria for areas distant from a zone of active seismicity. If the earthquake did occur at Shoshone, it could indicate that earthquakes of sufficient magnitude to cause damage have historically occurred on the plain, and the seismic designs at INEL may need to be reviewed.

The 1913 earthquake was reported to have occurred in the Hells Canyon area. This was the strongest shock known to have occurred in this region. An important observation regarding this earthquake is its long duration at Landore, Idaho reported to be over one minute. Increased duration is known to increase the destructive capability for even moderately strong earthquakes (Page and others, 1975). Although this earthquake occurred in an area that is still remote and sparsely populated, it is of considerable interest due to the near vicinity of large power dams on the Snake River.

The 1916 earthquake was reported to have occurred near Boise, affecting an area of 50,000 square miles (Woodward- Lundgren and Assoc., 1972). Mann (1989) believes the epicenter was actually to the northwest of Boise near Brownlee Dam in Hell's Canyon. If the earthquake did occur in the vicinity of a large dam, the seismic risk and adequacy of design may need to be evaluated. However, if the event occurred near Boise, existing buildings and building codes may need to be reevaluated.

IDAHO SEISMICITY

Distinct zones of seismic activity in Idaho are shown by location of earthquake epicenters in Figure 2. The major north trending zone on the eastern edge of Idaho was called the Intermountain seismic belt by Smith and Sbar (1974). The belt is more than 1300 km long and up to 100 km wide. It is a zone of pronounced earthquake activity extending north from Arizona through Utah, eastern Idaho and western Wyoming, and terminating in northwestern Montana (Figure 2). It intersects the eastern end of the Snake River Plain and encompasses the Yellowstone Park - Hebgen Lake, Montana region (Smith and Sbar, 1974).

Seismicity of eastern Idaho is associated with the Intermountain seismic belt. Several intensity VII earthquakes have occurred historically along the Idaho-Utah border. At the eastern end of the Snake River Plain large earthquakes occurred in 1947 and 1959. The 1959 Hebgen Lake, Montana earthquake was the largest historic event to occur in this zone, at 7.5 (Ms) magnitude.

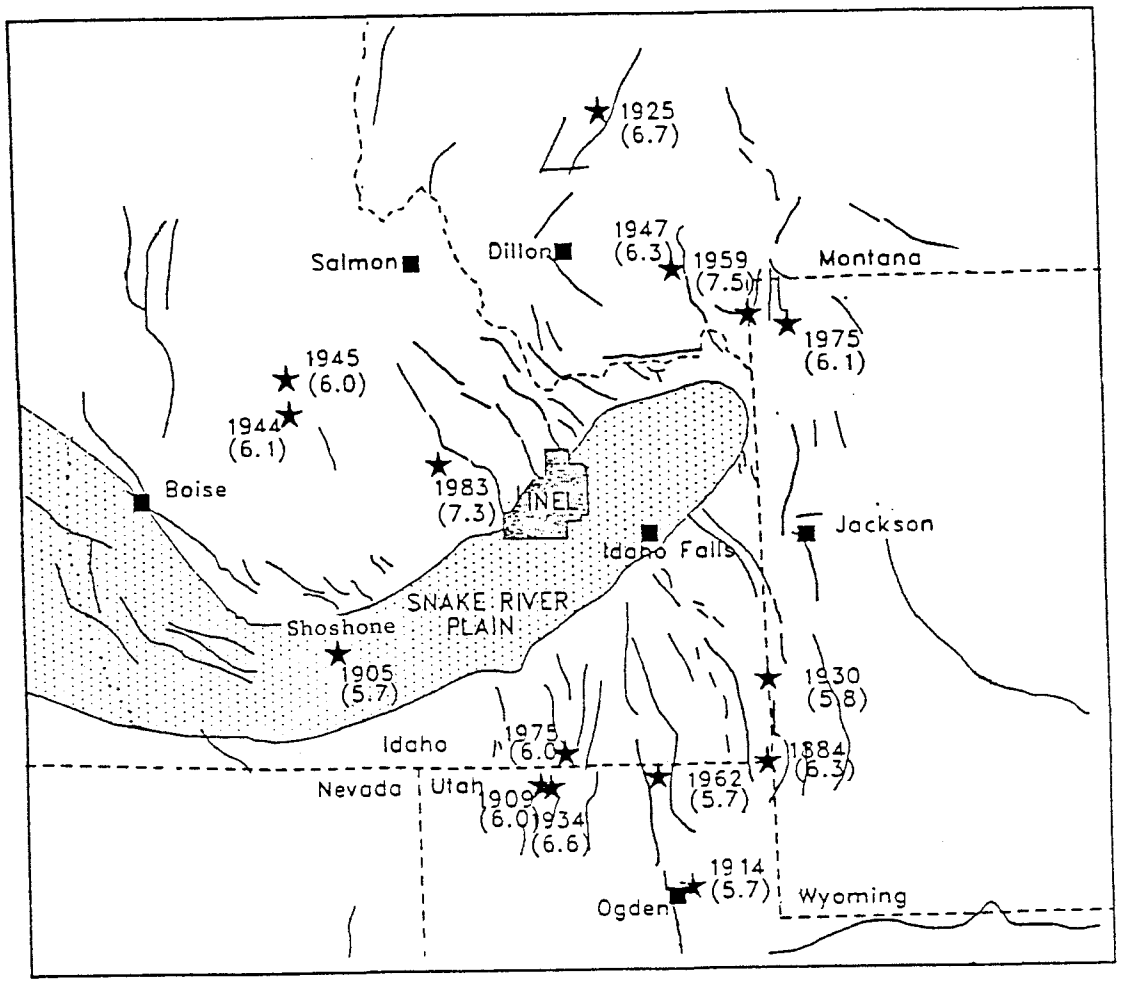

Figure 1: Map of central and eastern Idaho showing the locations of earthquakes (M > 5.5) emphasizing the aseismicity of the Snake River Plain, with the exception of the 1905 earthquake reported in older literature to be near Shoshone. Lines indicate faults near the Snake River Plain of late Cenozoic activity that Witkind (1975) suspected may have future earthquake activity. Map modified from Smith and Jackson (1990).

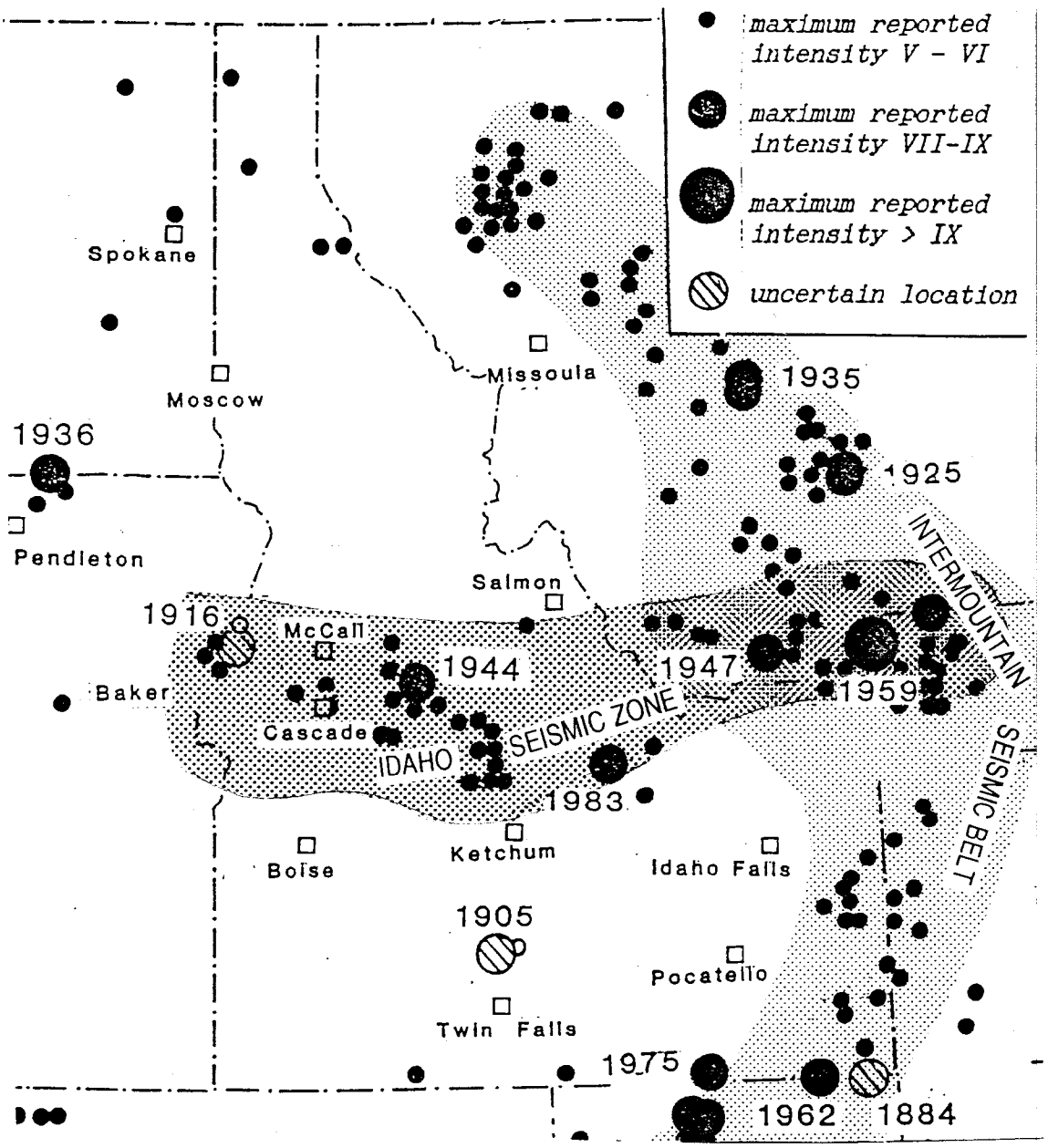

Figure 2: Map showing epicenters of earthquakes producing shaking greater than Modified Mercalli Intensity V., modified from Algermissan (1983) using information from Mann (1989) and Zollweg and Jacobson (1986). Location of the "Intermountain Seismic Belt" after Smith and Sbar (1974). Location of the Idaho Seismic Zone after Smith and Sbar (1974).

Table 1. NOTABLE EARTHQUAKES IN IDAHO AND EASTERN OREGON (through 1927)**

Date Reported	Reported Location	Maximum Intensity (MM)
Nov 9, 1884	near Paris, Idaho	VII
Mar 7, 1893	Umatilla, Oregon	VII
Nov 11, 1905	South-central, Idaho	*VII
Oct 14, 1913	Adams Co, Idaho	*VI
May 13, 1916	Western Idaho border	*VIII
Jan 10, 1923	Lake Co, Oregon	*VI+ (Rossi-Forel?)

*location is uncertain
**from Stover and others (1986), Townley and Allen (1939) and Zollweg and Jacobson (1986)

A secondary zone to the Intermountain seismic belt is the east-west trending Idaho seismic zone (Smith and Sbar, 1974). It extends north of the Snake River Plain from the Yellowstone Park -Hebgen Lake area west to Baker, Oregon (Figure 2). The belt roughly parallels the plain; located about 50 km north. It is about 75 km wide and 330 km long.

The eastern section of the Idaho seismic zone is characterized by north, northeast, and northwest trending normal faults. Regions of significant seismicity include: the 1983 Borah Peak, Idaho, earthquake sequence, and the seismicity in central Idaho which Dewey (1987) identified as the White Cloud, Seafoam, and the Twin Peaks-Myers Cove zones. Malde (1987) mapped late Quaternary-age faults extending down to the edge of the Snake River Plain. Within the past 26 years, this region has produced two earthquakes with magnitudes greater than 6.0; the largest being the 1983 Borah Peak earthquake at 7.3 (M_s) magnitude.

The western section of the Idaho seismic zone also shows zones of recurring activity. Woodward-Lundgren (1972) examined features of the Cascade - Sweet fault zone and suggested that the faults could be capable of generating a moderate to large earthquake. In 1976 - 1977 microseismic studies of this region indicate considerable activity (Vincent and Applegate, 1978). Gilbert and others (1983) identified Quaternary-age faults near Black Canyon Dam, north of Emmett, Idaho. Zollweg and Jacobson (1986) defined a zone of seismic activity in eastern Oregon which extends into Idaho near the Hells Canyon, Brownlee Dam area. Mann (1989) mapped large normal faults with a significant amount of Cenozoic displacement in the Brownlee Dam area. He suggests these faults may still be active.

Diffuse events of seismic activity occur in northern Idaho (Figure 2). Stickney and Bartholomew (1987) identify this area as the west-northwest, east-southeast trending Lewis and Clark seismic zone. In Idaho, this zone has not been as active historically as the Idaho seismic zone to the south, and has not produced earthquakes which have exceeded 5.5 in magnitude. The destructive 1935 Helena Valley earthquake (magnitude 6) occurred near the east end of the zone and is the only historic earthquake over magnitude 6 within the zone (Stickney and Bartholomew, 1987).

Areas in Idaho that have been relatively aseismic historically include southwest Idaho, the Snake River Plain, and the Selway-Clearwater River area which lies between the Lewis and Clark seismic zone and the Idaho seismic zone (Figure 2).

METHODOLOGY

Small-town newspapers and historical records on microfilm at the Idaho and Oregon Historical Libraries, the University of Oregon Library, and the Washington State Library were searched for information regarding the effects of the 1905, 1913, and 1916 earthquakes. Figure 3 indicates the location of small towns for which there are existing newspapers in the microfilm file at those libraries. The original full texts of all references to an earthquake as they appeared in the newspaper articles has been retyped and included in the appendix. The newspaper issues searched are noted as well as the existence of a report or no report, resulting in a complete record of the issues actually searched. The issues were searched up to two weeks after the actual event, however, most accounts of these three earthquakes were published within two days of their occurrence. The reports from each area were evaluated for the intensity of ground shaking using the Modified Mercalli Scale of 1913 (Appendix B). Each area affected was assigned an intensity value from the scale based on the descriptive information published. Isoseismal maps were constructed showing the distribution of the severity of ground shaking, and regions of similar ground shaking. From the isoseismal maps, the magnitude and severity of shaking was evaluated, and some new insight provided on possible epicentral locations.

