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**REEVALUATION OF PRE-1900 EARTHQUAKES  
IN WESTERN NEVADA**

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**This information should be considered preliminary.  
It has not been edited or checked for completeness  
or accuracy.**

Final Technical Report  
National Earthquake Hazards Reduction Program  
(NEHRP)

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**ABSTRACT**

Western Nevada has the highest earthquake hazard and seismic risk of the State. The urban corridor along the eastern Sierra Nevada Front is home to the second largest metropolitan area in the State, including Reno and the state capital, Carson City. This area also has some of the highest activity faults in the state, high rates of background earthquake activity, relatively high rates of geodetically measured deformation, and a number of notable, major historical earthquakes, several of which were in the 19<sup>th</sup> century. These early earthquakes caused significant damage to the urban corridor and would be major events and potentially disasters if they occurred today. We are examining these pre-1900 earthquakes in detail to gain information about strong shaking in the Reno-Carson City urban corridor that can be used to help characterize seismic hazard potential, and to use the details of these events to motivate citizens and decision makers that the local earthquake threat is real and preparedness and mitigative actions are worthwhile.

We began this study by canvassing and collecting descriptions of the pre-1900 earthquakes, including sending letters of inquiry, and contacting regional museums and libraries. We transcribed 212 accounts that we were able to locate for documentation and future research. There are some excellent accounts of collateral hazards, such as liquefaction and fire following earthquakes, and other characterizations of these events are now possible, such as minimum economic losses. We have summarized these earthquakes and began an analysis of their most probable epicentral locations and magnitudes. This report provides a summary of each earthquake, a chronologic listing of the earthquake sequence, transcriptions of earthquake catalogs, newspapers, and journals, and a summary of the intensities reported. The analytical procedure and in-progress results are given in the final section.

The “1852? Earthquake” is here referred to as the “1840s earthquake.” We have no direct accounts of an earthquake during this period, but nonetheless it seems likely that a large earthquake occurred in the 1840s or early 1850s in western Nevada because there are so many recollections of such an event. Based on post-1900 earthquakes, it seems likely that such an event would be felt and noted by people in Sacramento, California, where “continuous records” were kept in the form of daily newspapers. We have been searching these records for any evidence of an earthquake in western Nevada and have found none in the year 1852, or the autumn months of 1850 and 1851 (there is a recollection that indicates the event occurred in the autumn, following the pine nut harvest). According to recollections, the event strongly shook the Pyramid Lake area, the Stillwater/Carson Sink area, or possibly both.

The effects of 1857 and 1860 earthquakes in Nevada are still poorly understood, largely because fires in Virginia City and San Francisco destroyed most of the records. These events shook large portions of the Sierra Nevada and northern California, so they were clearly major events. We have two recollections for the 1860 earthquake of possible near-field effects from the Pyramid Lake area (rockfalls and possible aftershocks) indicating that as a candidate location. Further research will be conducted at the archives in Salt Lake City, Utah for Nevada accounts from these events.

The effects of the 1868 and two major 1869 earthquakes are fairly well documented. These earthquakes severely shook the Virginia City-Steamboat area, causing general hysteria amongst people. The 1868 event was limited to minor structural damage (bricks shaken down and brick walls cracked), whereas the 1869 events cracked many buildings, threw down parts of brick walls, and caused numerous rockfalls in the Virginia Range, along with large amounts of nonstructural damage. The accounts of the first 1869 event support the conclusion by Toppozada and others (1981) that this event was centered further south than the Olinghouse area, which has been traditionally ascribed the epicentral area; thus we feel labeling the 1869 earthquake as the “Olinghouse earthquake” to be erroneous. It has also been assumed that the first major 1869 earthquake was the largest. The accounts indicate that this may not have been the case, and that the second event was of equal size, or larger. With a lack of site conditions considered and using existing intensity assignments, the data are not yet good enough to inspire confidence in the general epicentral locations of these events yet using the Bakun and Wentworth (1997) approach.

The 1887 earthquake is one of the best documented and largest events of those studied, and caused several pronounced geologic effects, as well as damage. The earthquake notably shook western Nevada, the Sierra Nevada, and the central Great Valley. Whether any of the surface effects were the result of primary or secondary faulting remains a mystery; there is no confirmed surface faulting. Rockfalls, landslides, and liquefaction did occur, however. This earthquake was clearly the strongest earthquake in Carson City’s history. Several buildings were severely cracked and large amounts of plaster fell. Interruption in state governance was minimal and was related to delays from the clean up of fallen plaster, the caulking of cracks, and the restacking and counting of state money in the vault. Enough detailed information was collected for the 1887 event to make an estimate of the minimum economic loss of \$10,500 in 1887 currency. In-progress epicentral estimates using the Bakun and Wentworth (1997) approach indicate an epicentral area in the Lake Tahoe region; these results do not incorporate site corrections. There were a lot of spring changes in Eagle and Carson Valley, however, that may support local deformation, and an epicenter further east.

Less attention was given to the smaller events late in the 19<sup>th</sup> century (the 1888, 1894, 1896, and 1897 earthquakes). The maximum intensities for these events are estimated to be of Modified Mercalli Intensity VI to VII. Accounts are limited because of these events’ small sizes. The events in 1888 were likely aftershocks of the 1887 earthquake. The 1894 earthquake sequence appeared to be localized in the Virginia City area; damage was nonstructural in nature. The 1896 earthquakes were part of a small, local sequence at Carson City with minimal nonstructural damage. The 1897 earthquakes rattled Virginia City and Carson City, causing some nonstructural damage and part of a brick wall to fail in Virginia City. In general, these events in

the late 19<sup>th</sup> century were not widely felt in western Nevada or eastern California.

To better characterize the sizes and locations of the larger and better documented pre-1900 earthquakes we applied the approach of Bakun and Wentworth (1998). To account for local conditions in western Nevada, we analyzed the larger post-1900 earthquakes to develop revised coefficients for equations used in the Bakun and Wentworth approach. To accomplish this we entered 3617 intensity estimates at 1090 sites from 27 earthquakes in Nevada and eastern California. Due to time constraints, we developed coefficients for estimates without site corrections. Not only do we need to conduct site analyses, but we have other earthquakes that can be added to the calibration data set.

We have developed preliminary estimates for the locations and magnitudes of the larger pre-1900 events, but we caution their use until site effects can be accounted for, upgrades of intensity values are incorporated, and further densification of intensity data occurs. All of these are planned in the next round of research.

It is interesting to note that although these earthquakes badly frightened people and caused significant damage, they caused no hesitation in the determination and growth of western Nevada. We have found no accounts of death or serious injury, and major concerns were limited to re-establishment of business. If the 1869 or 1887 earthquakes occurred today, there would be much more structural and nonstructural damage because the exposure of risk to these earthquakes is so much greater.

## Table of Contents

Abstract	
Introduction	1
Earthquake Catalogs, Newspapers, and Accounts Reviewed	3
Earthquake Catalogs	3
Newspaper Accounts	3
Journals and Other Accounts	3
The Earthquake Magnitude and Location Analysis Procedure	4
Acknowledgments	5
1840s(?) Earthquake of West-Central Nevada	6
Earthquake Summary	6
Newspaper Accounts	8
1857, September 3 Western Nevada? Eastern California? Earthquake	11
Earthquake Summary	11
Earthquake Catalog Accounts	11
Newspaper Accounts	12
1857 Earthquake Intensity Summaries	18
1860, March 15 Western Nevada Earthquake	20
Earthquake Summary	20
Earthquake Catalog Accounts	21
Newspaper Accounts	22
Research Notes	27
1860 Earthquake Intensity Summaries	31
1868, May 30 Virginia Range Earthquake	34
Earthquake Summary	34
Earthquake Sequence	36
Earthquake Catalog Accounts	36
Newspaper Accounts	37
Local Journal Accounts	49
Research Notes	49
1868 Earthquake Intensity Summaries	51
1869, December 27 Virginia Range Earthquakes	55
Earthquake Summary	55
Earthquake Sequence	60
Earthquake Catalog Accounts	60
Newspaper Accounts	62
Local Journal Accounts	81
Research Notes	82
1869 Earthquake Intensity Summaries (01:55 GMT)	85
1869 Earthquake Intensity Summaries (10:00 GMT)	92
1887, June 3 Carson Valley Earthquake	95
Earthquake Summary	95
Earthquake Sequence	102
Earthquake Catalog Accounts	102

## **Table of Contents (cont.)**

1887, June 3 Carson Valley Earthquake (cont.)	
Newspaper Accounts	103
Local Journal Accounts	134
1887 Earthquake Intensity Summaries	136
1888, January 30 Carson Valley Earthquake	145
Earthquake Summary	145
Earthquake Catalog Accounts	145
Newspaper Accounts	146
1894, November 18 and December 18 Virginia City Earthquakes	147
Earthquake Summary	147
Earthquake Sequence	148
Earthquake Catalog Accounts	149
Newspaper Accounts	149
Local Correspondence	157
Local Journal Accounts	158
Research Notes	159
1896, January 27 Carson City Earthquake	160
Earthquake Summary	160
Earthquake Sequence	160
Earthquake Catalog Accounts	160
Newspaper Accounts	161
Local Journal Accounts	164
1897, May 15 Southern Virginia Range Earthquake	165
Earthquake Summary	165
Earthquake Sequence	165
Earthquake Catalog Accounts	165
Newspaper Accounts	166
Local Journal Accounts	168
Developing a Magnitude and Epicentral Location Analysis Procedure	169
References Cited	173
Figures	176

## Introduction

The late 1800s were one of the most active time periods of earthquakes in the Reno-Carson City urban corridor. Accounts from these events are rich with information about the shaking effects of from local earthquakes within the corridor, and are important in making the best characterization possible of the location and size of these events. These earthquakes also have a major impact in the development of shaking potential maps, such as probabilistic seismic hazard maps because they are the largest historical events in the area. The intent of this project is to significantly improve our descriptions, locations, and magnitudes of these earthquakes, and the effects and events that they precipitated.

In a summary paper designed to highlight the local earthquake hazard (dePolo and others, 1997), pre-1900 events were included in the analysis of the probabilities of having major earthquakes. Magnitudes from the Nevada Seismological Laboratory earthquake catalog and Rogers and others (1991) were used. Assuming the largest magnitudes for these events, the probability of having a magnitude 6 or greater earthquake within the next 50 years in the Reno-Carson City urban corridor is as high as 95% to 98% (dePolo and others, 1997). The occurrence rates of major historical earthquakes in western Nevada produced 1½ to 7 times higher probabilities of having a major earthquake than estimates based on instrumental seismicity and geological data sets. A careful reexamination of the locations and magnitudes of these pre-1900 earthquakes is warranted to reevaluate these values.