LIMITATIONS OF THE PROJECT

The epicenters of three earthquakes, the 1905, 1913, and 1916, have been previously reported using a limited amount of intensity data from major newspapers (Townley and Allen, 1939). These reports provide the only information previously available for pre-1928

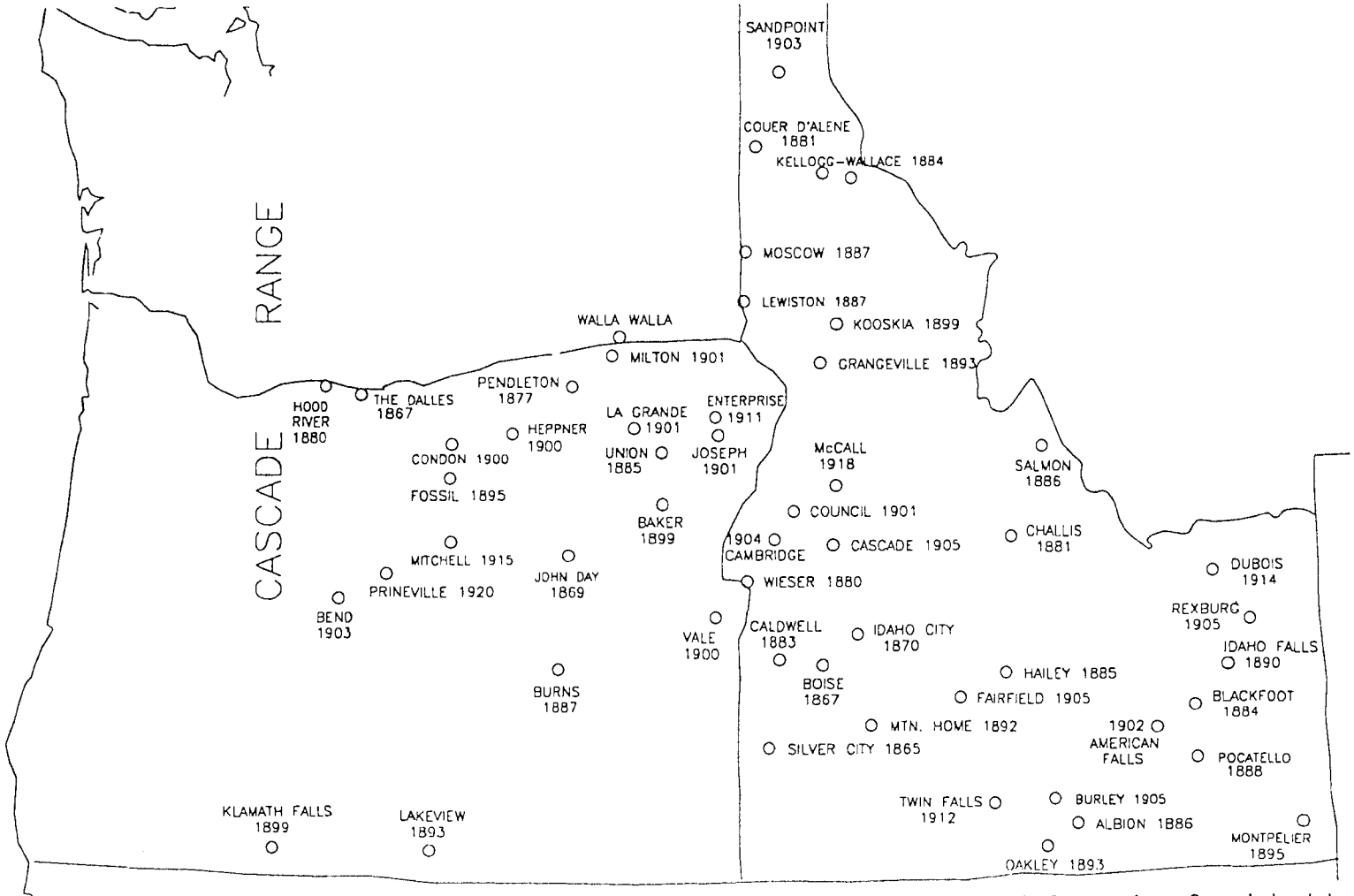

Figure 3: Year of earliest newspaper issues shown for each town. From information furnished by Denine Wascabage (Serials Librarian Oregon Historical Library, Portland), and Lu Ann Guerren (research librarian, Idaho Historical Library, Boise). Refer to Library of Congress (1984) for details and holdings at various libraries.

earthquakes. However, they can be misleading. For this type of study, the record of felt earthquakes is skewed to towns of sufficient size to publish newspapers, or those with good communication systems (Vincent and Applegate 1978). Judging epicentral locations from intensity data indicates the location that reported the strongest shaking, which is not necessarily the epicentral location, especially where reports are widely scattered, such as in pre-1928 earthquakes. Zollweg and Jacobson (1986) believe epicenters on western Idaho earthquakes located from intensity information are not accurate to better than 25 to 50 kilometers.

PREVIOUS SEISMOLOGICAL WORK

Little has been published for pre-1928 earthquake events in southwestern Idaho. Notable pre-1928 earthquakes of this region are listed in Table 1. Information describing the effects of these earthquakes is contained in published newspaper accounts and historical documents, which have never been previously searched to identify and analyze the effects and extent of ground motion for southern Idaho. This is the first time in Idaho these documents have been searched in a systematic way for this information. A systematic search of newspapers for a record of pre-1928 earthquakes has been completed for the eastern U.S., Arizona, California, and Colorado (T. Toppozada, California Mines and Geology 1975, Dubois 1981, Oaks 1981). Townley and Allen (1939), and Coffman and von Hake (1973), constructed earthquake catalogs for the larger events based on a similar search of major U.S. newspapers.

About 1928 good telephone connections to rural areas permitted communication of intensity data from outlying areas. This was also the time sufficient seismographs became operational in the U.S. to locate epicenters and assign magnitude values. Post-1928 earthquakes have been documented in the series U.S. Earthquakes published by the U.S. Department of Commerce (1928 - 1981), and by the U. S. Geological Survey (1981 to present).

INTENSITY RATINGS FOR THE THREE HISTORIC IDAHO EARTHQUAKES

Prior to 1928, insufficient seismographs were operational in the western U.S. for instrumental determination of the magnitude and location of most earthquakes smaller than magnitude 6.5. Earthquakes were generally located and assigned an intensity by non-instrumental data and the extent of damage to an area. The classification of perceptible ground motion is usually based on the Modified Mercalli Scale of 1913 (Appendix B). A numerical value is assigned to an area; the higher the number, the more damaging or greater the effects of the earthquake. The epicenter is determined based on the assumption that the higher the Mercalli reading, the closer the area to the epicenter of the event.

Tables 2 - 8 (Appendix C) summarize the intensity data reports and assigned intensity ratings for each area affected by the three historic Idaho earthquakes. The intensity reports (published newspaper accounts) were analyzed for the felt effects of ground motion and the extent of damage in each area. A numerical value, or intensity rating from the Modified Mercalli Scale, was assigned to each area based on this information. For many areas the accounts were detailed enough to easily assign an intensity rating. It was difficult to assign ratings for other areas due to various reasons: the published accounts were often too vague or more than one rating could be assigned to the same area based on the reports.

Several areas simply reported that 'an earthquake was distinctly felt' without further descriptive reports. I interpreted 'distinctly felt' to have been felt indoors by many, outdoors by few, a Mercalli Scale intensity of IV. However, the actual intensity may have been lower. Other areas reported only that 'an earthquake had been felt', with no other descriptive report. For these areas I assigned an intensity rating of II, the actual rating may have been higher. Therefore, for these descriptions there is major uncertainty regarding the accuracy of the assigned intensity ratings.

The following is an example of an area to which more than one rating could have been

assigned. The intensity rating from the Mercalli Scale of the descriptive account is placed in parenthesis following the account. The descriptive reports for the city of Boise during the 1916 earthquake include:

1. Hundreds of people rushed to the streets in alarm, felt by all (VI).
2. Fallen chimney bricks at Seventh and Main, no other damage (VI).
3. At the fire station the shock was felt on the top floor, but not on the ground floor (II or III).
4. A huge wave was started in the Natatorium pool (VII).
5. China was rattled but not broken (IV).

Woodward-Lundgren and Assoc. (1972) assigned Boise an intensity rating of VII for this event. I assigned Boise a rating of V-VI due to the lack of damage, only one fallen chimney in a city with many unreinforced masonry buildings. Because a given intensity level may include a few reports from the next higher level (J. Zollweg, written communication, 1991) I tended to discount single reports of level VI and VII effects.

ISOSEISMAL MAPS OF THE THREE HISTORIC IDAHO EARTHQUAKES

Utilizing the assigned intensity ratings from Tables 2-7, isoseismal maps (Figures 4 - 6) were constructed to outline the areas of similar ground shaking for the three historic Idaho earthquakes. The area enclosed within each contour, in square kilometers, is indicated on each map. Solid contour lines indicate fairly complete intensity data reports for an area. Dashed contour lines are used to indicate the approximate location of the intensity contour from scattered accounts. The total felt area is difficult to determine because of the sparse population in the past, and because lightly felt events probably were not considered newsworthy. Many of the papers tended to report the strongest effects of ground motion rather than the local effects.

In a study of moderately strong California and western Nevada earthquakes Toppozada (1975) devised a series of formulas relating earthquake magnitude to (a) maximum reported intensity, (b) area of perceptibility, and (c) the area enclosed by various isoseismal lines. The relations developed are:

$$(1) \quad M_L = -1.88 + 1.53 \text{ Log } A_I$$

$$(2) \quad M_L = 0.86 + 1.09 \text{ Log } A_V$$

$$(3) \quad M_L = 2.56 + 0.85 \text{ Log } A_{VI}$$

where A_{VI}, for example, is the area, in square kilometers, shaken at intensity VI or greater. M_L is local magnitude (see Bolt, 1988, for discussion of earthquake magnitude scales).

These formulae were applied to the data collected for the Idaho earthquakes to estimate earthquake magnitude (M_L). Most earthquakes Toppozada studied probably occurred on strike-slip and thrust faults rather than on normal faults like those prevalent in Idaho. Furthermore, intensity attenuation in the Idaho region may differ from that prevailing in California. A recommended follow-up study would be to duplicate Toppozada's methods for earthquakes in Idaho and adjacent regions for which instrumental magnitudes are known and fairly complete intensity data has been gathered in U.S. Earthquakes (1941).

1905 EARTHQUAKE

Figure 4 represents the maximum felt area in Idaho for the 1905 earthquake. Using Toppozada's formula relating area of intensity I or greater to local magnitude (M_L), the $I \geq 1$ area of 52,000 translates into a magnitude of 5.3. There is considerable uncertainty on the southwestern extent of the felt area. Since this study was completed, Suzette Jackson (EG&G Idaho Inc. at INEL, personal communication April 1991) has indicated that Nevada newspapers report damage sustained at Elko, Nevada due to the earthquake. I did not search Nevada papers, but if reports from Elko are verified, the felt area may increase from 52,000 to approximately 79,000 square kilometers which would translate to a magnitude (M_L) of about 5.6 or greater. The 'not felt' report from Mountain Home (Figure 4) is an important constraint on the southwest extent of the felt

area.

The epicentral location of the 1905 earthquake is listed in the Earthquake History of the United States, Part 1, U.S. Dept. of Commerce (1965) at Shoshone, Idaho (Figure 1, North Lat. 42.9,West Long. 114.5). Comments identify this location as uncertain, and suggest that the Shoshone area probably represents the center of maximum reported disturbance, but not necessarily the true epicentral location (Woodward-Lundgren and Assoc., 1972). The magnitude of the event was estimated to be 5.7 by Smith and Jackson (1990), but the basis for this estimation is not published.

The location of the event near Shoshone, and the intensity value of VI to VII is questioned. Major damage to unreinforced masonry structures in Shoshone was not reported, only falling plaster. An interesting follow-up study is suggested here to resolve these questions. Such a study should include an inventory of old buildings and type of construction in Shoshone (as of 1905) to document the number of unreinforced multistory structures that actually rode out the earthquake and are still standingtoday. The statistics of survival of older brick buildings at intensity VI and VII are fairly well known (Applied Technology Council, 1985).

1913 EARTHQUAKE

The isoseismal map of the 1913 earthquake (Figure 5) is not well contoured owing to limited historical accounts for the area during this time. To the north and northeast of Landore the area was nearly uninhabited, with the few populated sites being too small to publish newspapers. The western boundary of the felt area is constrained by a 'not felt' at Halfway, Oregon, but the north, east and southern boundaries are not constrained. Newspapers at Cambridge, Cascade and Grangeville did not report the earthquake at all. Either reports of the earthquake from towns twenty miles away were not considered newsworthy, or they actually did not feel it. Conceivably the earthquake may have been felt at these towns, but the papers chose to ignore it.

The isoseismal map of the 1913 event shows a local area of intensity VI without a corresponding large area of lower intensities. This is either because of the lack of reports from the sparsely populated area, or perhaps the result of an earthquake having a shallow focus. Nuttli and Zollweg (1974) suggested that an earthquake with a similar sharp fall-off of intensity was the result of a shallow focus.

Mann (1989) placed the epicenter for the 1913 earthquake at 45.1 N, 116.7 W, which fits within the center of maximum intensity for this earthquake. He suspects this location is still poor in relative accuracy, that it may have occurred in a more remote, uninhabited area of Hells Canyon or the Seven Devils Mountains.

Using Toppozada's formula relating area of intensity VI or greater to local magnitude (M_L), the $I \geq$ VI area of 540 square kilometers translates into a magnitude of 4.9.

1916 EARTHQUAKE

The 1916 earthquake was a relatively large event which was felt over an approximate area of 150,000 square kilometers (Figure 6). Using Toppozada's formula relating area of intensity 1 or greater to local magnitude (M_L), the $I \geq 1$ area of 150,000 square kilometers translates into a magnitude of 6.0. Calculations using area of intensity V or greater, 37,600 square kilometers produces a magnitude of 5.8.

The epicenter of the 1916 event is not likely to have been in Boise as reported in the earthquake catalog, it occurred to the north or northwest of Boise. Reports of intensity V at Elk City extend the area of maximum intensity to the north. People rafting down the Salmon River (Figure 7) viewed remarkable effects (slides and fissures) attributed to the earthquake, described in the only preserved fragment of a newspaper article published in the June 2, 1916 Idaho Recorder (Salmon, Idaho).

Previous estimates of the 1916 epicenter were based on a cursory analysis. The earthquake was reported from seismograph stations at Reno, Nevada, and Spokane, Washington. Estimates of distance from these seismographs fall outside the area of maximum

Earthquake	Time	Intensity	Intensity Data
Nov. 11, 1905	3:30 pm	Shoshone 6 to 7	Stone and brick buildings damaged. Extensive fall of plaster. Dishes knocked from shelves. Felt two distinct shocks.
		Heyburn 4-	Shook the buildings knocking objects from shelves. No report of duration.
		Idaho City 4	Too slight to do any damage but noticed by many. No report of duration.
		Rupert 3 to 4	Buildings swayed, bottles shaken from shelves. Duration of 30 seconds.
		Hailey 3 to 4	Rattled bottles on shelves. Duration of 5 seconds.
		Glenns Ferry 3 to 4	Rattled dishes and bottles on shelves. Duration of a "few" seconds.
		Boise 3+	Furniture moved 3 to 4 inches. Felt only by people on the upper floors of buildings. Wave traveled from east to west, with two shocks 1/4 minute apart.
		Oakley 3+	Felt by many indoors and outdoors. No report of duration.
		Ogden 3+	Very distinct, tenants on upper floors made a hasty exit. No report of duration.
		Salt Lake 3-	Slight earthquake. No report of duration.

Table 2: Intensity rating derived from newspaper reports from towns affected by the Nov. 11, 1905 earthquake.

Earthquake	Time	Was Reported As Not Felt	Did Not Publish A Record
Nov. 11, 1905	3:30 pm	Blackfoot	Challis
		Caldwell	Fairfield
		Emmett	Paris
		Idaho Falls	Salmon
		Montpelier	
		Mountain Home	
		Nampa	
		Payette	
		Pocatello	
		Saint Anthony	
		Weiser	

Table 3: Towns which reported the earthquake as not felt, and towns having newspapers that did not publish a record of the earthquake.

Earthquake	Time	Intensity	Intensity Data
Oct. 14, 1913	3:00 pm	Landore 7	Houses put out of plumb, telephone lines out. Stoves rocked, broken windows, dishes shaken from shelves. Duration of approximately 1 minute.
		Homestead 6	Houses rocked, upsetting chairs and breaking dishes. Duration 1 minute.
		Cuprum 6	People ran from houses, roar like thunder heard, houses swayed. Duration 1 minute.
		Ballards Landing 4	Felt the shock distinctly. Duration 1 minute.

Table 4: Intensity rating derived from newspaper reports from towns affected by the Oct. 14, 1913 earthquake.

Earthquake	Time	Was Reported As Not Felt	Did Not Publish A Record
Oct. 14, 1913	3:00 pm	Baker, Oregon	Cambridge, Idaho
		Halfway, Oregon	Cascade, Idaho
		Huntington, Oregon	Grangeville, Idaho
		LaGrande, Oregon	Lewiston, Idaho
			Weiser, Idaho
			Enterprise, Oregon
			Joseph, Oregon
			Nyssa, Oregon
			Ontario, Oregon
			Wallowa, Oregon

Table 5: Towns which reported the earthquake as not felt, and towns having newspapers that did not publish a record of the earthquake.

Earthquake	Time	Intensity	Intensity Data
May 12, 1916 (con't)	7:26 pm	Cascade, Id. 4	Reported 6 shocks, no further reports of damage.
		Rye Valley, Or. 4	Houses shook, people ran out into the streets.
		Brogan, Or. 3+ - 4	Houses and furniture shook.
		Nampa, Id. 3	China rattled, floors vibrated, but many residents were unaware of the earthquake.
		Bissel Creek, Id. 3	Quake was plainly felt.
		South Slope, Id. 3	Residents felt the earthquake.
		Miller, Or. 3	Plainly felt the quake.
		Caldwell, Id. 2	Not felt as violently as at Nampa.
		Nyssa, Or. 2	Slight earthquake, many people did not notice.
		Hailey, Id. 2	Reported only as felt.
		Idaho City, Id. 2	Reported only as felt.
		Baker, Or. 2	Felt only on upper floors, chandelier swayed.

Table 6: Intensity rating derived from newspaper reports from towns affected by the May 12, 1916 earthquake.

Earthquake	Time	Intensity	Intensity Data
May 12, 1916	7:26 pm	Boise, Id. 5+ - 6-	People rushed out of buildings, a few bricks from a chimney fell. A wave was generated in the Natatorium swimming pool. The earthquake wave traveled northeast to southwest.
		Cambridge, Id. 5	Residents heard a rumbling sound, doors and lamps swung. Wave traveled southwest to northeast.
		Elk City, Id. 5	Tremor was very distinct, windows rattled, dishes moved on shelves, and other loose articles about the homes disturbed.
		Highland, Id. 4+ - 5	Doors and windows were violently shaken.
		Emmett, Id. 4+ - 5	Doors, dishes and windows shook, people ran out of their houses.
		Ola, Id. 4+	People ran out of their houses.
		Arrowrock, Id. 4+	Reported the ground heaving.
		Ontario, Or. 4	Walls and buildings trembled, doors and windows rattled. People on upper floors became dizzy.
		Anaconda, Mt. 4	Very distinctly felt, buildings were shaken.
		Payette, Id. 4	Windows and dishes rattled.
		Weiser, Id. 4	Shock was plainly felt, new gas well showed an increase in pressure.

Table 6: Intensity rating derived from newspaper reports from towns affected by the May 12, 1916 earthquake.

Earthquake	Time	Was Reported As Not Felt	Did Not Publish A Record
May 12, 1916	7: 26 pm	Mountain Home, Id.	Aberdeen, Id.
		Rupert, Idaho	American Falls, Id.
		Twin Falls, Id.	Arco, Id.
		LaGrande, Or.	Blackfoot, Id.
			Grangeville, Id.
			Kellogg, Id.
			Enterprise, Or.
			Prairie City, Or.
			Wallowa, Or.

Table 7: Towns which reported the earthquake as not felt, and towns having newspapers that did not publish a record of the earthquake.

Earthquake	Time	Town Affected By Aftershocks	Intensity Report
May 13, 1916	9:04 pm	Red River, Id.	Felt 3 distinct shocks, alarmed residents.
		Cascade, Id.	Felt 3 shocks.
		Highland, Id.	Felt 9:04 pm, doors and windows rattled.
		Elk City, Id.	Felt 9:30 and 11:30 pm, alarmed residents.
		Cambridge, Id.	Those awake felt the 11:30 pm.
		Emmett, Id.	Felt the 11:30 pm only by those awake.
		Boise, Id.	Felt both aftershocks, noticed only by those on the upper floors of buildings, not noticed at street level.
		South Slope, Id.	Reported having felt the aftershocks.

Table 8: Towns having reported aftershocks from the May 12, 1916 earthquake.

Mercalli Intensity	Area (km^2)	Accuracy	Magnitude (M_L)
4	14,700	minimum	
3	52,000	maximum	5.3*

*Using formula (1) p. 8 from Toppozada (1975)

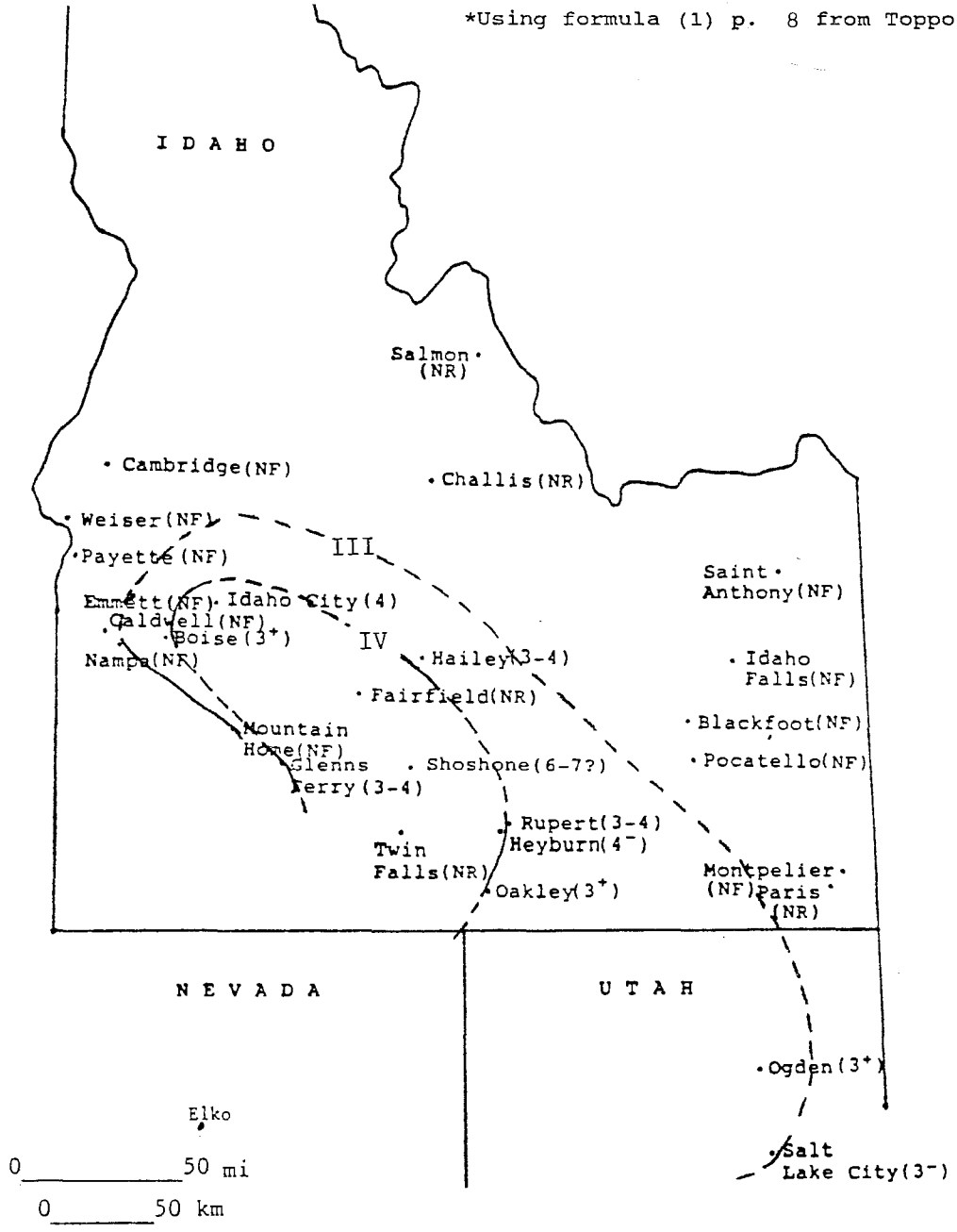

Figure 4: Isoseismal map for the Nov. 11, 1905 earthquake. Arabic numerals in brackets are Mercalli intensities determined in this study; NF equals not felt, NR equals no report.

Mercalli Intensity	Area (km^2)	Accuracy	Magnitude (M_L)
6-7	540	inexact	4.9*

*Using formula (3) p. 8 from Toppozada (1975)

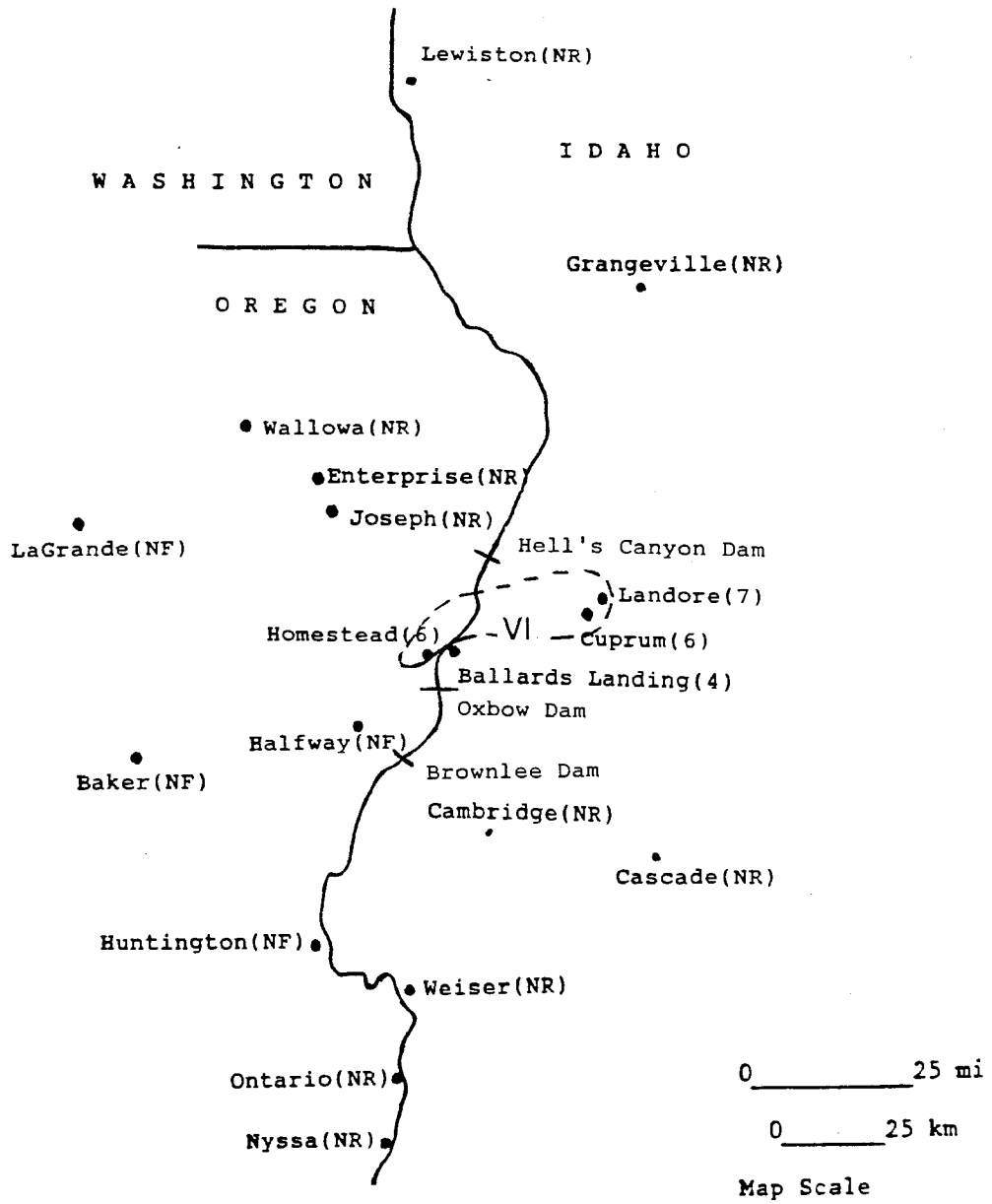

Figure 5: Isoseismal map for the Oct. 14, 1913 earthquake. Arabic numerals in brackets are Mercalli intensities determined in this study; NF equals not felt, NR equals no report.

Mercalli Intensity	Area (km^2)	Accuracy	Magnitude (M_L)
5	37,600	inexact	5.8*
4	72,000	inexact	
3	86,000	inexact	
1-2	150,000	inexact	6.0**

*Using formula (2) p. 8 from Toppozada (1975)
**Using formula (1) p. 8 from Toppozada (1975)

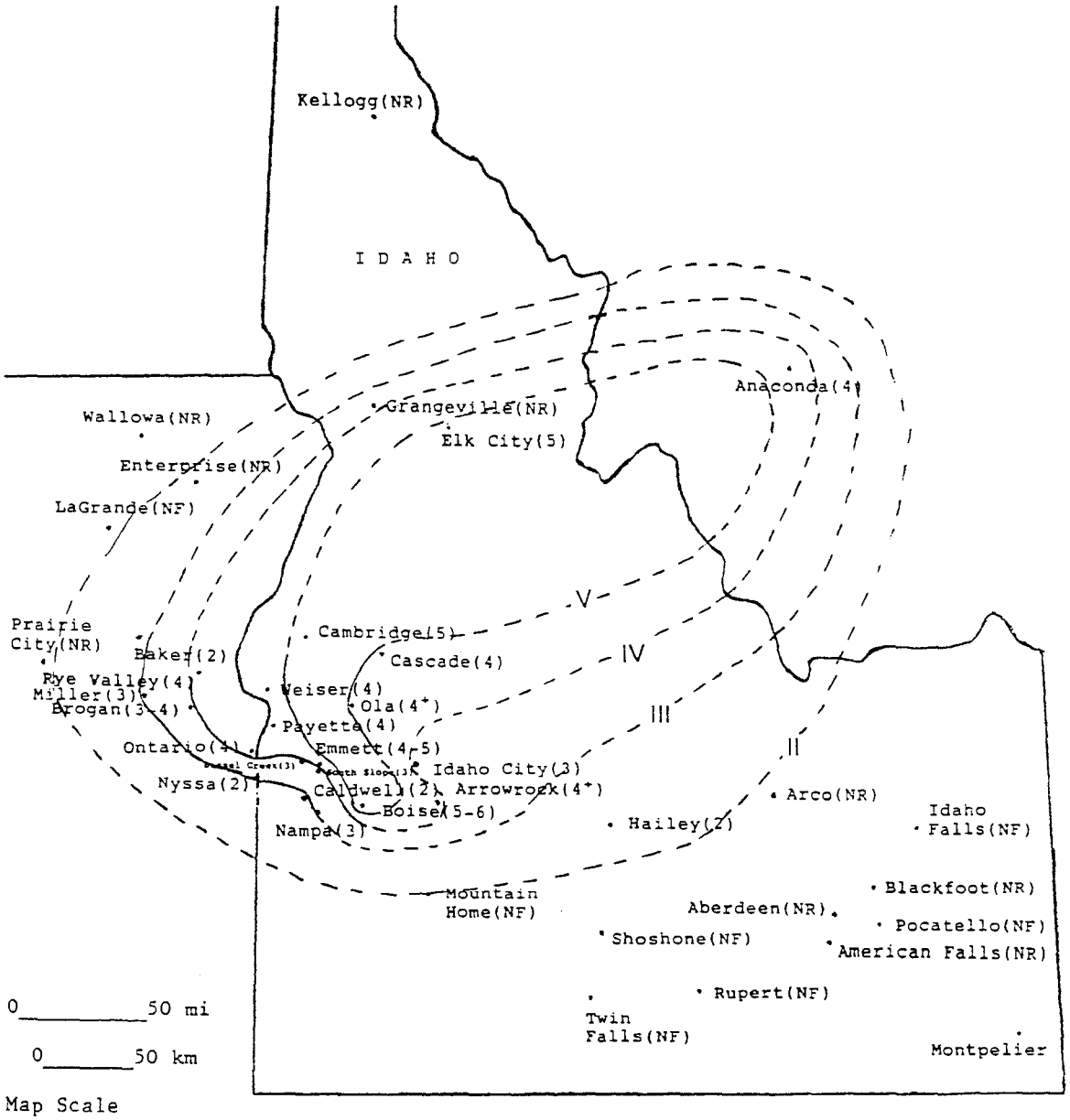

Figure 6: Isoseismal map for the May 12, 1916 earthquake. Arabic numerals in brackets are Mercalli intensities determined in this report; NF equals not felt, NR equals no report.