The approach taken was to first compile all published information, and to build on these with new accounts. This information was summarized into Modified Mercalli Intensities (a scale that describes the effects of earthquakes on humans and buildings) that were compiled with their locations for spatial analysis. The descriptive results are compiled here, with intensity summations for each earthquake. An analysis procedure developed by Bakun and Wentworth (1997) is being used to calculate the most likely locations and magnitudes of earthquakes based on intensity data. Maps summarize the in-progress results.

The accounts are telling of the reactions of humans when they have been shaken at the core of their existence. Even though they may not have been immediately threatened with bodily harm, they were out of control for a short period of time. This commonly causes a temporary humbling, an immediate need to talk about and understand their experience, and then a reaction to put the event out of mind and conversation after a few days. By all accounts, Nevadans were reasonably undaunted by these events and moved forward without hesitation. We will likely need this same courage in the future from similar events; how well prepared we are will dictate how easy or hard a future earthquake will be on us.

Table 1 is a list of pre-1900 earthquakes with magnitudes and intensities that have been reported for these events.



**Table 1      Pre-1900 Earthquakes in Western Nevada with  
Modified Mercalli Intensities  $\geq$  V**

<b>Date (GMT)</b>	<b>Location</b>	<b>Maximum Intensity</b>	<b>Mag<sup>1</sup></b>	<b>Mag<sup>2</sup></b>	<b>Mag<sup>3</sup></b>	<b>In-Progress Magnitudes<sup>4</sup></b>
1840s (?)	Carson Sink? Pyramid Lake?	VIII?	-	-	7.3	
1857, Sept 3	Western Nevada? Eastern California?	V?	-	6.0	6.2	
1860, Mar. 15	Pyramid Lake area	VI+?	7.-	6.3	7.0	
1868, May 30	Virginia Range	VII	6.-	5.8	6.0	5.9-6.5
1868, May 30	Virginia Range	VI	-	-	-	
1869, Dec. 27	Virginia Range	VIII	-	6.1	6.7	5.7-6.5
1869, Dec. 27	Virginia Range	VII	-	-	-	
1869, Dec. 27	Virginia Range	VIII	-	5.9	6.1	5.3-5.9
1869, Dec. 27	Virginia Range	V	-	-	-	
1887, June 3	Lake Tahoe region	VIII	-	6.3	6.3	6.2-6.6
1888, Jan 30	Carson Valley?	V	4.5	-	-	
1888, May 28	Carson Valley?	V	-	-	-	
1894, Nov. 15	Virginia City	VI	-	-	-	
1894, Nov. 18	Virginia City	VI-VII	-	-	-	
1894, Nov. 24	Virginia City	VI	-	-	-	
1894, Nov. 18	Virginia City	VI-VII	-	-	-	
1896, Jan. 27	Carson City	VI	-	-	-	
1897, May 15	S. Virginia Range	VI-VII	-	-	-	
1897, June 20	S. Virginia Range	V	-	-	-	

1 Slemmons and others (1965)

2 Topozada and others (1981)

3 Rogers and others (1991)

4 In-progress run using the approach of Bakun and Wentworth (1997), Topozada and others (1981) intensity assignments, and no site corrections. These magnitudes will be upgraded with new intensity assignments and site corrections.

**Earthquake Catalogs, Newspapers, and Accounts Reviewed**

Earthquakes in western Nevada were first studied collectively and compiled by Slemmons and others (1965). Toppozada and others (1981) included several western Nevada earthquakes in their systematic study of pre-1900 earthquakes in California. We have largely built on the intensities originally determined by Toppozada and others (1981), and their documentation of newspapers containing accounts of these earthquakes was invaluable. We've gone back to these accounts and transcribed most of them for several reasons. One of our goals is to discover interesting specific effects of earthquakes that have actually occurred locally. These can lead into insights on being better prepared for earthquakes. Another goal is to bring these earthquakes to life as much as possible to serve as a motivational factor for being prepared for earthquakes in western Nevada. The accounts allowed us to verify Toppozada and others' intensity assignments and to develop ranges in intensity for specific locations. In this report we have collected 212 transcribed accounts of the major, pre-1900 earthquakes from western Nevada.

### **Earthquake Catalogs**

Several earthquake catalogs were reviewed for accounts. Commonly, catalog accounts following an initial reporting in a catalog cite the former account or paraphrase it in a similar fashion. We report here the first account given of an earthquake and subsequent accounts only when they appeared to add new information. Initial reporting of earthquakes are found in Holden (1898), Townley and Allen (1939), and Slemmons and others (1965). Other catalogs used were Heck and Allen (1961), and dePolo and dePolo (1999).

### **Newspaper Accounts**

Newspaper accounts were collected principally at the Nevada Historical Society, the University of Nevada Reno Library, and the California State Library. These exist in microfilm copy and archived copies. Toppozada and others (1981) listed newspapers with accounts for the larger earthquakes, and this was used as a starting point. An invaluable reference for finding out what newspapers might be in existence at a given year for communities in Nevada is *The Newspapers of Nevada* (Lingenfelter and Gash, 1984); this guided most of our newspaper searches.

### **Journals and Other Accounts**

Journals and other accounts were found searching the Nevada Historical Society, the University of Nevada, Reno Library Special Collections, and through our letter request for accounts from regional museums. Reports from the Nevada State Weather Service, which include accounts of earthquakes, were also searched. One significant source of information are the journals of Alfred Doten, a newspaper writer at Virginia City. Doten's journals are condensed by Clark (1973), but for completeness we examined his original journals housed at UNR's Special Collections.

### **The Earthquake Magnitude and Location Analysis Procedure**

The analysis technique of Bakun and Wentworth (1997) is used for analyzing the intensity data for the most likely location and magnitude. This technique developed for pre-instrumental earthquakes with sparse intensity data in California. The various coefficients in the procedure developed by Bakun and Wentworth could not be directly used in Nevada without testing because of poor results they found in applying the technique to the 1966 Truckee and 1986 Chalfant Valley earthquakes. Bakun and Wentworth note, “Additional Basin and Range test earthquakes are necessary to clarify if and how the intensity analysis procedures presented here might be modified for use in eastern California and Nevada.” They speculate that different regional attenuation characteristics may account for this difference.

Bakun and Wentworth’s (1997) technique is as follows. A set of calibration earthquakes is developed; these have known epicenters, magnitudes, and intensity descriptions. Modified Mercalli Intensity values are plotted against the distance away from the epicenter. The results are large ranges of distances for each intensity value, but these ranges are at larger distances as intensity values get smaller. A mean and standard deviation are calculated for each intensity value. Values beyond two standard deviations are dropped to get rid of outliers, and a median of remaining values is calculated. Thus each intensity range is represented by a median value. The assumption is made that the central part of Modified Mercalli Intensity Scale, intensities III to IX, can be described in a linear fashion. A linear regression for each calibration earthquake was calculated using the median intensity values. The next step was to look for variations in the coefficients of these regressions with magnitude. This is done by plotting the slopes and intercepts from the regressions against magnitude. In Bakun and Wentworth’s study, they found that slopes did not vary systematically with magnitude, but that intercepts did. Thus, the intercept coefficient was replaced with a linear regression as a function of magnitude, leading to an equation in the form of,

$$\text{MMI} = C + C1(M) + C2(D),$$

where MMI is Modified Mercalli Intensity, M is magnitude, and D is distance. This equation is rearranged to make magnitude dependent on intensity for use in our problem, giving,

$$M = [\text{MMI} - C - C2(D)]/C1.$$

Thus, a magnitude estimate can be made if the intensity at a site and the distance between the site and the epicenter are known. The next major step in analyzing an earthquake is to develop a grid of possible epicenters in the general region where the earthquake occurred. Each grid point allows a site to epicenter distance to be calculated, and thus each intensity site can be used to estimate the magnitude of the earthquake if its epicenter was at that grid point. The mean value of all of the magnitude estimates is used to describe the best magnitude estimate for the grid point. The resulting magnitude estimates will have a general minimum in the epicentral region, but not always over the epicenter (Bakun and Wentworth). Constraints on the epicentral region are rather cleverly derived by minimizing the root-mean-square of the misfits of the magnitude calculation for each of the grid points. The ability to reckon the results to an epicentral area is a

function of the number of intensity points available. Bakun and Wentworth (1997 and 1998) have developed confidence intervals by random sampling for different values of residuals from the minimization, given different numbers of intensity observations. This allows us to outline an area that we are 95% confident that the epicenter is within, given all the assumptions of the technique and input data. Bakun and Wentworth's technique has been further used by Meltzner and Wald (1998, 1999) for foreshocks and aftershocks following the great 1857 Fort Tejon earthquake. Meltzner and Wald emphasize the importance of establishing ranges of possible intensity values where descriptions are ambiguous to test the final results and report the uncertainty in these results.

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# 1840s(?) Earthquake of West-Central Nevada

## EARTHQUAKE SUMMARY

The 1840s(?) Nevada earthquake remains a mystery. The details of this event are murky, but there does appear to have been a fairly large earthquake in west-central Nevada during the 1840s or early 1850s, based on newspaper and Native American recollection. There is little known about the effects of this event, and both its date and location remain unknown. This earthquake has been referred to as the 1852? earthquake (Slemmons and others, 1965) and the 1845? earthquake (Ryall, 1977). There are no direct accounts of this earthquake to date. The event is inferred from anecdotes in newspaper articles from later years, largely from recollections made by the Piute Indians. The event is included in the Slemmons and others (1965) catalog with the date of 1852?, and is located in the Pyramid Lake area (39.5°N Lat.; 119.5°W Long.) with a maximum intensity of MMI X. The primary reference given in Slemmons and others (1965) is an account from the *Daily Reese River Reveille* on October 17, 1865, citing the *Virginia City Territorial Enterprise*. This account, cited below, was paraphrased by Slemmons and others (1965) as “Piutes report quake near Pyramid Lake 13 yr ago. Great cracks opened from which water spouted 100 ft high. Large landslide on Slide Mountain. NRE. [not reported elsewhere].”