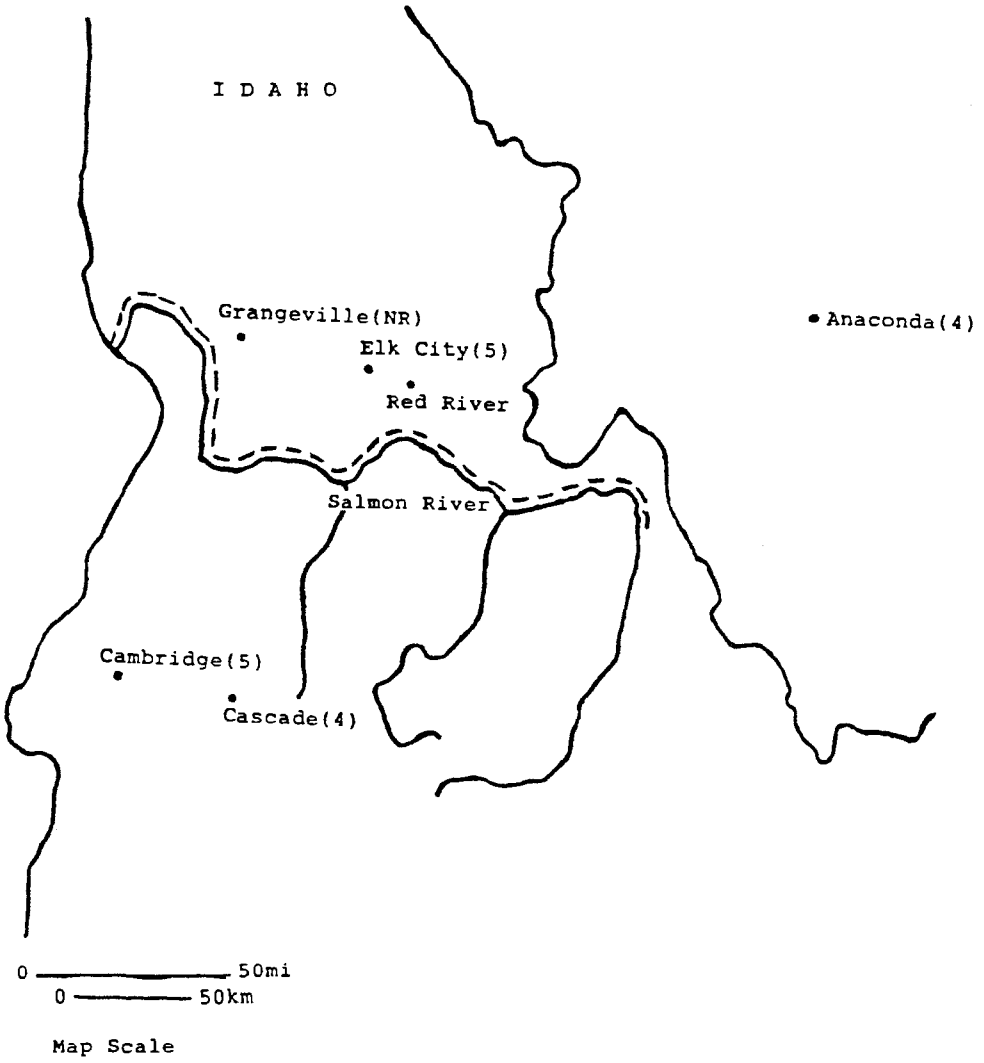

Figure 7: Intensity data for the May 12, 1916 earthquake and the location of the Salmon River. The dashed line indicates the section of the Salmon River that was traveled during 1916 (River of No Return, Carrey and Conley, 1978).

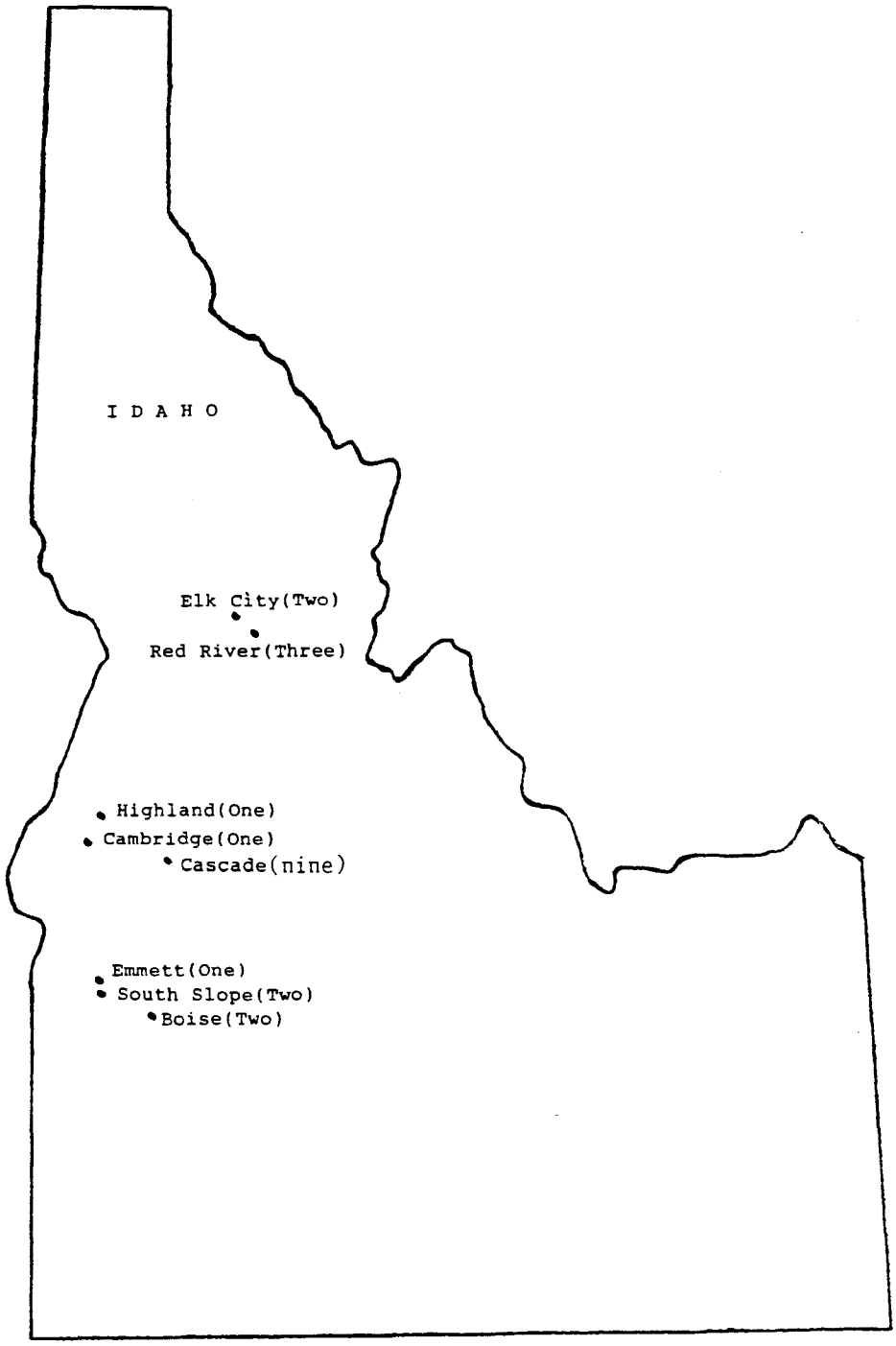

Figure 8: Towns having felt aftershocks from the May 12, 1916 earthquake. The number of aftershocks reported in parentheses.

intensity and therefore are not accurate. *The Monthly Weather Review (May 1916)* reports seismograph stations in Denver, Colorado and possibly at Georgetown University in Washington D.C. recorded the earthquake as well. Comments from Denver indicate a small and indistinct record, occurring somewhere in Montana, Idaho, or Washington. An event arrived at Georgetown seven minutes after the reported time in Idaho, although heavy microseism noise is reported to obscure that seismograph record *(Monthly Weather Review, May, 1916)*. The seismograph recording from the University of California at Berkeley is shown on the cover picture.

Woodward-Lundgren and Assoc. (1972) suggest the epicenter may have been near the Cascade - Sweet area and identify that since the earthquake was not reported at Mountain Home (41 miles southeast of Boise), nor at Twin Falls (133 miles southeast of Boise), that Boise was near the edge of the felt area and not at the earthquake epicenter. Mann (1989) suggested an epicenter near 44.2 N, 116.5 W based upon descriptive accounts from the Cambridge News (May 19, 1916), and the Idaho Daily Statesman (May 13,1916). His newspaper search was limited in comparison to the present study, nevertheless, the location he chose is well within the IV - V maximum contour that I generated from newspaper reports.

Additional information on the May 12, 1916 earthquake is developed by examining the number of aftershocks reported by various towns. Aftershocks on May 13 were reported by eight towns (Figure 8): Elk City, Red River, Highland, Cambridge, Cascade, Emmett, South Slope, and Boise. The northerly towns on the map reported the strongest aftershocks, while the southernmost aftershocks were felt only by those people in special circumstances (Table 8).

SUMMARY

Table 9 summarizes the total felt area in square kilometers, and the local magnitudes determined for the three historic Idaho earthquakes. The 1905 earthquake was felt in southern Idaho and parts of Utah. Shoshone represents the center of maximum reported disturbance, but the intensity rating of VI - VII is questionable due to the lack of reports of damage to unreinforced masonry structures. Identification of reports describing damage in Nevada due to the earthquake might locate the epicenter south of the Snake River Plain .

The 1913 earthquake occurred in a remote part of Idaho near the Hell's Canyon area, causing damage in the small towns of Cuprum, Landore, Ballard's Landing, and Homestead. Since the isoseismal map shows an area of high intensity without a corresponding large area of low intensities, it is possibly the result of an earthquake having a shallow focus.

The 1916 earthquake was a relatively large event felt over a widespread area; central and southwestern Idaho, eastern Oregon, and western Montana. The epicentral location was not at Boise as previously reported, but to the north or northwest of Boise in central Idaho. Descriptive accounts of high intensities reported from Elk City, Cambridge, and along the Salmon River place Boise at the southern edge of the felt area, and not at the center of maximum disturbance. Locations reporting felt aftershocks also confirm a central Idaho location.

Table 9. Summary of Total Felt Area and Local Magnitude For the Three Earthquakes

Earthquake	Total Felt Area (km^2)	Magnitude (M_L)
1905	52,000 - 79,000	5.3 - 5.6+
1913	540	4.9
1916	150,000	6.0

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APPENDIX A

NEWSPAPER ACCOUNTS OF THREE HISTORIC EARTHQUAKES

NOVEMBER 11, 1905

OCTOBER 14, 1913

MAY 12, 1916

SOURCE: Newspapers on microfilm at the Idaho State Historical Library, Oregon Historical Society Library, University of Oregon, Washington State Library (see Library of Congress, 1984 for location of microfilm records)

EARTHQUAKE: NOVEMBER 11, 1905

THE IDAHO DAILY STATESMAN
NOVEMBER 12, 1905 PAGE 1
BOISE, IDAHO

Seismic Shock Felt In Boise
Phenomenon Marked by Quivering of Buildings and Swaying of the Furniture - Observed by Occupants of the Top Floors of the Federal and Sonna Buildings - Two "Shocks" a Quarter of a Minute Apart Felt in Sonna Block, Furniture Moving Three or Four Inches - First Earthquake in Boise for Nearly 30 Years.

A SLIGHT EARTHQUAKE shock was felt in Boise yesterday afternoon about 3:30 o'clock, the occupants of the stories of the higher buildings of the city feeling it distinctly, while those who were upon the ground or who were busily engaged higher up did not notice it at all. Some of those who felt the shock, or quiver of the earth, say there were two movements, perhaps a quarter of a minute apart. The shaking was not of sufficient intensity to do even the slightest damage.

The quivering of the buildings in the city seemed to be in the general direction from east to west, with a slight variation to the north, being almost parallel with streets in the old townsite. So far as known only those who were seated at their desks facing in this direction, permitting them to be swayed backward and forward with the movement of the building in which they were located, noticed the quivering of Mother Earth and the shaking of the furniture.

Observer Wells of the United States weather bureau noticed but one shock, and it was so slight that he thought he had been mistaken. He paid little attention to it until one of the employees of the surveyor general's office, which, like the weather bureau, is situated on the fourth floor of the government building, came in to inquire about the phenomenon. He then realized there had been a slight earthquake shock, and that he had not been deceived by some slight shaking of the office furniture.

On the upper floor of the Sonna building, also, the quivering of the building was noticed. J.T. Pence, the attorney, was seated at his desk writing at the moment, when the desk suddenly seemed to sway in front of him. Upon looking up his eye caught a swaying overcoat hanging by a window, which, however, was closed, with no air current around it. A sectional bookcase full of books was noticed by him to sway fully three or four inches, as did also a hanging electric light globe.

Former Governor Morrison, in an adjoining room, noticed the same swaying of the furniture, and went into Mr. Pence's room to compare notes. After his arrival there, both noticed a second, and slighter, movement of the furniture the same as before.

The focus of the earthquake, judging from the extreme lightness of the quivering here, probably lay hundreds of miles away.

Old-timers say this is the second shaking of the earth's crust in Boise since there was such a place. The first one occurred about 4 o'clock one afternoon early in the winter of 1876 or 1877.

SHOCK WAS FELT AT MANY PLACES TO THE EAST AND SOUTHEAST OF BOISE

Not only was the earthquake felt in Boise, but it extended to a considerable distance to the east and southeast, as far as Salt Lake; perhaps farther. Indeed, the shock was more severe to the east, some damage being done at Shoshone and other places. This would indicate that Boise was on the edge of the affected belt, thus confirming the

deduction drawn from the fact that the shock was very light here.

A peculiar feature of the wave lay in the fact that it would be felt at one town and not at another close by. Although felt distinctively at Glenns Ferry, it did not affect Mountain Home. It passed Pocatello by with no manifestation, but was felt in Salt Lake.