The date of 1852? comes principally from combining two reports, one from the *Daily Reese River Reveille* (10/17/1865) and a second from the *Washoe Weekly Times* (6/10/1865). The first report, as already mentioned, describes an earthquake 13 years before 1865. The second report is of a landslide that occurred on Slide Mountain (northwest of Carson City) in the later part of November or the early part of December in 1852. A landslide off of Slide Mountain is mentioned in the *Daily Reese River Reveille* story as occurring during this earthquake, as well as in a later story in the *Territorial Enterprise* (11/27/1894). An interesting aspect of the landslide reported in the *Washoe Weekly Times* is that it was distinctly heard and felt near Genoa, 48 km (30 miles) away. An earthquake cause to the 1852 landslide has been speculated in later stories (e.g., *Nevada State Journal*, 8/6/1978). A possibility that cannot be precluded is that the 1852 date was derived from combining accounts of a landslide at Slide Mountain with those of a large earthquake that shook the southern Basin and Range Province that year (the 11/29/1852 Yuma Earthquake appears to have occurred in the Salton Trough area; Balderman and others, 1978).

The date of 1852 seems testable assuming a large earthquake in western Nevada should have notably shaken the Great Valley of California, similar to larger, post-1900 earthquakes in western Nevada, that have consistently shaken Sacramento, California (in the Great Valley) very perceptibly. At Sacramento in the early 1850s continuous records were kept in the form of daily newspapers. We (including Renee and Rudy dePolo of Sacramento) have searched the *Sacramento Daily Union* newspaper every day of the year 1852 and have found no accounts of

earthquakes that could have been located in western or west-central Nevada, or eastern California (the only reports of earthquakes in the *Union* for that year are the April 12, San Diego and Nov. 22, San Francisco earthquakes). Thus, it seems probable that this earthquake did not occur in 1852. There are many landslides reported in the Sierra Nevada in the severe winter of 1852, however, and a landslide off Slide Mountain is very believable.

A second logic pursued is based on the account of Piute Charley (Gold Hill Daily News, 12/30/1869). He recalled the old men telling of an earthquake that occurred following a pine nut harvest, or autumn. Thus, we search the remaining continuous record for autumns, the *Sacramento Transcript* for the autumn of 1850 (searched 10/7 to 12/20) and the *Sacramento Daily Union* for the autumn of 1851 (searched 10/1 to 12/20). No accounts of earthquakes that might have occurred in western or west-central Nevada, or eastern California were found.

An earthquake is also reported to have occurred in the mid-1840s in central Nevada (*Silver State News*, 10/5/1915). This would pre-date settlements by white men, which would be consistent with accounts in the *Silver State News* (6/7/1887), and with Piute Charley being a boy when he heard the story of the earthquake told.

Using the Townley and Allen (1939) catalog as a guide, there are only a few accounts that are nebulous enough that they could be from western Nevada from 1840 to 1852:

- 1850 Aug. 4 - "Stockton and Sacramento. Severe shocks"
- 1851 March - "California, several shocks this month"
- 1851 April - "California"
- 1851 Dec. 2 - "Downieville, Sierra Co."
- 1851 Dec. 31 - "Downieville, Sierra Co. Smart shock"

No account of the Dec. 2, 1851 earthquake was found in the Daily Sacramento Union, and no account of the Dec. 31, 1851 earthquake was mentioned in the 1852 editions of the Union. None of these dates have been searched in detail.

The location for this event also remains unconfirmed. Two locations are suggested in newspaper accounts, the Pyramid Lake area (*Daily Reese River Reveille*, 10/17/1865) and the Stillwater area (*Gold Hill Daily News*, 12/30/1869). Both of these accounts could be explained by liquefaction; cracks opening and water spouting in Pyramid lake, and the river running in the opposite direction, river banks falling down, and Native Americans being knocked off their feet near Stillwater Station. Could these be the effects of the same earthquake? These two areas are a little over 80 km apart, and the effects being described can be interpreted as at least intensity MMI VII to VIII. The Rainbow Mountain and Stillwater earthquakes (7/6/1954 and 8/24/1954) originated in the general "Stillwater area" and produced intensities of MMI VII to VIII in the Stillwater area, but only created intensity VI with no reported liquefaction in the Pyramid Lake area. A young rupture was found in trench studies of the Pyramid Lake fault and has been proposed to be a candidate rupture for this event (Anderson and Hawkins, 1984).

Research will continue on trying to locate this event in time and to find some accounts of its

effects, but it likely occurred when there were few records being kept, and some of those were likely destroyed. The earliest local settlements were about 1850 to 1851 (Genoa and Dayton). Several explorers and wagon trains crossed the region in the mid to late 1840s, and several kept journals.

## **NEWSPAPER ACCOUNTS**

### **Washoe Weekly Times June 10, 1865**

Mount Avalanche - About the latter part of November or the first of December A.D. 1852, during that "reign" of that terrible winter ... we have learned from two men of reliable character who were living above Genoa, at the time, a distance in the air line probably of thirty miles, that they distinctly heard and felt the shock. ...  
[This is one of the earliest accounts of the large landslide that occurred on Slide Mountain in 1852. It is surprising this landslide was felt for a distance of 30 miles.]

### **Daily Reese River Reveille October 17, 1865**

**Earthquakes in Nevada.** - The Virginia Enterprise says it has never known but one earthquake in Washoe, and that a slight one in 1860, but goes on to say: "We have often been told by the Pi-Utes, of a great earthquake which occurred in this region some thirteen years ago. They say that about that time the ground was very sick - that it shook tremendously - and that near Pyramid Lake great cracks opened, from which water spouted nearly one hundred feet high. It was at this time, they say, that the great slide occurred west of Washoe Lake in the Sierra Nevada Mountains - which slide is plainly to be seen to this day, and which cannot fail to be seen by all who go by way of the Ophir Grade to Washoe Lake. ... [further discussion is about earthquakes and mines]

### **Gold Hill Daily News December 30, 1869**

#### **Piute Earthquake Ideas**

Captain Charley, the well known Piute Sachem, paid us an official visit yesterday, as is his usual custom when he comes to town. He was rigged out in full regimentals of bobtailed coat and red stripes, plug hat trimmed with brass buttons, and numerous chunks of brass and clamshells dangling in his long tresses. Commanding his staff to await him on the porch, he entered our sanctum and gave us important official information of the late earthquake and its general effect upon the Piute Nation. He was just in from camp near Washoe Lake, and the following were his answers to our eager and interested questionings:

"Did you feel that earthquake pretty strong - the shakum up of the ground, you know?"

“Oh! Yes; heap catchum shake; ground git pooty sick; heap scarum squaw.”

“What do the Injuns talkee about it?”

“Piutee no says nottin.”

“But what does Piutee think about this big shake up that scare all the white folks - the pale faces, you know?”

“Piutee no tink nottin.”

“Didn’t any of ‘em get down - like this - and pray?”

“No sabe”

“What Piutee ‘spose make the ground shakum?”

“Piutee don’t sposse nottin; he don’t know. Some white mans tell ‘em, heap fire way down in the ground, and devil he gone stir ‘em up. Me tink its pretty good. Devil heap likum fire. Don’t ‘fraid of it.”

“Didn’t you ever hear about these earth shakums before?”

“Yes, ‘bout two years ago.”

“Yes, yes, that’s so, but before that time didn’t you never sabe earthquake shakum?”

“Oh, heap long time way back comes big shakum; ground gittum heap sick - he-e-eap shakum.”

“How long ago was that?”

“Me no sabe - me little boy, all same so high.”

“How old are you, Charley?”

“Don’t know.”

“You must be about 30 years old.”

“Yes guess so. Me little boy. Heap hear old mans tell ‘bout it”

“Well, what old mans say?”

“Oh, heap tellum ‘bout big ground shakum. Allee Pitues go catchum pine nut, jackass rabbit. Bime by come from Walker ribber, Carson, Truckee. All Injuns come Sink Carson pishin - heap catchum pish. Ground heap gittum big sick; knock down Injuns, wooh! All ‘long ribber brakum banks, fall down. Ground heap break off. You sabe Stillwater station, on ribber? Well, banks heap fall down all ‘long ribber; ground heap brakum, so ribber run ‘nudder way, all same now. ‘Spose, it’s all right; pish don’t likum pooty good, I tink. Well, good bye, now; me go Virginia. Bime by, me come again. Goodbye.”

## **Silver State**

**June 7, 1887**

### **Freaks of the Earthquake.**

The Enterprise of Sunday last says the earthquake is reported to have opened fissures near Cradlebaugh’s bridge which for a time spouted hot water and sand. The Piutes say that some years before the whites came such fissures were opened near Pyramid Lake during an earthquake, from which sheets of water were spouted to a height of sixty feet. ...

[Thus, in the Piute Indian’s historical record there had been strong shaking at Pyramid Lake that apparently caused liquefaction]



**Territorial Enterprise**  
**November 27, 1894**

**Nevada Earthquakes.**

... tells of a tradition among the old people of his tribe about a time a great many years ago when the ground got “heaps sick,” some of their cadupoodles tumbled down, and the whole side of a big mountain the other side of Washoe Valley slid off, filling the creek below. “Slide mountain” is a prominent familiar object today in corroboration of this tradition. ...

**Silver State**  
**Oct. 5, 1915**

This was the first earthquake known here for 31 years. A slight shock having been felt in 1884. However, pioneers were informed by Indians, many years ago, that during the early 40's heavy shocks were of frequent occurrence for four or five years.

[This is part of the account for the 1915 Pleasant Valley earthquake and “here” is Winnemucca, Nevada; the early 40s is the 1840s]

# 1857, September 3 Western Nevada? Eastern California? Earthquake

## EARTHQUAKE SUMMARY

This event shook the Sierra Nevada and central Great Valley of California distinctly, but it is unclear whether this earthquake originated in Nevada or California. The most significant damage reported from the event occurred in Nevada City, California (then called Nevada), where the court house was “cracked from top to bottom” (The Mountain Democrat, 9/5/1857).

Nonstructural damage was reported in the Sierra Nevada towns of North San Juan, Michigan Bluffs, and Last Chance. Topozada and others (1981) note that the effects of this earthquake are similar to the 1860, 1868, 1869, and 1887 events and that the epicenter is likely to the east of the Sierra Nevada, in the Nevada/California border region; they assign this event a magnitude of 6.

We have no accounts of the 1857 earthquake from Nevada, but we do have the names of several individuals who were in Carson Valley at the time and are pursuing their diaries and autobiographies in Salt Lake City libraries and archives. We are hopeful that accounts of this event from Nevada exist. The Mormon settlers of Carson County (Utah) were called back to Utah in 1857 by Brigham Young to defend against possible invasion by U.S. troops, immediately following this earthquake. The earthquake occurred on the 3<sup>rd</sup> of September, express riders from Salt Lake City announcing the call to come back to Utah arrived on the 5<sup>th</sup>, and 450 people left Carson Valley in a wagon train on the 26<sup>th</sup> (Elliot, 1987). Thus, at least several hundred people were in western Nevada at the time of the event.