This is supposed to be due from the character of the formation, it being a well known fact that an earthquake shock is not felt, even though severe on both sides, at a place where the formation is loose, as above a thick stratum of gravel, and is more pronounced close to rock formations.

SHOSHONE BUILDINGS CRACKED

Two Distinct Quakes, Dishes Being Knocked from Shelves.

(Special Dispatch)

SHOSHONE, Nov. 11, - An earthquake shook Shoshone at 3:45 this afternoon, knocking dishes from shelves and cracking several stone and brick buildings. This is the first time, as far as can be learned, that anything of this nature has ever visited this place and it was a complete surprise to everyone.

There were two distinct shocks, the first one somewhat longer than the second, which followed immediately after. The court house and school house, both being brick buildings, were slightly damaged and the plaster on almost every plastered house in town was more or less injured.

RATTLED DISHES ON SHELVES

Earthquake Reached Glenns Ferry at 3:45 in the Afternoon

(Special Dispatch)

GLENNS FERRY, Nov. 11, - A distinct earthquake shock was felt here this afternoon at 3:45 o'clock which lasted only a few seconds. The shock was so distinct that in some buildings dishes and other articles rattled on the shelves.

BOTTLES RATTLED AT HAILEY

No Damage Done, Shock Not Being Severe Enough to Break Glass.

(Special Dispatch)

HAILEY, Nov. 11, - The earthquake shock which is reported to have been felt this afternoon at many southern Idaho points was severe enough here to rattle the bottles on the shelves in the saloons. No damage was done, however, the shock not being severe enough to break the glass in window panes.

TREMOR IN SALT LAKE

SALT LAKE, Nov. 11 - A slight earthquake occurred here at 3:26 this afternoon. No damage is reported.

NO QUAKE OBSERVED AT EMMETT

(Special Dispatch)

EMMETT, Nov. 11 - No earthquake shock was felt here this afternoon, no tremor whatever being observed.

SHOCK LIGHT AT IDAHO CITY.

(Special Dispatch)

IDAHO CITY, Nov. 11 - There was a slight earthquake shock at this place this afternoon, occurring about 3 o'clock. The shock was too slight to do any damage, but the tremor was noticed by almost the entire population.

NO TREMOR FELT AT CALDWELL.

(Special Dispatch)

CALDWELL, Nov. 11 - There was no earthquake shock here today, or if any tremor occurred, it was too slight to be noticed.

NOTHING DOING AT PAYETTE.

(Special Dispatch)

PAYETTE, Nov. 11 - Nothing in the nature of an earthquake shock occurred here this afternoon, as at other places.

NOT FELT AT MOUNTAIN HOME.

(Special Dispatch)

MOUNTAIN HOME, Nov. 11 - No earthquake shock was observed here, as at other places, although one was felt at Glenns Ferry, only a few miles away.

SOUTHEAST SEEMS EXEMPT.
(Special Dispatch)

POCATELLO, Nov. 11 - No earthquake shock was felt here this afternoon, nor have any reports from surrounding towns been received telling of such an occurrence in this section.

IDAHO FALLS FELT NOTHING.
(Special Dispatch)

IDAHO FALLS, Nov. 11 - No earthquake shock was felt at this place today.

St. ANTHONY IS TREMORLESS.
(Special Dispatch)

St. ANTHONY, Nov. 11 - Nothing in the nature of an earthquake tremor was felt in this vicinity today.

VERY DISTINCT AT OGDEN.

OGDEN, Nov. 11 - A very distinct earthquake shock was felt here at 3:30 this afternoon. No damage was done. Many tenants on the upper floors of an office building made a hasty exit, fearing its collapse.

IDAHO WORLD NOVEMBER 13, 1905 PAGE 1

IDAHO CITY, IDAHO

An earthquake shock was felt at this place between 3 and 4 o'clock last Saturday. It was light in Salt Lake and very distinct in Ogden. In Southeastern Idaho the tremor was not felt except at Glenns Ferry and Hailey, where it was strong enough to rattle dishes.

THE LEADER-HERALD NOVEMBER 14, 1905 PAGE 5

NAMPA, IDAHO

Boise had an earthquake shock Saturday afternoon. Nothing of the kind was experienced at Nampa, Caldwell, or Payette.

THE LEADER-HERALD NOVEMBER 21, 1905

NAMPA, IDAHO

Earthquakes

Apropos of the recent earthquake experienced at Boise, the French scientist, Abbe Moreau, a short time ago, made the prediction that we are nearing a period of seismic disturbances. He expressed the view that "as the solar activity will slowly diminish, it is highly probable that earthquakes will occur," and he set the time for March or April, next. As Abbe Moreau predicted the earthquakes which a few months ago devasted parts of India and which, he held, were due to sun spots, his prognostications are read with considerable interest.

According to this scientist, there is unmistakable connection between solar activity and earthquakes, as well as volcanic eruptions. The fact is, he claims that the awakening of the internal forces of the globe coincides with sudden changes in the curve of spots on the sun. He adds:

"Earthquakes, and especially volcanic action, are localized on the lines of fracture of the globe, and particularly at the intersection of these lines - (A) the west coast of the two Americas; (B) the line including the volcanic districts of eastern Asia; (C) the South Sea Islands and Australia, and, finally, (D) the depression of the Mediteranean cutting the three first lines of fracture almost at right angles."

How to account for these facts, is the question. M. Moreau suggests that the sun acts on the crust of the earth either by causing its potential electricity to vary or by modifying the heat sent to the earth. For both, he says, there would be a dilation or shrinking of the envelope.

THE WEISER SIGNAL NOVEMBER 15, 1905 PAGE 4
WEISER, IDAHO

The papers report an earthquake shock, felt on the Wood River and in south Idaho. Not so! It was only Govenor Gooding jarring loose from that Fremont business.

THE SHOSHONE JOURNAL NOVEMBER 11, 1905 PAGE 1
SHOSHONE, IDAHO

An earthquake shock shook at 3:45 this afternoon knocking dishes from shelves and cracking several stone and brick buildings.

THE SHOSHONE JOURNAL NOVEMBER 17, 1905 PAGE 5
SHOSHONE, IDAHO

Saturday afternoon Heyburn experienced a slight earthquake shock, hard enough to shake the buildings and knock things from the shelves.

THE WOOD RIVER TIMES NOVEMBER 11, 1905 PAGE 4
HAILEY, IDAHO

There was a slight earthquake felt here at 3 o'clock this afternoon. The shock did not last over 5 seconds, and it did no damage.

TROY WEEKLY NEWS NOVEMBER 17, 1905 PAGE 17
TROY, IDAHO

Ogden feels quake. Ogden, Utah, Nov. 12 - A distinct earthquake shock was felt here at 3:30 Saturday afternoon. No damage was done.

THE RUPERT RECORD NOVEMBER 16, 1905 PAGE 8
RUPERT, IDAHO

An earthquake shock last Saturday was distinctly felt in Rupert.

RUPERT PIONEER NOVEMBER 16, 1905 PAGE 16
RUPERT, IDAHO

Earthquake is Felt at Rupert

The mild earthquake which shook up a considerable portion of the west last Saturday afternoon, was felt in this city, and while the quakes were mild yet they were sufficient to cause quite a commotion and many laughable antics among our citizens.

The shaking commenced about 3:26 p.m. and lasted fully thirty seconds. In some places bottles were shaken from shelves, while in others the occupants thought they were simply having an attack of ague.

The reporter happened to be sitting in the office of our local attorney. Mr. Atkins, at the time consulting on the wisdom of a certain section of the constitution of the United States, and when the building commenced to tremble, accused the attorney of malicious mischief. But that gentleman assured him that he was innocent of the charge and forwith tip toed to the rear where he expected to find some practical joker swaying his building. No one was around however, so the attorney in his bewilderment reversed, went to the front and, while many spectators laughed, took a firm hold of one corner of the building and viciously shook it trying to find a defect in the structure. The attorney has since claimed that the reporter was so badly frightened that he couldn't move but we wish to assure our dear readers that he was very brave and calm and showed a remarkable presence of mind at all times.

THE OAKLEY EAGLE NOVEMBER 16, 1905 PAGE 4
OAKLEY, IDAHO

An earthquake shock that was quite general throughout the west was felt at Oakley on Saturday last at 3:30. As this is the first within the memory of the settlers of this country it occasioned

considerable surprise and talk. To those who had never experienced such a thing it was a "tremendous shock", to others a very slight one. If we do not have any worse ones, we shall not complain.

THE OAKLEY EAGLE NOVEMBER 23, 1905 PAGE 1

OAKLEY, IDAHO

Earthquakes.

A slight earthquake shock such as that experienced on 11 inst. makes people wonder what kind of an old earth this is that we a reliving on anyway. Astronomers, geographers, and geologists tell a that it is an immense sphere, highly heated and whizzing thru space at a terrific rate. We believe them and pretend to understand all about it, when in reality, we do not comprehend it at all, at all. But having accepted so much in such good faith we need not be at any loss whatever in understanding quite thoroughly just what an earthquake is and how it is caused.

It was formerly believed that the earth had a rind or crust of slight thickness, and that the interior was a fiery molten mass. Physicists, however nowadays assure us that such would be absolutely impossible, and that the earth from circumference to its very center is as rigid as steel.

That the interior of the earth, however, is highly heated cannot nor need not be denied. Everywhere on the globe, where deep mines and wells have been dug into the earth, it has been found that the temperature increases as the depth becomes greater. The average rate of increase is one degree for every fifty or sixty feet of descent.

If this rate of increase in temperature continues as it probably does, the interior of the earth must be intensely heated. But we must remember the pressure inward increases, which naturally raises the melting point. This pressure is equal to hundreds and thousands of tons to the square inch, thus preventing the rocks from reaching melting temperature.

The earth is continually losing some of its heat and this loss causes a shrinkage in the rocks, and this contraction is evidenced in mountain building, in fractures of the earth's surface. The stability of the earth then is not assured. It seems a restless old earth, and the interior activity will perhaps continue for at least a few chapters yet. The high mountainous regions of the world are most unstable. The western part of the United States has had several slight shocks during the past 10 years. East of the Rocky Mountains there have been 2 shocks, one in Mississippi valley 1811: and one in Charleston, South Carolina 1886, during the past century. Little Japan has them about as regularly as the seasons.

An earthquake is a jar passing thru the rocks. It is an expression of the interior heated condition of the earth. The direct cause may be (1) The falling in of a cavern producing a jar. or (2) The struggling of gases and steam imprisoned within the rocks, causing fractures; movement, jars. or (3) The removal of pressure in volcanic areas where immense fractures in the earth relieve pressure, causing decrease in melting point and permitting the solid interior to become molten, gaseous or fiery, and escape or (4) The breaking or faulting of rocks or (5) The attempt of lava to escape. All of which means practically the same thing i.e.. The interior is highly heated, is cooling, and endeavoring to adapt itself to its new condition.

People have long since ceased to look upon these events as supernatural, and indeed, it is quite surprising when we think of it, with what equanimity we do sit upon this restless little sphere when we realize what may happen. How fortune it is that we can be so contented and that we have so much confidence and faith in the profidences of God that we can always say with Browning " All's right in the world " " All's right in the world. "

MONTPELIER EXAMINER NOVEMBER 17, 1905 PAGE 2

MONTPELIER, IDAHO

A slight earthquake shock was felt in Boise last Saturday afternoon about 3:30 o'clock. About the same time shocks were felt in Glenn's Ferry, Shoshone, Hailey, and other points in the southern part of the state. At Shoshone the shock was more severe than at any other point. Dishes were thrown from shelves and several brick buildings were cracked.

NEWSPAPERS THAT DID NOT REPORT THE 1905 EARTHQUAKE

GEM STATE RURAL CALDWELL, IDAHO

THE IDAHO REPUBLICAN BLACKFOOT, IDAHO

THE IDAHO RECORDER SALMON, IDAHO

THE SALMON HERALD SALMON, IDAHO

THE CAMAS PRAIRIE COURIER SOLDIER, IDAHO

THE GENESEE NEWS GENESEE, IDAHO

THE REPUBLICAN MOUNTAIN HOME, IDAHO

THE IDAHO REGISTER IDAHO FALLS, IDAHO

THE TWIN FALLS NEWS TWIN FALLS, IDAHO

THE SILVER MESSENGER CHALLIS, IDAHO

THE PARIS POST PARIS, IDAHO

THE POCATELLO TRIBUNE POCATELLO, IDAHO

NO NEWSPAPERS ON RECORD FOR THE YEAR 1905

CASCADE, IDAHO

AMERICAN FALLS, IDAHO

COTTONWOOD, IDAHO

BURLEY, IDAHO

PAYETTE, IDAHO

ALBION, IDAHO

EARTHQUAKE: OCTOBER 14, 1913

THE IDAHO DAILY STATESMAN
OCTOBER 15, 1913
PAGE 1

BOISE, IDAHO

SEVERE EARTHQUAKE SHAKES TOWNS ON IDAHO-OREGON LINE

Telephone Lines Down, Houses Put Out of Plumb, Windows Broken.

PORTLAND - A special to the Oregonian from Baker, Ore., says a severe earthquake shock of more than a minute's duration was felt at 3 o'clock Tuesday afternoon in the Seven Devils country along the Snake river, on the Idaho-Oregon border line. The towns affected are Homestead, Ore., Ballard's Landing, Landore and Cuprum, Ida.

Telephone lines were put out of commission and reports are meager. Stoves and dishes were rocked out of place, windows broken, and some houses out of plumb. A similar shock was felt four years ago, but it was not so severe.

THE COUNCIL LEADER OCTOBER 17, 1913 PAGE 3
COUNCIL, IDAHO

An earthquake was reported in Cuprum the first of the week.

THE COUNCIL LEADER OCTOBER 23, 1913
PAGE 2
COUNCIL, IDAHO

QUAKE ROCKS SEVEN DEVILS

Oregon-Idaho Border Gets Severe Shaking Up

Baker, Or. - A severe earthquake shock was felt at 3 o'clock Tuesday afternoon in the Seven Devils country, along the Snake River, that divides Oregon and Idaho.

The towns affected were Homestead, Or., and Ballard's Landing, Landore and Cuprum, Idaho. Telephone lines were put out of commission and reports are meager.

It is reported that at Homestead houses were rocked, upsetting chairs and breaking dishes. At Landore the shock was more severe. Windows were broken, stoves rocked and dishes were shaken from the shelves. Some houses there are believed put out of plumb.

At Cuprum the inhabitants ran from their homes badly frightened, and a panic was imminent, as the houses swayed. The earth quivered and a roar like thunder came from the earth.

Ballard's Landing felt the shock distinctly, but it is believed little damage was done there. No fatalities are reported.

The shock was distinct in all places and lasted fully one minute. The people of all towns are badly frightened, and are preparing for a repetition of the quake. All the towns affected are small, the largest being Homestead, with about 300 population. They are 100 miles southeast of here. A similar shock was felt there four years ago, but it was not as severe or as long as this one. Baker had a shock about 20 years ago, but it was very slight.

THE COUNCIL LEADER OCTOBER 24, 1913
PAGE 1
COUNCIL, IDAHO

John Hancock was up at Landore last week when the earthquake occurred there. He was sitting in his hack holding the horses when there came a rumbling noise like a distant blast, the earth rocked, trees swayed, the horses became frightened and started to run and there was general confusion. The quake extended from the neighborhood of Bear Creek over into Oregon. No damage was done.

THE BAKER HERALD OCTOBER 14, 1913
PAGE 1
BAKER, OREGON

Earthquake Shocks Homestead, Landore, Ballard's Landing And Cuprum, Driving People From Their Homes, Late This Afternoon

(Special to the Herald)

Halfway, Oct. 14 - Meager reports have reached here of severe earthquake shocks at Homestead and Landore at 3 o'clock this afternoon. Telephone communication with those points is cut off, so it is impossible to get details. It is reported that at Homestead chairs were rocked and dishes rattled, while at Landore the shock was more severe. No disturbance was felt here.

The shock was over a minute in duration. At Landore windows were broken, stoves rocked and dishes shaken from their shelves. At Cuprum, Idaho, the inhabitants of the village were badly scared, running from their houses terror stricken. The earth quivered and a roar like distant thunder was heard, only sounding like it came from the earth.

Four years ago, a similar shock was felt in this locality but was not of such long duration nor as severe.

Telephone communication with Landore cannot be established.

Reports at 4 o'clock this afternoon indicate that one shock was felt. No damage has been reported other than rocking of the houses. Ballard's Landing plainly felt the shock.

THE LIVE WIRE OCTOBER 15, 1913
PENDLETON, OREGON

Seven Devils Country Quakes

Baker, Ore., Oct. 15 - A severe earthquake shock of more than a minute's duration was felt at 3 o'clock yesterday afternoon in the Seven Devils country along the Snake river on the Idaho-Oregon border line. The towns affected are Homestead, Ore., Ballard's Landing, Oregon and Cuprum, Idaho.

Telephone lines were put of commission and reports are meager. Stoves and dishes were rocked out of place, windows broken and some houses thrown out of plumb. A similar shock was felt four years ago, but it was not so severe.

DAILY EAST OREGONIAN OCTOBER 15, 1913
PENDLETON, OREGON

Quake Shakes Few Towns In Oregon

Severe Shocks Are Felt And Residents Are Thrown Into Panic

Baker, Ore., Oct. 15 - A severe earthquake shock was felt at 3 o'clock yesterday afternoon in the Seven Devils' country, along the Snake river that divides Oregon and Idaho.

The towns affected were Homestead Ore., and Ballard's Landing, Landore, and Cuprum, Idaho. Telephone lines were put out of commission, and the reports are meager.

It is reported that at Homestead houses were rocked, upsetting chairs and breaking dishes. At Landore the shock was more severe. Windows were broken, stoves rocked and dishes were shaken from the shelves. Some houses there are believed put out of plumb.

At Cuprum the inhabitants ran from their homes badly frightened and a panic was imminent, as the houses swayed. The earth quivered and a roar like thunder came from the earth.

Ballard's Landing felt the shock distinctly, but it is believed little damage was done. No fatalities are reported.

The shock was distinct in all places and lasted fully one minute. The people of all towns are badly frightened and are preparing for a repetition of the quake. All the towns affected are small, the largest being Homestead, with about 300 population. They are about 100 miles southeast of here. A similar shock was felt there four years ago, but it was not as severe or as long as that of yesterday. Baker had a shock about 20 years ago, but it was very slight.

LA GRANDE EVENING OBSERVER
OCTOBER 15, 1913 PAGE 8
LA GRANDE, OREGON

Earthquake on Snake River

Huntington, Or., Oct. 15 - A slight earthquake was noticeable mostly on the other side of Snake river in the Seven Devils district yesterday afternoon but was not felt in this city, although according to reports the tremor, which was of about a minute's

duration, caused consternation at Landore and Cuprum, Ballard's Landing and other places. The reports are meager. However, it is believed no damage resulted, houses being slightly rocked and the people pretty well frightened. The shock was also noticed at Homestead on the Oregon side of the river.

Old inhabitants say that a severe shock occurred 35 years ago and a slight one was recorded four or five years ago, but as in the present case they were slight and caused no damage.

NEWSPAPERS THAT DID NOT REPORT THE EARTHQUAKE

THE CAMBRIDGE NEWS (SALUBRIA) CAMBRIDGE, IDAHO

IDAHO COUNTY FREE PRESS GRANGEVILLE, IDAHO

THE WEISER SIGNAL WEISER, IDAHO

THE LEWISTON TRIBUNE LEWISTON, IDAHO

THE CASCADE NEWS CASCADE, IDAHO

THE OAKLEY EAGLE OAKLEY, IDAHO

MALHEUR ENTERPRISE MALHEUR, OREGON

BEND BULLETIN BEND, OREGON

THE GATE CITY JOURNAL NYSSA, OREGON

HEPPNER GAZETTE HEPPNER, OREGON

MILTON EAGLE MILTON, OREGON

BLUE MOUNTAIN AMERICAN JOHN DAY, OREGON

THE DALLES CRONICLE DALLES, OREGON

THE JOSEPH HERALD JOSEPH, OREGON

THE WALLOWA SUN WALLOWA, OREGON

THE EVENING HERALD KLAMATH FALLS, OREGON

ONTARIO DEMOCRAT ONTARIO, OREGON

BLUE MOUNTIAN EAGLE JOHN DAY, OREGON

THE ENTERPRISE RECORD ENTERPRISE, OREGON

CROOK COUNTY JOURNAL PRINEVILLE, OREGON

DUFUR DISPATCH DUFUR, OREGON

WALLA WALLA UNION WALLA WALLA, WASHINGTON

NO NEWSPAPERS ON RECORD FOR THE YEAR 1913

McCALL, IDAHO

FREEWATER, OREGON

PRAIRIE CITY, OREGON

CONDON, OREGON

SPRAY, OREGON

EARTHQUAKE: MAY 12, 1916

THE IDAHO DAILY STATESMAN MAY 13, 1916 PAGE 1

BOISE, IDAHO

BOISE GETS SECOND QUAKE IN TWO WEEKS

Tremor Felt From Anaconda Clear to Weiser - Hard Jar Creates Alarm.

PEOPLE RUSH TO STREETS: CHIMNEY BRICKS FALL

An earthquake of some violence shook Boise Friday night at 7:26, the duration of the tremor being about three seconds. The disturbance, according to reports from outlying cities and the federal weather bureau, was traveling from northeast to southwest.

In Boise, while no damage was done, hundreds of people rushed to the streets in alarm after the first shock of the quake. Incidents humorous and ludicrous were reported from the larger office buildings.

At Weiser the shock was plainly felt. During the morning the gas flow pressure at the Weiser Oil & Gas company's plant unaccountably advanced from 45 to 74 pounds. In the early afternoon the pressure became so great that the well was fired to prevent bursting of the pipes. The shock of the earthquake increased the flow and sent hundreds of people to the plant to witness the big spread of flame, many of them attributing the mysterious increase in pressure to the earth disturbance.

MOUNTAIN HOME NOT SHAKEN.

At Mountain Home the quake was not felt, but early reports of the tremor caused people to worry about the condition of the Long Tom dam. A telephone report, saying that the old break in the dam had previously let practically all of the water out of the reservoir, was given out shortly after the first reports of the earthquake.

A slight tremor was felt at Hailey, 143 miles east. Twin Falls reported no knowledge of the disturbance. A few persons at Payette reported feeling the temblor.

At Nampa the quake was about as violent as in Boise, although at Caldwell it seemed to be less noticeable.

FELT AT ARROWROCK

Three men were working below the Arrowrock dam at the time of the quake. When the ground began to heave under their feet, their eyes turned with common accord to the mighty cement walls that hold back the millions of tons of water. Their next thought was of the people in the valleys below, and they hastened to inspect the big dam. No damage in any part could be found.

Idaho City and Emmett both reported the disturbance, as did other places in the western part of Idaho. At no place was any damage reported.

A few fallen bricks from a chimney at Seventh and Main streets was the only damage attributed to the quake in Boise. In practically every building on Main street the excited people first looked up from their work in alarm and then rushed to the street. Within a few minutes after the shake the street was lined with people.

THOUGHT CAPITOL WOULD FALL.

The sensation at the state capitol was described by a woman who was in the library on the basement floor.

" It seemed as if some supernatural power had grasped the building and were shaking it violently, " she said.

" One thought the building surely must fall. "

People who were in the public library immediately dropped the books and papers to make a grand rush for the doors. For a moment the exits, were crowded.

The clock in the weather bureau offices stopped with the first shock of the temblor, giving the exact time of the disturbance.

Just before the quake was felt in Boise a woman stepped into an elevator in the Idaho building. A new boy was operating the lift. The door closed, the elevator started down. Then came the quake.

" You should not try to run this thing until you know how, " said the woman indignantly as the

car began to rattle in its drop. " Can't you control the thing ? "

NEVER ACTED SO BEFORE.

"I'm doing the best I can," responded the boy as his face paled and his hand shook upon the lever. "It never acted this way before. Believe me, I want to get out too."

Some person called the Commercial club as soon as the tremor was over. A negro porter answered the phone.

"Did you feel the earthquake up there?" was asked.

"Lawdy, yes. Dat's about all we did feel."

"How long did it last?"

"Well, sah, ah caint say. Some 'o the men says it was fifteen minits; seem lak an hour to me."

At the fire station the shock was felt on the top floor but not on the ground floor. Two men were upstairs at the time. Both came sliding down the emergency pole, their faces blanched with fear.

"There was no alarm," said the chief, in surprise.

"Didn't need to be," answered one of the men. "I'd prefer an alarm any time to this."

CHINESE WOMAN SCARED

One of the most frightened persons in the city, perhaps, was the little Chinese wife of Louie Lai, a Chinese merchant on Seventh street. Her husband had left her in charge of the store, which is filled with rare china and bric-a-brac.

As the plates and cups started rattling and the building started to sway the little Chinese woman ran screaming to the door and called for help.

Attendants at both hospitals say the shock was felt plainly there. The patients were little alarmed by the disturbance. No operations had been performed during the day.

The shock of the earthquake started a huge wave in the Natatorium pool. The wave traveled the length of the plunge, "ducking" many swimmers and splashing up on the curb at the north end.

LAST SHAKEUP APRIL 30.

On April 30 of this year a slight earthquake shock was felt in Boise, and as far west as Weiser, but that disturbance was not nearly so violent as the one of Friday night.

The last widespread sharp earthquake which occurred in Idaho and eastern Oregon previous to the present one was recorded October 2, 1915. At the time Boise, Nampa, Payette, Caldwell and Weiser, in Idaho; Seattle, Wash.. and Baker, Huntington and several villages in Oregon, were shaken, and at some points damage to buildings resulted. The same temblor was felt in Nevada, Arizona and parts of California and Utah.

REGISTERED AT SPOKANE

Center of First Disturbance About 80 Miles Southeast, Says Gonzaga College

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SPOKANE, Wash. - The seismograph at Gonzaga University here registered one pronounced earthquake shock at 6:29 o'clock Friday night, followed by several smaller ones, the entire disturbance lasting about 15 minutes. Father Adams, the local observer, said the general direction of the temblor was southeast to northwest, the main shock being unusually severe for this region.

The quake occurred, Father Adams estimated, about 80 miles southeast of Spokane.

ANACONDA SHAKEN BY SEISMIC DISTURBANCE

ANACONDA, Mont. - An earth shock was distinctly felt here at 7:30 o'clock Friday night. Buildings in the business district were shaken, but no damage was done.

ONTARIO HAS TWO SHOCKS

Walls and Buildings Tremble as Though With Cold.

ONTARIO, Ore. - Two distinct earthquake shocks were felt here at 7:30 o'clock Friday evening. Neither was severe and no damage has been reported. The first tremor lasted only a few seconds and was barely noticeable. The second, commencing a moment later at exactly 7:30 continued nearly 40 seconds. Walls and buildings trembled as though shivering with cold, and doors and windows rattled like clattering teeth. Guests in

upper rooms of the Moore hotel, the highest building in town, became dizzy.

SEISMOGRAPH AT RENO REGISTERS DISTURBANCE

RENO, Nev. - The seismograph at the Mackay School of Mines, University of Nevada, registered an earthquake at 6:31 o'clock Friday night. The disturbance lasted until 6:36. Professor J.C. Jones of the university figured the center of the disturbance as about 400 miles north of Reno.

FELT SLIGHTLY AT BAKER

Not Noticed at Street Level, but Phone Operators Feel Shake

BAKER, Ore. - A slight earthquake was felt here about 6:20 o'clock Friday night in rooms above the first floor but not on the street. On the second floor of telephone exchange central girls saw the switchboard and chandeliers sway. The tremor lasted about 4 seconds and was so slight that it was not recognized until reports came later of the earthquake at other points.

THE IDAHO SUNDAY STATESMAN MAY 14, 1916 PAGE 1

BOISE, IDAHO

TWO QUAKES SATURDAY NIGHT

Earth Disturbances Reported at 9:04 and 11:31 o'Clock; Almanac Predicts Tremblors Now Visiting Northwest.

Two earthquake shocks were felt in Boise Saturday night, the first coming at 9:04, the second at 11:31. Neither was of sufficient violence to be generally noticed over the city, although a number of persons reported them by telephone. E.L. Wells of the weather bureau took the time of the first shock in his office on the top floor of the federal building, but had left the office before the second occurred.

Men in the Commercial club rooms felt the first quake, as did men in most of the higher office buildings. Numbers of people called up The Statesman office after the second shock to report having felt the tremblor and to assure themselves that it was not their imagination at work.

ONE WEEK OFF.

"The first earthquake period in May is central on the first, extending from about April 27 to May 4. The quadrature of Uranus on the 10th and Mars on the 14th, will most likely prolong this period, but the crisis of the period will fall within four days of midnight on the 1st. You will hear from it.

"An earthquake period is central on the 17th, covering the 14th to the 20th. See if violent earthquakes are not reported, the crisis falling within three days of sunrise on the 17th, most likely after the 17th.

ANOTHER COMING?

"Another earthquake period is central on the 31st, on the day which the moon passes conjunction with the sun and earth. Within less than four days of noon on the 31st, expect earthquake reports from different parts of the planet.

According to Hicks, earthquakes may be expected during the rest of the year. The one which will be experienced between May 31 and June 4 will fall in the afternoon and night and the location of the shocks will lie mainly in the regions of the north Pacific coast. In September notable tidal waves and volcanic eruptions are foretold, heaviest, however, south of the equator.

These predictions by Hicks were made just a year in advance.

THE NAMPA LEADER HERALD MAY 15, **1916 PAGE 1**

NAMPA, IDAHO

BABY EARTHQUAKE SETS CHINAWARE TO DANCING

Perceptible Temblor Visits Nampa Wednesday Evening - Lasts For Several Seconds.

A slight temblor was perceptible for a few seconds in Nampa Friday evening about 7:30 o'clock. The quake did no material damage and many residents were unaware of its visit. Some reported that they heard the chinaware rattle and that they could feel the floors vibrate. Chickens and domestic fowls of all kinds made a great disturbance while the tremor lasted.

The earthquake was felt over a large territory, running northwest and northeast from Anaconda, Montana to Weiser, Idaho. Nowhere was there any report of serious damage.

THE PAYETTE ENTERPRISE MAY 18, 1916
PAGE 5
PAYETTE, IDAHO

The earthquake was felt by a good many Friday evening and it was amusing to hear people tell what they thought it was. One party thought it was the horse rubbing against the house and sent a member of the family to see. One housekeeper, when her dishes began to move tried to hold the table but finding that it didn't help she ran and locked the doors.