## EARTHQUAKE CATALOG ACCOUNTS

### Holden (1898)

**1857. September 2; 19h. 45m.; III [RF]**

Slight shock at San Francisco, Sacramento, Marysville, Nevada, San Juan, Downieville, and Camptonville, Cal. - J.B.T. [Trask, J.B., 18\_\_]

### Topozada and others (1981)

**3 September 1857 M6.0**

Objects were shaken from shelves (V-VI MM) at North San Juan, Last Chance, and Michigan Bluffs. No aftershocks were reported felt and no high intensities were reported even though the

earthquake was felt as far as San Francisco. The effects in California were similar to those of the western Nevada earthquakes of 1860, 1868, 1869, 1887. It is, therefore, likely the epicenter was probably to the east, in the largely unpopulated California/Nevada border region. There are no newspapers in the state of Nevada in 1857. The Territorial Enterprise was first published in December 1858 in Genoa, moved to Carson City in November 1859, and finally to Virginia City in November 1860.

## NEWSPAPER ACCOUNTS

### **The Mountain Democrat (Placerville?, CA) September 5, 1857**

#### **EARTHQUAKE.**

On the evening of election day the inhabitants of our neighboring towns were slightly agitated by the shock of an earthquake. - Whether our village stood firm amid the general convulsion or whether our citizens were so absorbed in the political contest we are unable to say, but so far as we have made inquiry no shock was experienced in this vicinity. Dispatches to the Sacramento Union from all the surrounding stations mention it as having been experienced simultaneously from Benicia to Downieville. The shock in Sacramento is thus described in the *Union* of Thursday.

The shock of an earthquake was distinctly noticed in this locality about five minutes past seven o'clock last evening. It was generally observed throughout the city, creating considerable excitement. The motion, which was vibratory from the northeast to the southwest, was observed distinctly three times in this office, the duration being sufficiently long to enable the inmates to converse thereon before its termination. Sundry bells suspended in a hardware store on the upper part of J street were rung distinctly, and the boarders in the Dawson House, as well as tenants in other localities, ran out upon the street or evinced extreme excitement in the fear that their respective buildings were on the point of falling about their ears. The shock was not sufficient to cause any damage to property.

The following despatches show the extent of this convulsion.

#### NEVADA, September 2 - 9 P.M.,

About twenty minutes to eight o'clock this evening, we felt quite a hard shock of an earthquake, causing, for a few moments, much consternation among the inhabitants of brick buildings. The court-house was cracked from top to bottom, but the extent of the injury cannot be ascertained until daylight. It shook out the lights in the jail office, and the prisoners were awfully frightened. All of the occupants of the court-house made some good feats of ground and lofty tumbling in leaving it, and some of them ran several hundred yards before the shock ceased.

SAN JUAN, Nevada Co., Sept. 2d.

At a few minutes after seven o'clock P.M., a very perceptible shock of an earthquake was felt in this place. Persons leaning against buildings or seated in them, experienced a heavy swaying or vibration of the earth from south-east to north-west. The shock was sufficiently heavy to rattle the jars in the drug store and make the lamp chimneys dance, and continued about five seconds.

FOREST CITY, Sierra Co., Sept. 2d.

About seven o'clock the shock of an earthquake was felt very sensibly. It seemed to pace from north to south, and lasted nearly half a minute. The shock was great enough to rattle the glasses and bottles the entire length of stores in this place. In some of the houses, where it was felt most severely, the inmates rushed out, not knowing what was occurring. Chickens were frightened from their roosts. The shock was much more severe and longer than it was felt here some weeks ago. - making more noise, and apparently running in a southerly direction.

DOWNIEVILLE, SIERRA Co., Sept. 2d.

The shock of an earthquake was felt in this place this evening. It was not so severe as the one felt some weeks ago. It lasted about one minute.

PLACERVILLE, El Dorado Co., Sept. 2.

At about seven o'clock we felt a slight shock of an earthquake. The shock was very distinct, and several window lights were jarred out and bottles were rattles together in drug stores. It lasted some fifteen minutes.

DIAMOND SPRINGS, Sept. 2d.

A slight shock of an earthquake was felt at this place about seven o'clock this evening. Two very distinct vibrations were felt. It lasted for five seconds.

BENICIA, Sept. 2d.

The shock of an earthquake was felt here this evening.

CAMPTONVILLE, Yuba Co., Sept. 2d.

The shock of an earthquake was experienced at this place this evening.

EARTHQUAKE.-Yesterday evening a very heavy shock of an earthquake was felt at this place; the houses were shaken with considerable violence, and for several seconds the earth trembled as though about to open and take us all in.-*Courier*, (Yankee Jim).

A slight shock of an earthquake was experienced in this place on Wednesday evening, about 7 o'clock.

### **September 3, 1857**

Earthquake. - By a telegraph dispatch received last evening, from Sacramento , we learn that a shock of an earthquake was sensibly felt in that city at 7 o'clock; also at Marysville, Nevada, San Juan, Camptonville and Downieville. A slight shock was also experienced at the same hour in various sections of this city.

### **Daily Alta California (San Francisco, CA) September 7, 1857**

The recent earthquake was felt at Mokelumne Hill.

### **Daily Evening Bulletin (San Francisco, CA) September 3, 1857**

Earthquake. - A shock of an earthquake was sensibly felt, last night, about 7 o'clock, at Sacramento, Marysville, Nevada, San Juan, Downieville, and Comptonville.

### **Daily Evening Bulletin (San Francisco, CA) September 4, 1857**

#### **The Last Earthquake.**

The earthquake of Wednesday evening last, does not seems to have been observed in this vicinity. From telegraphic dispatches to the Sacramento papers it would appear that the shock was sensibly felt over a large district, extending from Benicia to Downieville, including Sacramento, Forest City, San Juan, Nevada, Grass Valley, Diamond Springs, Placerville, Camptonville, &c. The time when the shock took place is generally stated to be about 7 o'clock. At Nevada it is mentioned as taking place about twenty minutes to 8, although this may be supposed to be a mistake. At that town, the shock caused much consternation among the inhabitants. The Court House was cracked from the top to the bottom. The shock shook out the lights in the jail office, frightening the prisoners terribly. All of the occupants of the Court House made some good feats of ground and lofty tumbling in leaving it, and some of them ran several hundred yards before the shock had ceased.

At Forest City, Sierra county, the shock was pretty severe. It seemed to pass from the north to south, and last nearly half a minute. The shock was great enough to rattle the glass and bottles the entire length of stores in the place. In some of the houses, where it was felt most severely, the inmates rushed out, not knowing what was occurring. Chicken were frightened from their roosts.

At San Juan, Nevada county, persons leaning against buildings, or seated in them

experienced a heavy surging or vibration of the earth, from southeast to northwest. The shock was sufficiently heavy to rattle the jars in Drug stores, and make the lamp-chimneys dance.

At the other places already named, the earthquake made itself known in similar ways. The shock is represented to have lasted five seconds at some places, fifteen seconds at others, and so much as a minute at Downieville. The *Union* says, the shock created considerable excitement in Sacramento, and adds:

The motion, which was vibratory, from the northeast to the southwest, was observed distinctly three times in this office, the duration being sufficiently long to enable the inmates to converse thereon before its termination. Sundry bells, suspended in a hardware store, on the upper part of J street, were rung distinctly, and the borders in the Dawson house, as well as tenants in other localities, ran out upon the street, or evinced extreme excitement, in the fear that these respective buildings were on the point of falling about their ears. The shock was not sufficient to cause any damage to property.

### **Marysville Herald September 3, 1857**

Earthquake. - At a quarter past seven o'clock last evening a severe shock of an earthquake was felt in this city.

We learn by telegraph that the shock was also felt in Sacramento.

### **Marysville Herald September 4, 1857**

The Earthquake. - The earthquake of Wednesday evening was felt in Nevada, San Juan, Forest City, Downieville, Placerville, Diamond Springs, Camptonville, Benicia, and other places. It was the most severe shock ever experienced in the State, and created not a little alarm in many places. The court house in Nevada was cracked from top to bottom and at Forest City glasses and bottles were moved the entire length of the stores and houses.

### **Marysville Herald September 6, 1857**

The Earthquake At Michigan Bluffs. - A correspondent of the *Union* writing from Michigan Bluffs, Placer county, September 3d., thus refers to the earthquake heretofore noticed by us:

Last evening at about half past 7 o'clock, our citizens were startled by the visitation of an earthquake, the shock from which was very severe. Its oscillation occupied ten seconds. Buildings swayed to and fro to the extent of six inches, causing the inmates to rush out in all directions. I hear of no damage therefrom, save detaching a clock from its fastenings, dashing glass jars, &c. &c. from various shelves, and the crockery from several tables.

**Sacramento Daily Union**  
**September 3, 1857**

Earthquake. - The shock of an earthquake was distinctly noticed in this locality about five minutes past seven o'clock last evening. It was generally observed throughout the city, creating considerable excitement. The motion, which was vibratory from the northeast to the southwest, was observed distinctly three times in this office, the duration being sufficiently long to enable the inmates to converse thereon before its termination. Sundry bells suspended in a hardware store on the upper part of J street were rung distinctly, and the boarders in the Dawson House, as well as tenants in other localities, ran out upon the street or evinced extreme excitement in the fear that their respective buildings were on the point of falling about their ears. The shock was not sufficient to cause any damage to property.

**Sacramento Daily Union**  
**September 5, 1857**

The Earthquake At Michigan Bluffs. - A correspondent writing from Michigan Bluffs, Placer county, Sept. 3d. Thus refers to the earthquake heretofore noticed by us:

Last evening at about half past seven o'clock, our citizens were startled by the visitation of an earthquake, the shock from which was very severe. Its occupation occupied ten seconds. Buildings swayed to and fro to the extent of six inches, causing the inmates to rush out in all directions. I hear of no damage therefrom, save detaching a clock from its fastenings, dashing glass jars, &c. &c. from various shelves, and the crockery from several tables.