THE EMMETT INDEX MAY 18, 1916
PAGE 1
EMMETT, IDAHO

STRONG FLOW OF GAS AT WEISER

Gas Flow Estimated at Half Million Cubic Feet - To Sink Another Well

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Gas in commercial quantities has been struck at Weiser at a depth of 421 feet. Experts estimate the present flow at half a million cubic feet every 24 hours. The Signal tells the story as follows:

" The Plumb has made good on its name and the only question on the gas strike in the city of last Friday is only " how much ? " The sand struck Friday morning at 11 o'clock is admittedly gas sand of the granite variety, the same sand which carries gas the world over and in this hole it goes to a depth of between 7 and 8 feet, absolutely dry. The pressure remains practically stationary as given on a steam gauge although there has been noticeable increases from time to time. Since Friday the gas well has been the chief topic of conversation in this city and practically everyone in the community has visited it to see for themselves that the strike has really been made.

" Just what flow will measure is a matter of conjecture but a gas meter has been ordered and as soon as this arrives it will be possible to measure up and settle the matter for certain. B. Kutch who is the man in charge of the company's business, is of the opinion that this hole will produce at least one-half million cubic feet of gas every 24 hours. In the event this surmise is correct there would be an output of 15 million feet a month and if every house in Weiser burned two stoves each at the maximum capacity they could consume but 6 million feet in 30 days.

" The company does not intend to measure the present finding as all there is to be found here but will start on a second well tomorrow morning. The exact location has not been decided definitely but it is very probable that it will be located about a half a block east of the corner of Park and Fourth street east. The new hole will start with an eight-inch casing and this will be continued as far as possible with the hope that this gas sand can be struck with that sized drill. It will in any event allow the use of a 6-inch drill.

" Saturday Purdem and Rowland, both gas and oil men from the east, one from Pittsburgh and the other from Maryland, were here and after investigating what is shown both declared there was no question about the presence of oil in the immediate territory.

The Plumb was commenced March 31 being drilled by J.M. Wilson, assisted by L.S. Coen, both of Payette. The first showing of gas appeared in a water sand struck May 2 at a depth of 350 feet. The next showing came in a fissure at 374 feet, and another fissure at 411 and the gas sand at 421. The strike at first blew the drill out of the 4-inch hole and sent rocks and water to a height of 75 feet. This was Friday morning, May 12.

The sand was penetrated today (Tuesday) to a depth of 7 feet or the shale was discovered again at 428 feet. One thing favorable for the finding of oil lower, was the color of the sand found in the bottom of the strata. It was almost black whereas the top sand was very light. Oil sand is black and the bottom of this layer was filled

with the same colored sand.

" The present gas is said to contain about a 3 per cent suspension of gasoline which it will be possible to extract without detracting from the value of the gas for commercial purposes. "

EARTHQUAKES NUMEROUS

Shocks Felt Here Friday and Saturday - Cascade Has Six in a Day

Something evidently has gone wrong with this side of good old Mother Earth. The trouble seems to be internal, as earthquake shocks are distressingly numerous of late, even though they are slight and of short duration. Friday night there were two, one of them severe enough to shake windows and doors and rattle dishes. On Saturday night, about 11:30, another distinct quake was felt by those who were awake. Boise also felt the shocks.

At Cascade, in Long Valley, there were six shocks Friday night and three on Saturday, according to a letter received by Mrs. Parrish from her daughter, Mrs. Sollie Callender.

These seismic disturbances, it appears, were foretold a year ago by Rev. Irl Hicks, the weather prophet. He says in his prognostications that there will be more, another spasm being due in June and another in September.

THE EMMETT INDEX MAY 18, 1916
PAGE 4
EMMETT, IDAHO

On Friday evening the capital city experienced the most violent earthquake shock of its history according to those who have lived here longest. Although no damage was done, beyond the shaking down of a few chimneys, those who were located in tall buildings had the feeling for a few seconds that their hold on the earth was insecure. Rocking chairs swayed, and the pictures on the walls swung out or from side to side. Those who tried to walk across the floor staggered and were made dizzy. Many people were badly frightened. Boise seems to have been the place where the seismic disturbance was most felt.

THE EMMETT INDEX MAY 18, 1916
PAGE 8
EMMETT, IDAHO

Bissel Creek

The earthquake Friday night was felt very distinctly in this neighborhood.

South Slope

Friday and Saturday the South Slope people felt the shock from the earthquake. Three in less than 48 hours is running them in pretty thick. We suppose it jarred loose this warm weather.

THE EMMETT INDEX MAY 25, 1916
PAGE 8
EMMETT, IDAHO

Ola

On Friday of last week occurred the hardest earthquake that has ever been felt at Ola. Some people ran out of their houses, thinking they were going to be demolished.

THE CHALLIS MESSENGER MAY 17
PAGE 5
CHALLIS, IDAHO

A distinct earthquake shock was felt at Upper Salmon River points last Friday evening. The shock was reported at various points in the west.

THE IDAHO FALLS REGISTER MAY 16, 1916
PAGE 3
IDAHO FALLS, IDAHO

BOISE SHAKEN BY EARTHQUAKE

TREMOR VERY PLAINLY FELT, BUT NO DAMAGE DONE TO PROPERTY OR BUILDINGS.

Felt As Far Away As Spokane-Pocatello Reports Slight Shake-Not Felt Around Here.

Boise, Ida., May 15 - Boise experienced early Friday evening the most violent earthquake shock in the history of the city. The tremor, which occurred at 7:26 o'clock, lasted about three seconds and was more in the nature of an upheaval than a wave. In the down-town district people rushed from the buildings to the street. No damage has been reported.

Tonight's tremor was the second in a fortnight, the first having been recorded on April 30th.

At Weiser, sixty miles west, the quake was felt with exceptional violence. A new gas well, in which a flow was struck ten days ago, showed a remarkable increase of pressure immediately after the quake. The flow caught fire tonight and hundreds of people watched the shooting flames.

The tremor was not felt to the east of Boise. Twenty-five miles north, at Emmett, the quake was violent and alarmed the inhabitants. Nampa, to the south, also felt the shake, as did Idaho City, thirty-six miles north. Windows rattled at Payette.

Spokane, Wash., May 15 - The seismograph at Gonzaga university here registered a pronounced earthquake shock at 6:29 o'clock tonight, followed by several smaller ones, the entire disturbance lasting about fifteen minutes. Father Adams, the local observer, said the general direction of the temblor was southeast to northwest, the main shock being unusually severe for this region. The quake occurred, Father Adams estimated, about eighty miles southeast of Spokane.

THE CAMBRIDGE NEWS MAY 19, 1916
PAGE 1
CAMBRIDGE, IDAHO

IDAHO FEELS TREMBLOR

Quake Shakes Towns, But Little Damage Is Done

Boise, - At 7:26 Friday evening Boise experienced the most violent earthquake shock in the history of the city. The tremor lasted about three seconds and was more in the nature of an upheaval than a wave. In the downtown district people rushed from the buildings to the streets. No damage has been reported. The quake was the second in a fortnight, the last one having been reported on April 30.

At Weiser, 80 miles west, the quake was felt with exceptional violence. A new gas well, in which a flow was struck ten days ago, showed remarkable increases of pressure immediately after the shakeup. It caught fire and hundreds of people were out watching the shooting flames.

In Boise several brick chimneys were partly wrecked. The tremor was not felt to the east of Boise, either at Twin Falls or at Hailey. Twenty-five miles north, at Emmett, the quake was violent and alarmed the inhabitants. Nampa, to the south, also felt the shake, as did Idaho City, 36 miles north. Windows rattled at Payette.

Friday night's violent earthquake here was followed Saturday evening by a slight shock at 4 minutes after 9 o'clock. It was noticed only in the city's higher buildings and not at all at street level. No damage was done.

Some Earthquakes

Two More Last Week. Boise Claims the Credit as Usual.

Last Friday evening at about 7:30 the most distinct earthquake shock ever felt in Cambridge was experienced by our people. According to descriptions given the News, it came with a rumbling sound not unlike a sudden strong wind, and lasted from two to three seconds. Most people agree that the vibrations were from southwest to northeast. Doors rattled and lamps swung. No damage of any kind was done, as far as can be learned.

Boise people, at least a few of them, think the immense amount of water accumulated at the Arrow Rock dam is responsible for the shocks. Boise has always claimed everything in sight, so it is not surprising that they try to supercede God Almighty in the matter of earthquakes.

Then again, Saturday evening another light shock was felt by those who were awake at 11:30. This one was not so distinct and was only noticed

by a few.

As usual the News man did not know of either until told of them.

Earthquake at Highland

Highland, May 14 - A distinct earthquake was noticed here Saturday evening at 9:03.30. The shock lasted for about three seconds. Doors and windows were violently shaken. May have a reaction from the Irish uprising.

LEWISTON MORNING TRIBUNE MAY 13, 1916 PAGE 1

LEWISTON, IDAHO

Quakes In Idaho

Violent Rocking in Southern Part of State.

Boise Chimneys Fall

Motion That of Upheaval Rather Than Wave--Exceptional Severity at Weiser.

Boise, Idaho, May 12 - At 7:26 tonight Boise experienced the most violent earthquake shock in the history of the city. The tremor lasted about three seconds and was more in nature of an upheaval than a wave. In the downtown disrict people rushed from buildings to the street. No damage has been reported. Tonight's quake was the second in a fortnight, the last one having been recorded on April 30. At Weiser, 60 miles west, the quake was felt with exceptional violence. A new gas well in which a flow was struck 10 days ago, showed a remarkable increase of pressure immediately after the shakeup. This morning the pressure was 75 pounds. Tonight the flow caught fire and hundreds of people were out watching the flames.

In Boise several brick chimneys were partly wrecked. The tremblor was not felt to the east of Boise, either at Twin Falls or at Hailey.

Twenty-five miles north, at Emmett, the quake was violent and alarmed the inhabitants, Nampa, to the south, also felt the shock, as did Idaho City, 36 miles north. Windows rattled in Payette.

The movement was in all cases from east to west with Boise as the eastern limit of the upheaval. No towns to the east of Boise noted the tremor, nor did Walla Walla county of southeastern Washington.

In Boise a chimney of a business block in the heart of the city was shaken down and in other buildings plaster was broken down from the walls. Dishes fell from tables and plate racks, tables, chairs, beds and desks were moved. Aside from a fright to residents and fear of a repetition of the shock, Boise and southern Idaho escaped injury. The tremblor in many sections of this part of the intermountain country was without direction in its motion and in that respect was different from the one felt here last fall. The swaying motion was not felt in the quake here tonight.

The swaying of lights, the rattling of furniture and dishes and straining of timbers in building for two or three seconds were other incidents of tonight's shake. Residents exhibited more curiosity than fear over the disturbance.

For fear the quake may have damaged the great Arrow Rock dam, situated 22 miles above this city. Inquiry developed the fact that, while the quake had been felt there, the dam was not damaged.

From the irrigated sections reports have been received that some of the canals were damaged, but not beyond repair. The earthquake last fall split a deep seam across the New York canal, one of the largest in Idaho, and it required weeks to repair it. Instruments at the local weather bureau office indicate the quake was confined to the intermountain country and that the duration of the quake was less than a half minute. Officials say that had it been a more violent shock it would have had force enough to shake building down.

Not Severe at Ontario.

Ontario, Ore., May 12 - Two distinct earthquake shocks were felt here at 7:30 o'clock this morning. Neither was severe and no damage has been reported. Walks and buildings trembled and doors and windows rattled. Hotel guests in upper rooms became dizzy.

Last Sharp Quake Oct. 2, 1915.

Portland, Ore. May 12 - The last sharp earthquake which occurred in Idaho and eastern Oregon previous to the present one was recorded October 2, 1915. At that time Boise, Nampa, Payette, Caldwell and Weiser, Idaho, Seattle, Wash. and Baker, Huntington and several villages in Oregon, were shaken and at some points damage to buildings resulted. The tremblor was felt in Nevada, Arizona and parts of California and Utah.

Disturbance Lasted 15 Minutes.

Spokane, May 12 - The seismograph at Gonzaga university here registered a pronounced earthquake shock at 6:29 o'clock tonight, followed by several smaller ones, the entire disturbance lasting about 15 minutes. Father Adams, the local observer, said the general direction of the tremblor was southeast to northwest, the main shock being unusually severe for this region. The quake occurred, Father Adams estimated, about 80 miles southeast of Spokane.

Felt at Anaconda.

Anaconda, Mont., May 12 - The earthquake shock was distinctly felt here at 7:30. Buildings in the business district were shaken, but no damage was done.

LEWISTON MORNING TRIBUNE MAY 14, 1916 PAGE 1
LEWISTON, IDAHO

Another Shock at Boise.

Boie, Idaho, May 13 - Friday night's violent earthquake here was followed tonight by a slight shock. It was noticed only in the city's higher buildings and not at all at street levels. No damage was done.

LEWISTON MORNING TRIBUNE MAY 14, 1916 PAGE 8
LEWISTON, IDAHO

Elk City Felt a Quake.

Mining Town Visited by a Tremor--Seemed Coincident With the South Idaho Visitation.

Stites, May 13 - (Special in the Tribune.) - A dispatch received this morning from Elk City stated an earthquake shock was experienced there about 6:30 o'clock last evening, the tremor continuing for several seconds and was so distinct that windows rattled, dishes on the shelves were moved and other loose articles about the homes were disturbed. At the time the message from Elk City was received, no advices had been received here relative to the disturbances in the southern part of the state and the people were inclined to ridicule the idea of an earthquake at Elk City.

The arrival of the Tribune this morning with the south Idaho reports of an earthquake shock last evening, convinced the people that the Elk City report is correct and that the belt affected by the quake Friday night extends northward from the south Idaho sections through the Elk City region.

LEWISTON MORNING TRIBUNE MAY 15, 1916 PAGE 6
LEWISTON, IDAHO

Elk City Again Visited.

Quake Tremors Again Experienced Saturday Evening - No Damage.

Stites, May 14. - A report received this morning from Elk City stated earthquake tremors were again experienced Saturday evening about 10:30 o'clock, while at Red River, 8 miles from Elk City, three distinct shocks were felt. The report states no damage has been sustained, but the people are considerably alarmed.

THE IDAHO RECORDER JUNE 2, 1916 PAGE 1
SALMON, IDAHO

(In duplicating to microfilm, one side of this article

was not copied. The original paper has been destroyed. "----" indicates the missing text.)

---- In Rocks
---- Earthquakes?
---- Down Through the
---- Walls of the River
---- Are Said to Have Seen
---- Sights.

---- travelers down the Salmon
---- last voyage with Harry
---- having seen remarkable
---- the effects of the recent
---- felt in Idaho, according
---- received from Lewiston.
---- they arrived last Monday
---- shocks first occurred
---- ago, followed later by
---- passengers were down in the
---- the canyons below, where
---- hundred feet high walls
---- both sides, they are said
---- great fissures and rents
---- which they could not
---- unless the forces of nature
---- in the earthquakes
----. They also observed
---- that been thrown
---- the sheer walls into the
---- they had plowed their
----. that met the view in
---- along the way confirmed
---- that the earth distur-
---- them. The effects of
---- slides were also seen in
---- .

THE PIONEER RECORD MAY 18, 1916
PAGE 4
RUPERT, IDAHO

Earthquake Shock in Idaho

Boise, Idaho - Southern Idaho, as far east as Twin Falls and eastern Oregon as far west as Ontario, experienced a violent earthquake shock between 7:26 and 8 o'clock Friday. No severe damage was done.

MONTPELIER EXAMINER MAY 19, 1916
PAGE 6
MONTEPELIER, IDAHO

Earthquake Shock In Idaho

Boise, Idaho - Southern Idaho, as far east as Twin Falls and eastern Oregon, as far west as Ontario, experienced a violent earthquake shock between 7:26 and 8 o'clock Friday. No serious damage was done.