**Sacramento Bee**  
**September 3, 1857**

The Earthquake in the Mountains. - The shock of an earthquake was distinctly felt in this city, about seven o'clock last evening. And by the telegraphic dispatches in the Union and Journal, we learn that it extended to El Dorado, Placer, Nevada, Sierra, Yuba, and Solano counties. In Nevada the shock cracked the Court House, and extinguished the lights in the jailers office. At San Juan, in the same county, the shock was sufficiently heavy to rattle the jars in the drug store and make the lamp chimneys dance, and continued about five seconds. At Forest City, in Sierra, the shock was great enough to rattle the bottles and glasses in the stores, and it even frightened chickens from their roosts. So it was at Placerville, but we have heard of no damage having been done by it, beyond that done to the Nevada Court House. The shock was also felt at Marysville.

The Earthquake. - An earthquake shock was felt in this city last evening a few minutes past 7 o'clock. There were three or four distinct shocks, following each other in quick succession. It was less violent than one or two shocks experienced here a few months ago, but was observed generally by those who were within doors. We heard one man suggest that the shocks occurred immediately after the polls were closed was a nervous sensations of Mother

Earth at the election of Col. Weller, but as he is an inveterate Stanley man and knows more of politics than of science, we presume that his theory is defective.



## 1857 Earthquake Intensity Summaries

(modified from Toppozada and others (1981))

Earthquake:   Date: 1857, September 3  
                   Time: 03:05 GMT; 19:05? September 2 PST  
                   Location: 39.0 N?, 120.0W?               Nevada/California Border Area

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### California

#### Calaveras County

Mokelumne Hill       Int. = II  
                           Felt by few. *The Placer Herald* (Auburn), 12 Sept. 1857, p. 2.

#### Eldorado County

Diamond Springs       Int. = light  
                           Slight. *Sacramento Daily Union*, 3 Sept. 1857, p. 1.

Placerville       Int. = V?  
                           Slight. *The Mountain Democrat* (Placerville), 5 Sept. 1857, p. 2.  
                           "...several window lights were jarred out and bottles were rattled in the drug stores." *Sacramento Daily Union*, 3 Sept. 1857, p.1.

#### Nevada County

Nevada City   Int. = V (VI?)  
                           "The Court House received a crack from top to bottom"; candles knocked over;  
                           seated persons thrown forward. *The Nevada Journal*, 4 Sept. 1857, p. 2.  
                           Felt only by people indoors. *Nevada Democrat*, 9 Sept. 1857, p. 2.

North San Juan       Int. = V-VI  
                           Bottles fell from shelves. *The Nevada Journal*, 4 Sept. 1857, p. 2.

#### Placer County

Auburn       Int. = felt  
                           Plainly felt. *The Nevada Journal*, 11 Sept. 1857, p. 2.

Iowa Hill       Int. = V-VI  
                           Doors and windows rattled; people left their tenements. *Daily Alta California*  
                           (San Francisco), 11 Sept. 1857, p. 2.

Last Chance   Int. = V-VI  
                           Objects thrown from shelves. *Placer Press* (Auburn), 12 Sept. 1857, p. 2.

Michigan Bluffs Int. = V-VI

People rushed out; knocked objects from shelves. *Sacramento Daily Union*, 5 Sept. 1857, p. 2.

Yankee Jim Int. = V-VI

Very heavy. *Placer Press* (Auburn), 5 Sept. 1857, p. 2.

#### Plumas County

Rabbit Creek (La Porte) Int. = felt

Plainly felt. *The Nevada Journal*, 11 Sept. 1857, p. 2.

#### Sacramento County

Sacramento Int. = V

Bells in a hardware store rang; some people ran out of buildings. *Sacramento Daily Union*, 3 Sept. 1857, p. 1.

#### San Francisco County

San Francisco Int. = light

Slight. *Daily Alta California* (San Francisco), 3 Sept. 1857, p. 2.

Not felt. *Daily Evening Bulletin* (San Francisco), 4 Sept 1857, p. 2.

#### Sierra County

Downieville Int. = felt

Felt. *Sacramento Daily Union*, 3 Sept. 1857, p. 1.

Forest City Int. = V

Some people ran outside; rattled bottles. *Sacramento Daily Union*, 3 Sept. 1857, p.1.

#### Solano County

Benicia Int. = felt

Plainly felt. *The Nevada Journal*, 11 Sept. 1857, p. 2.

#### Yuba County

Camptonville Int. = felt

Felt. *Nevada Democrat*, 9 Sept. 1857, p. 2.

Marysville Int. = severe

Severe. *Marysville Herald*, 3 Sept. 1857, p. 2.

Youngs Hill Int. = felt?

Plainly felt [location undetermined]. DeLong Diary.

# 1860, March 15 Western Nevada Earthquake

## EARTHQUAKE SUMMARY

The March 15, 1860 earthquake was a major event that strongly shook western Nevada and northeastern California, and was felt as far away as San Francisco and Yreka. Considering its felt area, this appears to be one of the largest historical earthquakes to have occurred in the western Nevada region. However, for several reasons, very little is known about this earthquake. Western Nevada was still in its early settlement period at the time, and we have no direct accounts of the earthquake from the state of Nevada. The Comstock lode had just been discovered, and early arrivals at Virginia City were suffering through a hard and protracted winter, as were all others in the region. Further, the event was overshadowed in the news by growing tensions between white settlers and the Pyramid Lake Paiute tribe – tensions that led to a battle at Pyramid Lake on May 14, 1860, wherein the vast majority of a loosely knit “battalion” of about 80 whites were killed (cf., Egan, 1972). Lastly, the March 17 and 24, 1860 issues of the *Territorial Enterprise*, which at the time of the earthquake was located in Carson City and was the only newspaper being published in Nevada, are unfortunately missing.

In Carson City, the earthquake was so severe that a general rush was made for the street from nearly every house in town, goods were shaken from the shelves of stores, and a general panic prevailed for a few minutes (*Sacramento Union*, March 16, 1860). At Sacramento, it strongly shook buildings, rang bells, and caused pendant bird cages and gas fixtures to swing; many vacated buildings under the impression they were about to fall (SU 3/16/1860). At Georgetown, it disarranged bottles and crockery ware on the shelves of stores (SU 3/17/1860), and it was described as severe in several other northern Sierra Nevada towns.

The intensity of shaking throughout northern California was similar to the subsequent 1869 and 1887 earthquakes, and the earthquake thus appears to have been of roughly similar size and to have been centered in the same general area (i.e., western Nevada). Two accounts suggest that the earthquake was centered in the vicinity of Pyramid Lake. In one account (*Territorial Enterprise*, March 31, 1860), prospectors reported finding “...immense masses of rock had become detached from projecting points on the hill sides, and had rolled down into the trail.” The prospectors also reported experiencing “during the course of the afternoon seven distinct shocks.” In the second account (*Territorial Enterprise*, June 6, 1868), “a gentleman...was engaged in herding stock near Pyramid Lake, when a shock occurred which was so severe that it caused large boulders to roll down the hills.”

Anderson and Hawkins (1984) interpreted that the most recent surface rupture along the Pyramid

Lake fault zone occurred within the last few hundred years, and speculated that it may have occurred during either the 1860 earthquake, or the poorly understood 1852(?) earthquake (see previous discussion on the mid-1800s earthquake). A possible, albeit speculative and indirect, reference to surface rupture during the 1860 earthquake comes from Angel (1881, p. 150), which recounts that during April, 1860, Paiutes from throughout the region were congregating at Pyramid Lake to discuss what they should do about the encroachment of white people on their lands. Ha-za-bok, a chief from Antelope Valley, proposed “...to cause the ground to open and swallow the whites...” Perhaps he was inspired to make this statement by just having witnessed ground rupture in the area.

## **EARTHQUAKE CATALOG ACCOUNTS**

### **Holden (1898)**

#### **1860. March 15; 11h.; VII [RF]**

Violent shock at Sacramento. The wave passed through the counties of Placer, Nevada, El Dorado, and Plumas. The earthquakes extended to the eastern base of the Sierra Nevada. At Carson City it occurred at 10h. 45m. And was very violent. - J.B.T. [Trask, J.B., 18\_\_]

poss. aftershocks:

#### **1860. April 16; 7:30 p.m.**

... 7 p.m. Severe shocks at S.F., Cal. (VI) [RF] - Perrey. April 17? About this time shocks during several hours at Washoe, Nev. - Perrey.

### **Toppozada and others (1981)**

#### **15 March 1860 M6.3**

Rock slides were reported between Pyramid Lake and Carson City, Nevada (VI MM or greater). Goods were shaken from shelves and a general panic prevailed in Carson City, Nevada (VI MM). Unfortunately, the Carson City paper for 17 and 24 March are missing. The earthquake was felt in Yreka (25 km north of the NW corner of the isoseismal map, Figure 22), and by a few in San Francisco (II MM). Seven aftershocks were reported felt the same day in the neighborhood of Pyramid Lake, Nevada, indicating that the epicenter was probably near Pyramid Lake. Townley and Allen (1939) reported that the earthquake was felt as far as Utah to the east; also The Deseret News (Salt Lake City, 11 April 1860, p. 48) states that the earthquake was felt in “the western part of this territory [Utah]”. In 1860, the western boundary of Utah Territory was the California state line. Thus, the statement that the quake was felt to Utah does not necessarily mean it was reported felt any further east than the Pyramid Lake area.

## **NEWSPAPER ACCOUNTS**

**Territorial Enterprise**  
**March 31, 1860**

EARTHQUAKE.—Mr. Jerome T. Totten and others, who have been in the neighborhood of Pyramid Lake, on a prospecting tour, report that the convulsion of the earth there, was very apparent. They think the shock lasted for three minutes; it was accompanied by a noise like the rushing of the wind. Upon their journey to this place they found in several places, that immense masses of rock had become detached from projecting points on the hill sides, and had rolled down into the trail. They experienced during the course of the afternoon seven distinct shocks. All the country in that section shows recent volcanic origin, and this positive evidence of the severity of the earthquake, out in that volcanic region, strengthens the supposition.

**Nevada National (Grass Valley, Nevada Co.)**  
**March 17, 1860**

THE EARTHQUAKE.—The earthquake of Thursday last was far more general throughout the State than any which has occurred since the period of the gold discovery. It was distinctly felt so far as heard from throughout a range of country mostly mountainous, of about 250 miles in diameter, and embracing both sides of the Sierra Nevada. The shock seemed to pass from East to West, with three distinct vibration, and decrease in violence as it moved westward. Judging from its local effects the center of disturbance would seem to have been centrally, or to the eastward of the Sierra Nevada Mountains. The shock was not felt in San Francisco, and but slightly in Coloma and Placerville.

**The Nevada Democrat (Nevada Co.)**  
**March 21, 1860**

EARTHQUAKE.—The shock of an earthquake was felt in this place, on Thursday at quarter past eleven o'clock in the forenoon. The shock was not very severe, but the vibrations continued for eight or ten seconds, and the shaking was very sensibly felt by those who happened to be occupying the second stories of brick buildings. The shock was felt on both sides of the mountains, from Carson Valley to Sacramento, and from Placerville to Yreka. The course of the earthquake was from south to north.

**The Nevada Democrat (Nevada Co.)**  
**March 28, 1860**

ANOTHER EARTHQUAKE.—The Roseburg Express, published in southern Oregon, of the 17<sup>th</sup> instant, says: "On Sunday night last, just after dark, a rumbling, explosive sound, resembling only that produced by an earthquake, was heard on a direct line over twenty miles through this valley, and how much farther we are unable to say. The report was heard and noticed by many persons, in different parts of the valley, some of whom reside twenty miles apart, at the same time. We have heard of several parties who also felt a well defined shock at

the same instant of the report.”

**Sacramento Daily Union**  
**March 16, 1860**

THE EARTHQUAKE AT CARSON CITY. – The earthquake, which visited this State so generally yesterday, was very severe at Carson City. A dispatch to the *Bee*, from that locality, yesterday, says:

A violent shock of an earthquake, lasting for several seconds, was felt here at about 10:48 A.M. It was so severe that a general rush was made for the street from nearly every house in town, goods were shaken from the shelves of stores, and a general panic prevailed for a few minutes.

**Sacramento Daily Union**  
**March 16, 1860**

EARTHQUAKE.—A decided sensation was caused throughout the city at ten minutes past ten o'clock yesterday morning, by a sudden and general movement in real estate and personal property hitherto unexampled in this locality. The phenomena was regarded as a mystery at first, but upon reflection it was unanimously concluded that the moving cause was an earthquake. The wave passed from the east to the west, with force sufficient to shake frame and brick structures, ringing bells on the hose tenders in the engine houses and in hotels, and producing a vibrating motion of pendant bird cages, gas fixtures, etc., generally. The phenomenon lasted several seconds, and with such force that many vacated their premises under the impression that their buildings were on the point of falling. Our telegraphic dispatches in this connection show that the disturbance was not confined to this locality. The cause of the phenomenon may yet be satisfactorily ascertained.

**Sacramento Daily Union**  
**March 17, 1860**

EARTHQUAKE AT GEORGETOWN. – A correspondent of the *Union*, writing from Georgetown, March 15<sup>th</sup>, says a very severe shock of an earthquake occurred there at 15 minutes before 12 o'clock. No particular damage was done, except the disarrangement of bottles and crockery ware on the shelves of stores.

**Sacramento Daily Union**  
**March 19, 1860**

RATHER TOO HEAVY.—The Sacramento correspondent of the *Bulletin*, although ordinarily correct in his remarks upon things in general, has piled on the agony rather too heavily in his account of the late earthquake, or rather its manifestations in this city. He says:

Though not to the manner of these tremors born, I endured the first five shakes with

manly firmness, and resolved to sit the play out; but at this critical moment the ladies rushed into the hall with hysterical screams. This decided my course, and—I confess it with shame—I fled. The swaying of the house caused a very palpable and disagreeable nausea, identical with sea sickness, which I felt for fifteen minutes. I saw pendant signs in the streets swinging from the vibrations ten minutes after the occurrence.

He must have been a good deal scared to have seen signs in the street swinging ten minutes after the shaking of the earth.

### **The Daily Bee (Sacramento)**

**March 15, 1860**

A SEVERE EARTH-SHAKE.—Sacramento is not subject to earthquake shocks; indeed, it is a great rarity to feel one here, however indistinctly; but the severest one that ever has been felt in this City of the Plain, in the memory of the oldest inhabitant, occurred at eleven and a quarter o'clock to-day. The movement was from south to north, or in that direction, and continued for several seconds. The chair on which we were sitting, moved under us and scraped the floor—the walls creaked and moved back and forth—we saw them do it; and garments hanging on the wall shook as if in the wind, while the lamps pending from the ceiling oscillated extensively and long; and the cases, at which the printers stood, staggered as it were with drunkenness, and one of the compositors began to get sea-sick, but soon recovered and kept down his bile; while the flag-staff on this office nodded its head for some time in recognition of the novel greeting. At the St. George, the people, ladies and all, rushed out on the balcony, affrighted; the gasaliers in Hansbrows' old stand, on K street, trembled and wiggled, and the tinware on the shelving rattled, and portions of it toppled over to the floor, while pedestrians, as they traversed the streets, felt as if terra firma was no longer a substantial foothold. All over the city it was felt—all the houses were shaken by it—and after the first start of wonderment had passed, the general exclamation was—"What must it be in San Francisco, when it threatens us here!"

The residents of the Bay City may have sent it here for the purpose of moving the Capital, as they could not accomplish that feat in any other way. It was a weak invention of the enemy.

"If plagues and earthquakes break not Heaven's design,

Why then a Borgia or a Cataline?"

Or, as a Douglas man suggests, a "Buchanan."

### **The Daily Bee (Sacramento)**

**March 16, 1860**

THE EARTHQUAKE. – The shock of yesterday was felt, evidently, over the State, and the following will show, in part, where and the time it took place:

<i>Where.</i>	<i>Hour.</i>	<i>Min.</i>
Sacramento.....	11	15
Marysville.....	11	20
Yreka.....	11	17

Forest City, Sierra.....	11	00
Nevada.....	11	11
North San Juan.....	11	11½
Downieville.....	11	14
Forest Hill, Placer.....	11	10
Yankee Jims.....	11	15?
Iowa Hill.....	11	15
Carson City, U.T.....	10	45

### **The Daily Bee (Sacramento)**

**March 17, 1860**

EARTHQUAKE. – We are informed that during the excitement last night, at the American Eagle Hotel, corner of Twelfth and J streets, the police officer in attendance, instead of “rushing out furiously on a walk,” as stated in a morning paper, threw himself in a tragic attitude, and with his hand on his pistol, and with noiseless step, like “an airy phantom,” bore himself along through the darkness, and, presenting his pistol at the supposed earthquake, in a sepulchral voice demanded to know the cause of this disturbance of the peace. He was informed that said earthquake was decidedly drunk.

### **The Daily Bee (Sacramento)**

**March 18, 1860**

THE earthquake of Thursday last was felt at Placerville, Stockton and San Francisco, as well as in the other places heretofore named, but the shock was not as heavy as elsewhere.

### **The Placer Herald (Auburn, Placer Co.)**

**March 17, 1860**

#### **Earthquake.**

The shock of an earthquake was distinctly felt on Thursday morning, a little after 11 o’clock, A.M., at Sacramento, Marysville, Downieville, Yreka, Forest City, Nevada, San Juan, Forest Hill, Yankee Jim’s, Iowa Hill, and other places. Telegraphic dispatches to the Sacramento *Union* from the three last named places in this county, represent the shocks as quite severe. In Sacramento they are disposed to brag on their “shock” as “a right smart earthquake,” and that the charge heretofore made against the place, as being dull and unexcitable will hold good no longer.

Auburn, although in the range of the tremor, was not moved by it; and reflecting that on other occasions shocks have been felt to the north and south of us on the same day, without giving the town a visitation, we conclude it takes something more than an earthquake to move Auburn.

This shock is said to have had a moving effect upon some of the “assembled wisdom” at Sacramento, who put a respectful distance between themselves and the walls of the Capitol within the smallest time possible.



**Daily Evening Bulletin (San Francisco)**  
**March 16, 1860**

NO EARTHQUAKE TO SPEAK OF.—An old pioneer in Maine, having listened all the evening to the stories of some persons from the city who had been seeing bear tracks, getting glimpses of the animals themselves, and almost killing several during the day, was finally asked to detail his experience. Putting a quid the sized of a fair pine-knot into his cheeks he remarked that he “never could see as many b’ars as some folks.” We share our down-East pioneer’s inability to see and hear a great many things that others have eyes and ears for. For instance, earthquakes. Some folks are having them every few nights. If they read of a tremor down in Peru, they can remember the shock of one hereabouts, very near the same time. If they eat too much lobster-salad – lo! An earthquake at midnight. If the weather is delightful it is an earthquake-breeder; if very bad, it heralds one, sure. Of course these men would not permit an earthquake to occur in Washoe without our having a slight shock, or if on flat, dismal Sacramento they boast of a vibration, our city, so much its superior in everything, must have a shake.

This, Friday morning, we see one announced as having been felt on Rincon Hill about 20 minutes after 1 o’clock A.M., of Wednesday. We should have been happy to feel it, but honestly we did not and shall have to admit, so far as our own observation goes, that Sacramento for once has got the better of us. As the Capitol-Removal Committee has reported, we trust our insensibility will not be charged to political account or to a pre-engagement with the shrieks of locality.

**Daily Evening Bulletin (San Francisco)**  
**March 17, 1860**

THE LAST EARTHQUAKE.—The earthquake of 15<sup>th</sup> March appears to have been felt over an extensive district of country – from Washoe to Sacramento, and as far north as Yreka. At Downieville, Placerville, Nevada, Marysville and many other places within the region named, the shock was particularly severe. The people of these quarters can no longer say that San Francisco has a monopoly of the “shakes.”

**Daily Trespass**  
**June 4, 1868**

OUR PIONEER EARTHQUAKE.—In mentioning the earthquake here on the 29<sup>th</sup>, we spoke of it as the first positive shake of the sort that had ever visited our footing in Nevada. Gen. Noteware writes to correct us; and informs us that about the 1<sup>st</sup> of June, 1860, a shock fully equal to that of the 29<sup>th</sup> was felt by many persons in Carson Valley. It occurred at about 2 o’clock in the afternoon; and was sufficiently severe to set crockery on the shelves to dancing.

**Territorial Enterprise**  
**June 6, 1868**

MORE EARTHQUAKES. – Night before last, at 9 ½ o'clock, a slight shock of an earthquake was felt in this city, and another, a pretty lively one, yesterday morning at 6 ½ o'clock. It is thought by many that we may have been having these slight shocks occasionally ever since the settlement of the country, but that people not looking for anything of the kind here, they passed unnoticed. A gentleman informs us that in February, 1860, he was engaged in herding stock near Pyramid Lake, when a shock occurred which was so severe that it caused large boulders to roll down the hills. The large crevices to be seen at Steamboat Springs, running north and south for nearly a mile, were undoubtably opened by an earthquake. On the whole, we are beginning to think that we may safely reckon earthquakes among the other interesting spontaneous productions of this State.