FRUITLAND BANNER MAY 19, 1916
PAGE 2
FRUITLAND, IDAHO

Boise, according to daily newspaper reports seems to be headquarters for earthquakes. Besides pulling of nightly quakes last week the capital city wound up with 2 performances Saturday night.

THE IDAHO COUNTY FREE PRESS MAY 18, 1916
PAGE 5
GRANGEVILLE, IDAHO

Prevalence of Earthquakes Disturbing.

The recent prevalence of earthquake shocks in the capital city during the past month or more is attracting the attention of a good many people in this section of the state. Apparently there is a little of the uneasiness bors of superstition in the air, and a fear for the future just as actual as though expressed in words. There seems to be a widely held opinion that the recent shocks were but intitratory to further and worse seismic disturbances. Among the causes that are given for the shocks the one most generally held is that the completion of the Arrowrock dam, and the filling of the reservoir, has resulted in a readjustment in the interior of the earth, bringing about the tremors which have been experienced.

THE WEEKLY STAR MIRROR MAY 15, 1916 PAGE 1

MOSCOW, IDAHO

Earthquake Shock in Southern Idaho

Only Slight Damage to Irrigation Ditches is Reported

Arrow Rock Dam Not Affected - One Chimney Topples Over

(By the United Press Association)

Boise, May 13 - A violent earthquake shock was felt here shortly before 8 o'clock last night and reports indicated that it was felt as far east as Twin Falls and as far west as Ontario, Oregon. Only slight damage to irrigation canals are reported and the Arrow Rock dam was not affected. One chimney in the business part of town was shaken down.

THE KOOSKIA MOUNTAINEER MAY 15, 1916 PAGE 5
KOOSKIA, IDAHO

Idaho News Notes

A violent earthquake rocked southern Idaho as far east as Twin Falls, and eastern Oregon as far west as Ontario Friday night. No severe damage has been reported. A chimney in the business part of town was shaken down and other buildings suffered broken plaster from walls. Dishes in homes fell from tables and plate racks. Saturday evening a slight shock was felt at 4 minutes after 9 o'clock. It was noticed only in the higher buildings and not at all at street level. No damage was done.

SOUTHERN IDAHO DEMOCRAT MAY 19, 1916 PAGE 1
SHOSHONE, IDAHO

Well Shaken Up.

Boise, the capital of the state, has been certainly well shaken up the past few weeks. The citizens there are now in the throes of a recall election whereby the present mayor of the city is the principal figure. In connection with this the capital city has experienced several earthquake shocks during the past couple of weeks, the last two coming on Saturday evening last, an account of which is given in the Capital News as follows:

Boise and this section of southwestern Idaho recorded two earthquake shocks last night or three for the week. Not to be outdone in observing the customary Saturday night quake, the first shock arrived exactly at 9:04 o'clock and the second 11:32 o'clock. Both were light but distinct. E.L. Wells, director of the U.S. weather bureau of Boise, was the first person to report the first shock. He felt it while in his office on the fourth floor of the federal building and says he could not be mistaken. The receiver on his telephone rattled noticeably and there was a slight swaying.

The second shock was plainly felt in the Capital News office. That there could be no mistake with regard to the quake having taken place was evidenced by the fact that the telephone calls from several parts of the city were received from persons who announced that they had also felt it. Electric lights swayed from the effects of the second shock or quiver - for it was more like a quiver than anything else. It could not be classed as violent. Many people however, were surprised to learn there had been two shocks. They felt neither of them.

Within the past two weeks three earthquakes have been recorded to Boise and this territory. Two weeks ago there was a distinct shock on Saturday night. Friday night of this week there was also a very distinct shock. Dishes were rattled, clocks stopped, chimneys broke down, and window panes rattled. None of those things happened last night with the two quakes experienced, for they were slight.

MALHEUR ENTERPRISE MAY 20, 1916
MALHEUR, OREGON

Malheur

Malheur, Oregon, May 15.-An earthquake shock was reported at Bridgeport the other night at six thirty, lasting about a minute.

Brogan

Friday evening about 7:30 pm the

Broganites were startled by a sudden shaking of houses and furniture, but after a minutes thought realized it was a slight earthquake shock. No damage was reported.

THE GATE CITY JOURNAL MAY 12, 1916
NYSSA, OREGON

Earthquake Shock

A slight earthquake was felt in Nyssa Friday evening about 7:30. No damage was done and many people did not notice the disturbance. The duration of the tremor was about 3 seconds which, according to the reporter of the federal weather bureau at Boise, was traveling from northeast to southwest.

A slight earthquake shock was felt in Nyssa on April 10 of this year, but it was not as noticeable as the latest tremblor. The last widespread sharp earthquake which occurred in Eastern Oregon previous to the present one was recorded on October 2, 1915. At that time Nyssa and other towns of the northwest were shaken, and at some points damage to buildings resulted. The same tremblor was felt in Nevada, Arizona and parts of California and Utah. That tremblor was attributed by scientists to the Wasatch fault in Utah.

LA GRANDE EVENING OBSERVER MAY 13, 1916 PAGE 1
LA GRANDE, OREGON

Quake Slight In This Vicinity

News Gets Out That La Grande Was Hit

Boise and Nearby Points Especially Damaged by

Severe Tremor

While Baker, Boise, Ontario and country in between were rocked by an earthquake last night, no tremor was felt in La Grande. News reached Boise, somehow that La Grande was badly shaken up, and from there information got into the press wire services and wires were kept hot for an hour denying the allegation. Only after repeated denials would the big night news services cut La Grande from the list of towns affected.

Baker is Troubled.

Baker, May 13 - An earth tremor was distinctly noticeable here last evening about 6:30 o'clock, being noticed at several of the hotels and telephone office. No damage of any nature was done, but the buildings shook so that the occupants noticed it. The phone office reported the heaviest shock, but guests in some of the hotels were momentarily alarmed.

Boise, May 13 - The most violent earthquake in Boise's history was felt at 7:26 last night. It lasted three seconds and was more like an upheaval than a wave. People rushed from down-town buildings to the streets. No serious damage is reported.

The quake was the second in a fortnight, the last one having been felt on April 30.

At Weiser, 80 miles west, the quake was felt with exceptional violence. A new gas well, in which a flow was struck ten days ago, showed remarkable increase of pressure immediately after the quake. This morning the pressure was 75 pounds. Tonight the flow caught fire and hundreds of people are out watching the shooting flames.

In Boise several brick chimneys were partly wrecked. The tremor was not felt east of Boise, neither at Twin Falls or Hailey, 25 miles north. At Emmett the quake was violent, alarming the inhabitants. Nampa also felt the quake, as did Idaho City, 36 miles north. Windows rattled at Payette.

Ontario Feels Tremor.

Ontario, May 12 - Two distinct earthquake shocks were felt here at 7:30 tonight. Buildings trembled and guests in upper stories of the Moore hotel, the highest building in town, became dizzy.

Felt At Anaconda.

Anaconda, Mont., May 12 - An earthquake was distinctly felt here at 7:30 tonight. Buildings in the business district were shaken. There was no damage.

THE LIVE WIRE MAY 13, 1916
PENDLETON, OREGON

Idaho Towns Are Rocked By Tremblor

Chimneys Topple, Plaster Crumbles and People Rush to Streets for Safety

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Ontario Feels Quake

Disturbance is From East to West and More in Nature of Upheaval Than Wave

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(By the Associated Press)

Boise, Ida., May 13 - At 7:30 Friday evening, Boise experienced the most violent earthquake shock in the history of the city. The tremor lasted about three seconds and was more in the nature of an upheaval than a wave. In the downtown district people rushed from buildings to the streets. No damage has been reported. Last night's quake was the second in a fortnight, the last one having been recorded on April 30.

At Weiser, 80 miles west, the quake was felt with exceptional violence. A new gas well, in which flow was struck ten days ago, showed remarkable increase of pressure immediately after the shape up. In the morning the pressure was 75 pounds. At night the glow caught fire and hundreds of people were out watching the shooting flames.

In Boise, several brick chimneys were partly wrecked. Twenty-five miles north, at Emmett, the quake was violent and alarmed the inhabitants. Nampa also felt the shock, as did Idaho City 36 miles north. Windows rattled at Payette.

The movement was in all cases from east to west, with Boise as the eastern limit of the upheaval. No towns to the east of Boise noted the tremor nor did the Walla Walla country or southeastern Washington.

Ontario, Ore., Shaken By Two Tremors

Ontario, Ore., May 13 - Two distinct earthquake shocks were felt here at 7:30 o'clock last night. No damage has been reported. The first tremor lasted only a few seconds and was barely noticeable. The second, commencing a moment later, continued 40 seconds.

Walls of buildings trembled and doors and windows rattled. Persons in the upper rooms of the Moore Hotel, the highest building in town, became dizzy.

THE BAKER HERALD MAY 13, 1916
BAKER, OREGON

Slight Seismic Tremor Is Felt Through Four States

Although only faintly felt, an earthquake so wide spread as to be noticeable through Oregon, Idaho, Washington and Montana, caused some consternation here, but was over almost as soon as started. The quake was probably the most plainly shown in Baker, when finely balanced scales in the Muegge drug store, wavered up and down, and could not be used with accurate results until the tremor had subsided. The quake was felt by the girls in the telephone exchange and in the upper stories of hotels in the city.

In Boise a few fallen bricks constituted the only real damage, but from the vicinity of the Arrow Rock dam, damage to irrigation canals was reported. The quake was felt in Ontario, Nampa, Weiser, Spokane and Anaconda.

WALLA WALLA UNION MAY 13, 1916
PAGE 1
WALLA WALLA, WASHINGTON

Boise Rocks, Quake Felt Other Places

Chimneys Topple and People Rush Into Streets For Safety

Weiser Reports Severe Shaking

Montana Town Reports a Shock-Felt About 80 Miles from Spokane

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(By the Associated Press)

Boise, Ida., May 12 - Southern Idaho as far east as Twin Falls and eastern Oregon as far west as Ontario experienced a violent earthquake shock between 7:26 and 8 o'clock tonight. Late reports received here are to the effect that no serious

damage was done. The shock was rapid and more of a shake than a heaving.

BOISE, Ida., May 12 - At 7:26 Friday evening, Boise experienced the most violent earthquake shock in the history of the city. The tremor lasted about three seconds and was more in the nature of an upheaval than a wave. In the downtown district people rushed from the buildings to the streets. No damage has been reported. Tonight's quake was the second in a fortnight, the last one having been reported on April 30.

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The movement was in all cases from east to west, with Boise as the eastern limit of the upheaval. No towns to the east of Boise noted the tremor nor did the Walla Walla country or southeastern Washington.

Spokane Registers Disturbance.

SPOKANE, Wash., May 12 - The seismograph at Gonzaga university here registered one pronounced earthquake shock at 6:29 o'clock tonight, followed by several smaller ones, the entire disturbance lasting about 15 minutes. Father Adams, the local observer, said the general direction of the trembler was southeast to northwest, the main shock being unusually severe for this region. The quake occurred, Father Adams estimated, about 80 miles southeast of Spokane.

Tremors at Ontario.

ONTARIO, Ore., May 12 - Two distinct earthquake shocks were felt here at 7:30 o'clock this evening. Neither was severe and no damage has been reported. The first tremor lasted only a few seconds and was barely noticeable. The second commencing a moment later at exactly 7:30, continued nearly 40 seconds. Walls and buildings trembled like a person shivering with cold, doors and windows rattling like clattering teeth. Guests in upper rooms of the Moore hotel, highest building in town, became dizzy.

Quake Felt in 1915.

PORTLAND, Ore., May 12 - The last sharp earthquake which occurred in Idaho and eastern Oregon previous to the present one, was recorded October 2, 1915. At that time Boise, Nampa, Payette, Caldwell and Weiser, in Idaho, Seattle, Wash., and Baker, Huntington and several villages in Oregon were shaken and at some points damage to buildings resulted. The same trembler was felt in Nevada, Arizona and parts of California and Utah.

Anaconda Feels Quake.

ANACONDA, Mont., May 12 - An earthquake was distinctly felt here at 7:30 o'clock tonight. Buildings in the business district were shaken but no damage was done.

WALLA WALLA UNION MAY 14, 1916
WALLA WALLA, WASHINGTON

BOISE SHAKEN A SECOND TIME

(By Associated Press)

BOISE, Ida., May 13 - Friday night's violent earthquake here was followed Saturday evening by a slight shock at 9:04 o'clock. It was noticed only in the city's higher buildings and not at all at street level. No damage was done.

THE BAKER HERALD MAY 15, 1916
BAKER, OREGON

QUAKE FRIGHTENS RYE VALLEY FOLK

No Damage Done, But People Rush Into Open - Tremor Also Felt in the Miller Vicinity.

(Special to the Herald)

Rye Valley, May 15 - An earthquake shock was felt here at 6:30 o'clock one evening last week, lasting about 30 seconds. No damage was done other than to shake the houses and frighten the people causing some to run out in the street. The shock was also felt at Miller.

NEWSPAPERS THAT DID NOT REPORT THE EARTHQUAKE

CAMAS PRAIRIE CHRONICLE COTTONWOOD, IDAHO

THE IDAHO REGISTER IDAHO CITY, IDAHO

THE WOOD RIVER TIMES HAILEY, IDAHO

THE WEISER SIGNAL WEISER, IDAHO

THE REPUBLICAN MOUNTAIN HOME, IDAHO

THE IDAHO REPUBLICAN BLACKFOOT, IDAHO

THE WARDNER NEWS KELLOGG, IDAHO

THE GRANGEVILLE GLOBE GRANGEVILLE, IDAHO

GEM STATE RURAL CALDWELL, IDAHO

THE ABERDEEN TIMES ABERDEEN, IDAHO

THE ARCO ADVERTISER ARCO, IDAHO

THE AMERICAN FALLS PRESS AMERICAN FALLS, IDAHO

THE OAKLEY EAGLE OAKLEY, IDAHO

TWIN FALLS NEWS TWIN FALLS, IDAHO

MITCHELL SENTINEL MITCHELL, OREGON

HEPPNER GAZETTE HEPPNER, OREGON

MILTON EAGLE MILTON, OREGON

BLUE MOUNTAIN EAGLE JOHN DAY, OREGON

BLUE MOUNTAIN AMERICAN JOHN DAY, OREGON

THE WALLOWA SUN WALLOWA, OREGON

THE EVENING HERALD KLAMATH FALLS, OREGON

ONTARIO DEMOCRAT ONTARIO, OREGON

GRANT COUNTY JOURNAL PRAIRIE CITY, OREGON

BAKER HERALD BAKER, OREGON

FOSSIL JOURNAL FOSSIL, OREGON

ENTERPRISE RECORD ENTERPRISE, OREGON

DUFUR DISPATCH DUFUR, OREGON

CROOK COUNTY JOURNAL PRINEVILLE, OREGON

SPRAY COURIER SPRAY, OREGON

PASCO EXPRESS

PASCO, WASHINGTON

NO NEWSPAPERS ON RECORD FOR THE YEAR 1916

FILER, IDAHO

McCALL, IDAHO

COUNCIL, IDAHO

CASCADE, IDAHO

FAIRFIELD, IDAHO

SILVER CITY, IDAHO

BURLEY, IDAHO

JEROME, IDAHO

GLENNS FERRY

ALBION, IDAHO

POCATELLO, IDAHO (missing May 14 issue, no news in later issues)

BEND, OREGON

FREEWATER, OREGON

JOSEPH, OREGON

CONDON, OREGON

STANFIELD, OREGON