## RESEARCH NOTES

### PYRAMID LAKE

...prospectors think the shock lasted for three minutes...in several places, immense masses of rock had detached from projecting points on hillsides, and rolled down into the trail...seven distinct shocks during the course of the afternoon (*Territorial Enterprise*, 3/31/1860)

### CARSON CITY

...so severe that a general rush was made for the street from nearly every house...goods were shaken from shelves of stores...general panic prevailed for a few minutes. (*Sacramento Daily Union*, 3/16/1860)

### SACRAMENTO

...rang bells on hose tenders in engine houses and in hotels, and produced vibrating motion of pendant bird cages, gas fixtures, etc...lasted several seconds...many vacated their premises under the impression that their buildings were on the point of falling. (*Sacramento Daily Union*, 3/16/1860)

...continued for several seconds...chair on which we were sitting moved and scraped the floor; walls creaked and moved back and forth; garments hanging on the wall shook as if in the wind; lamps pending from the ceiling oscillated extensively and long; one of the compositors began to get sea-sick. At the St. George, people rushed out on the balcony, affrighted...tinware on shelving rattled, and portions toppled to the floor...felt all over the city (*Sacramento Daily Bee*, 3/15/1860)

### GEORGETOWN

...very severe...no particular damage done, except disarrangement of bottles and crockery ware on

shelves of stores. (*Sacramento Daily Union*, 3/17/1860)

#### FOREST HILL

Severe (*Placer Herald*, 3/17/1860)

#### YANKEE JIM'S

Severe (*Placer Herald*, 3/17/1860)

#### IOWA HILL

Severe (*Placer Herald*, 3/17/1860)

#### MARYSVILLE

Felt (*Placer Herald*, 3/17/1860)

Particularly severe (*San Francisco Daily Evening Bulletin*, 3/17/1860)

#### DOWNIEVILLE

Felt (*Placer Herald*, 3/17/1860)

Particularly severe (*San Francisco Daily Evening Bulletin*, 3/17/1860)

#### YREKA

Felt (*Placer Herald*, 3/17/1860)

#### FOREST CITY

Felt (*Placer Herald*, 3/17/1860)

#### SAN JUAN

Felt (*Placer Herald*, 3/17/1860)

#### NEVADA CITY

...not very severe, but vibrations continued for eight or ten seconds...very sensibly felt by those occupying the second stories of brick buildings (*Nevada Democrat*, 3/21/1860)

## PLACERVILLE

...felt, but was not as heavy as elsewhere (*Sacramento Daily Bee*, 3/18/1860)

## STOCKTON

...felt, but was not as heavy as elsewhere (*Sacramento Daily Bee*, 3/18/1860)

## SAN FRANCISCO

...felt, but was not as heavy as elsewhere (*Sacramento Daily Bee*, 3/18/1860)

### California accounts suggesting the 1860 earthquake occurred east of the Sierra Nevada

“The earthquake...was far more general throughout [California] than any which has occurred since the...gold discovery [in 1849]. It was distinctly felt...throughout a range of...about 250 miles...embracing both sides of the Sierra Nevada...the center of disturbance would seem to have been centrally, or to the eastward of the Sierra Nevada...” (*Nevada National*, March 17, 1860)

“The shock was felt on both sides of the mountains, from Carson Valley to Sacramento.” (*The Nevada Democrat*, March 21, 1860)

“The earthquake...was so severe [at Carson City] that a general rush was made for the street from nearly every house in town, goods were shaken from the shelves of stores, and a general panic prevailed for a few minutes. (*Sacramento Union*, March 16, 1860) <stronger effects than described anywhere in California>

### General accounts on the severity of the winter of 1859-60 and conditions at the time

“The winter of 1859-60 was one of unprecedented severity in Nevada...the first wave of white emigration from California to the Comstock [had begun the preceding summer]...Many of [the Paiutes] believed that the evil spirit had been angered by the presence...of so many whites; and...was sending the storms that were freezing and starving them....The Truckee River [was] frozen over hard enough to bear up loaded teams.” (Angel, 1881; p. 148)

“...people...have erected...several stone tenements [in Virginia City]...The stone buildings already up have been laid in mud that doubtless will not protect their walls from the heavy winds which prevail...” (letter dated March 26, 1860; Tennessee, 1983)

“When I arrived at Virginia City in March, 1860, I found a large number of people living there in tents, behind rocks, in holes in the ground, and in every possible way they could devise to protect themselves from the prevailing inclement winds.” (Stewart, 1908; p. 129)

## 1860 Earthquake Intensity Summaries

(modified from Toppozada and others, 1981)

Earthquake: Date: 1860, March 15  
Time: ~19:00 GMT; ~11:00 PST  
Location: ~39.5 N, ~119.5 W

Western Nevada

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### Nevada

#### Carson City

Carson City Int. = VI

Goods shaken from shelves; “a general panic prevailed”. *Daily Evening Bulletin* (San Francisco), 15 March 1860, p. 2.

#### Douglas County

Genoa Int. = felt

Noticed. *The Mountain Democrat* (Placerville), 17 March 1860, p. 2.

#### Washoe County

Neighborhood of Pyramid Lake Int. = felt

Very apparent. *Territorial Enterprise* (Carson City), 31 March 1860, p. 2.

Washoe Int. = felt

Felt. *Daily Evening Bulletin* (San Francisco), 17 March 1860, p. 2.

#### County Unknown

Between Pyramid Lake and Carson City Int. = VI+

Rock slides. *Territorial Enterprise* (Carson City), 31 March 1860, p. 2.

### California

#### Butte County

Oroville Int. = N

Not felt. *The Butte Record* (Oroville), 24 March 1860, p. 2.

#### El Dorado County

Coloma Int. = light

Slight. *Nevada National* (Grass Valley), 17 March 1860, p. 2.

Georgetown Int. = V

Very severe; bottles and crockery were disarranged. *Sacramento Daily Union*, 17 March 1860, p. 2.

Placerville Int. = light

Slight. *Nevada National* (Grass Valley), 17 March 1860, p. 2.

## Nevada County

Bope's Ranch, 10 mi above North San Juan      Int. = VI+  
 Pond stirred up. *The Hydraulic Press* (North San Juan), 17 March 1860, p. 3.

Grass Valley      Int. = felt  
 Felt. *Nevada National* (Grass Valley), 17 March 1860, p. 2.

Nevada City      Int. = V-VI  
 People ran out. *The Nevada Journal*, 16 March 1860, p. 3.

North San Juan      Int. = V-VI  
 People ran out; not felt by some. *The Hydraulic Press* (North San Juan), 17 March 1860, p. 3.

Omega      Int. = IV  
 Rattled dishes. *The Nevada Journal*, 23 March 1860, p. 3.

## Placer County

Auburn      Int. = felt?  
 "...not moved by it..." *The Placer Herald* (Auburn), 17 March 1860, p. 2.

Forest Hill      Int. = V-VI  
  
 People ran from buildings. *Weekly San Joaquin Republican* (Stockton), 24 March 1860, p. 1.

Iowa Hill      Int. = VI  
 Rang every bell. *Daily Alta California* (San Francisco), 17 March 1860, p. 1.

Yankee Jim's      Int. = severe  
 Quite severe. *The Placer Herald* (Auburn), 17 March 1860, p. 2.

## Sacramento County

Sacramento      Int. = VI?  
 People ran out; felt by people in the streets; knocked over tin ware. *The Daily Bee* (Sacramento), 15 March 1860, p. 3.  
 Shook frame and brick structures; rang bells on hose tenders and in hotels; vibrated pendant bird cages and gas fixtures; "...many vacated their premises under the impression that their buildings were on the point of falling."  
*Sacramento Daily Union*, 15 March 1860, p. 3.  
 Stopped clocks; rang bells. *Daily Alta California* (San Francisco), 17 March 1860, p. 1.

## San Francisco County

## San Francisco

Int. = II

Not Felt. *Nevada National* (Grass Valley), 17 March 1860, p. 2.Felt by some about Rincon Point. *Daily Alta California* (San Francisco), 17 March 1860, p. 1.

## San Joaquin County

## Stockton

Int. = light

Very slight. *Weekly San Joaquin Republican* (Stockton), 17 March 1860, p. 2.

## Santa Clara County

## San Jose

Int. = N

Not felt. *San Jose Telegraph*, 21 March 1860, p. 2

## Sierra County

## Downieville

Int. = V-VI

Goods shaken from shelves. *Weekly San Joaquin Republican* (Stockton), 24 March 1860, p. 1.

## Forest City

Int. = felt

Felt. *The Placer Herald* (Auburn), 17 March 1860, p. 2.

## Siskiyou County

## Yreka

Int. = felt

Felt. *The Nevada Democrat*, 21 March 1860, p. 2.

## Sutter County

## Yuba City

Int. = V

Some people ran out. *Daily Appeal* (Marysville), 16 March 1860, p. 2.

## Yuba County

## Marysville

Int. = V

Some people ran out. *Daily Appeal*, 16 March 1860, p. 2.Stopped clocks. *Weekly San Joaquin Republican* (Stockton), 24 Mar. 1860, p. 1.

# 1868, May 30 Virginia Range Earthquakes

## EARTHQUAKE SUMMARY

Friday night, May 29, 1868, two similar-size earthquakes occurred about ten minutes apart. These were the largest of several earthquakes to shake western Nevada during the middle part of that year, and were the first widely reported earthquakes in Nevada's history. They rattled dishes, windows and nerves, shook down plaster and cracked brick walls, but did not cause any serious damage.

The first strong earthquake occurred between 9:11 and 9:20 P.M. (PST), on Friday, May 29, 1868, and was reported to have lasted from 3 to 9 seconds. The second earthquake came ten minutes later, and was almost if not quite as severe as the first (TE 5/30/68). The earthquakes strongly shook the western Nevada communities of Virginia City, Gold Hill, Silver City, Steamboat Springs, Washoe City, Carson City, Dayton, Reno, and others. They were also very severe at Fort Churchill, and were felt from the California Bay Area to Austin (TE 5/30/68; SDU 6/3/68; AD).

### Virginia City area

In Virginia City, the first earthquake was very severe, sending everybody into the streets (TE 5/30/68). At Piper's Opera House, where many were attending a benefit performance, the earthquake started a heavy rush of all hands for the doors, and shook the theater very much as a boiler explosion or firing of a very heavy cannon might do; people were quieted down after a while, but then the second earthquake came and caused a panic worse than the first (AD). In Gold Hill, the operator at the telegraphic dispatch office said the building oscillated like a cradle (DA 5/30/68). In Silver City, the Masons were meeting in the upper story of the Sierra Nevada Hotel, a stone building, and all rushed out thinking the building was surely about to fall (TE 5/30/68). Also in Silver City, a child was thrown out of its cradle upon the floor (DT 5/30/68).

At Virginia City, plastering was thrown down from ceilings in almost every brick building, and some bricks were shaken from the top of the Court-house; the doors of the International Hotel and Haas & Co.'s store were jammed open; and at Dale & Co.'s music store the lid of a piano was slammed down upon the hands of a gentleman who was playing (TE 5/30/68).

### Steamboat Springs area

At Steamboat Springs, the earthquakes were "much more severe" than at Virginia City; the following day, the springs were vomiting hot mud instead of hot water, as usual; and one of the large boiling springs was clogged up and burst out in a new place (TE 5/31/68). About 10:00



A.M. the morning after the earthquakes, “quite a severe” aftershock was experienced at Steamboat Springs (DT 6/1/68), but was not reported as being felt in Virginia City. At Washoe City bottles were thrown from the shelves in the drug stores, and things were sent dancing generally; while at the Magnolia House, at the foot of Geiger grade, dishes were thrown from a table onto the floor (TE 5/31/68).

### **Carson City**

At Carson City, many persons rushed into the street. Doors, windows and lamps oscillated and vibrated to an extent most had never before experienced from the same cause, but no damage was done (DA 5/30/68).

### **Other places**

At Susanville, “[the earthquake] created quite a commotion among furniture and rocked buildings about...” (SB 6/6/68). It was described as violent at Nevada City and Iowa Hill in the Sierra Nevada (NDG 6/1/68; SS 6/4/68), and was quite severe, rattling windows and causing gas lamps to swing in Sacramento (TE 5/30/68; SDB 5/30/68). And in the Bay Area, it was very distinctly felt in Oakland (SDU 6/3/68), and slightly felt in San Francisco (TE 5/30/68).

### **Effect on mines**

The earthquakes were felt very plainly in the mines at Virginia City, and a terrible rumbling was heard; some miners said that it sounded as though the whole upper part of the mine had caved in and immense quantities of rock were tumbling down the shaft (TE 5/30/68). At the Gould & Curry mine, the earthquake was felt at the lowest point of the Bonner shaft—the men thought something was falling down the shaft and got out of the way—and at the 225-foot level it was very perceptible (TE 5/30/68). The shock created considerable consternation in the 1200-foot level of the Chollar-Potosi, where the men started up the incline, thinking some part of the mine had caved in, and said their sensations while ascending were indescribable; sometimes the incline itself seemed to be rushing upward and sometimes descending (DT 5/30/68). Boiling water issued from the Cole tunnel, where the water was cold before (DT 6/4/68).

## EARTHQUAKE SEQUENCE (PST)

(as reported from Virginia City; combined from Territorial Enterprise and Daily Tresspass accounts)

May 29, 1868	8:56PM	very faint
May 29, 1868	9:05PM	a little more distinct
May 29, 1868	9:17PM	<b>mainshock</b> ; very severe
May 29, 1868	9:27PM	equally severe, but less duration
May 29, 1868	9:30PM	slight
May 29, 1868	10:08PM	slight
May 30, 1868	10:00AM	quite severe at Steamboat; not reported as felt in Virginia City
May 30, 1868	9:00PM	two slight shocks; short duration, resembled heavy blast
June 4, 1868	9:25PM	slight
June 5, 1868	6:35AM	perceptibly jarred crockery in cupboards and iron ware on stoves
June 8, 1868	7:30AM	rattled dishes, bottles & windows; awoke light sleepers

## EARTHQUAKE CATALOG ACCOUNTS

### Townley and Allen (1939)

#### 1868 May 24.

9 p.m. Sacramento. Two shocks. - Fuchs. Not felt in San Francisco; violent in the State of Nevada. - Perrey.

#### 1868 May 29

9 p.m. Lassen County. Three shocks: first at 9 p.m.; two others in the course of fifteen minutes. - B. MS. - S.F. Bulletin, June 12, 1868. [Building rocked and furniture moved.] About 9 p.m., series of shocks in interior of California and in Nevada; but not at San Francisco, nor north of a line from Sacramento to Fort Churchill; felt in Sacramento. - B. MS. [The center of Lassen County is well over one hundred miles north of a line from Sacramento to Fort Churchill, Nevada. The text should probably read *south* of this line, instead of *north*. Since the times are the same and the descriptions similar, there is a suspicion that the records of May 24 and May 29, 1868, refer to the same phenomenon.]

### Topozada and others (1981)

#### 30 May 1868 M5.9 [5:10 GMT]

Brick buildings were cracked and some bricks were shaken down in Virginia City (VII MM). Plaster fell in nearly all the brick buildings. Two foreshocks were reported at Virginia City. The intensity distribution resembles that of the December 1869 earthquakes.

**Holden (1898)****1868. May 29; 9 p.m.**

[not clear this is the NV quake by description]

**NEWSPAPER ACCOUNTS****Territorial Enterprise****May 30, 1868****OUR EARTHQUAKES**

The disposition, which obtains in Washoe as well as in the rest of the world, to think ourselves as smart as anybody, render us unwilling to be eclipsed in any anything – even in the matter of earthquakes. We have hitherto been comparatively free from convulsions, save some occasional shock in the stock and money market. There is indeed a tradition among the old settlers that something of an earthquakish character was experienced in ‘59 or ‘60, but the story has generally been regarded as one of those fictions which attach to the remote history of every country, and has never been accorded any considerable degree of credence. It was therefore very natural that we should have hankered after a decided and handsome shock – something that would give us plausible grounds to dispute supremacy with San Francisco in this as in other respects. Her jolly upheaval three years ago – which gave her so much eclat – excited our envy to an almost uncontrollable degree, and, like the boy whose rival gained a decided advantage from the circumstance of having occasional fits, we have been wishing to have fits ourselves ever since. The recent lively earthquake times in the West Indies and Hawaiian Islands have rather augmented our original desire, and we believe it was an almost universal wish to see the mysteries of the Comstock exposed by a bottomless fissure and Mount Davidson burst forth in a grand pyrotechnical display. But if such wishes have been entertained, they were very suddenly revoked last night. Three severe earthquake shocks – occurring at 9:17, 9:27 and 9:30 – brought the entire town into the streets, and dispelled all desire for a further or greater enjoyment of the luxury. Having had considerable experience with San Francisco earthquakes, we cannot conscientiously say that ours were first-class articles. Speaking somewhat scientifically, we should say that they were earthquakes of about the second magnitude. But whatever their degree – expressing our sentiments from the fourth story of a brick building, with the walls still vibrating – they will do for us. We are satisfied. San Francisco, St. Thomas and the Sandwich Islands are welcome to all these kinds of luxuries and honors. We will be content hereafter to take Washoe Straight – without earthquakes.

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**An Earthquake in Virginia.**

Last night four distinct shocks of an earthquake occurred in this city between the hours of 9 and 10 o'clock. The first was at 17 ½ minutes past 9, the second at 9:27 minutes, the third at

9:30 and the fourth a few minutes after 10 o'clock. The first shock lasted about three seconds and was very severe indeed, sending everybody into the streets : the second was almost if not quite as severe as the first, while the third and fourth were tolerably light.

#### ITS EFFECTS.

The first effect was to send everybody traveling for the open air about as fast as their legs could carry them, and its second was to make them very willing to stay there. No buildings were shaken down or very badly injured, which is astonishing, considering the severity of the shocks experienced. Some bricks were shaken from the top of the Court-house, and the building, which is of brick and five stories high, reeled and cracked in a most frightful manner. The Odd Fellows' had a meeting in the building at the time, and all the brethren present rushed pell-mell down the stairs and into the streets with their regalia on. The doors of the International Hotel, opening on B Street, could not be closed by about one foot after the first three shocks, and the doors of Haas & Co.'s store in the same block were in the same fix. Plastering was thrown down from ceilings in almost every brick building in town, and there was everywhere a frightful racket.

#### THE MINES.

We have not heard of any damage being done in the mines, though we only visited the Savage works. The shocks were felt very plainly by those in the underground works, and there as a terrible rumbling heard. Some of the miners say that it sounded as though the whole upper part of the mine had caved in and immense quantities of rock were tumbling down the shaft. The big 300-horse power engine was stopped by the first shock, and it was with difficulty started up again. David Bowie, superintendent at the Gould & Curry mine, informs us that the earthquake was felt in the lowest point in the Bonner shaft. The men thought something was falling down the shaft and got out of the way. At the 225-foot level it was felt very perceptibly.

#### INCIDENTS, ETC.

At the time of the first shock we were in our sanctum, in the fourth story of the Enterprise Building (brick), and therefore had a pretty good chance for getting the full benefit of the shake. The shock was accompanied by a dreadful, roaring sound, the window glass and everything in the room rattled loudly, while the walls and partition gave out a creaking, groaning sound. Several visitors were in the editorial rooms at the time, talking of the impeachment, but very suddenly dropped the subject, and immediately there was a grand rush down the stairs of editors, printers, and visitors. "Devil take the hindmost" was the motto of all hands. Piper's Opera House was crowded, the occasion being the benefit of Billy Robinson, and at the first shock there was a grand rush for the doors. Several ladies fainted and for a moment all was confusion among the present. The man at the ticket office ran away and left all the money taken lying where it might have been stolen by any one thinking more of money at the moment than his life. The play in progress was "The Soldier's Bride," and Miss Sue Robinson was seated at a table and was supposed to be writing a letter to her father. "Dear father," she was just saying, "I sit down – to write – you that – I wish to – to leave this – this horrible place!" When the first shock came, and she did leave with a rush for her "dear father" behind the scenes. At Dale & Co.'s music store the lid of a piano was slammed down upon the hands of a gentleman who was playing, and all over town curious things occurred – even some who were eating at the restaurants rushed away and forgot to settle their bills. One man stood in the centre of the street with uncovered head and uplifted hands and fervently remarked to those about him that this ought to be a

warning to people to pay more attention to religious subjects : “I feel,” said he, “that I have fallen far short of my duty to God!” Some thought the day of judgement had come. A lady in the city was taking with her husband about what the last great day would, in her judgement, probably be like, when the first heavy shock came. She cried out, “There it is, now!” and ran away to tell her neighbors the awful news. After it was all over everybody seemed stricken with a terrible thirst and the bars were crowded with men engaged in washing down the effects of the several shocks. Our earthquake experience previous to last night has been quite limited – confined to half a dozen light shocks which we thought rather interesting than otherwise – but we must now say that we are not stuck after earthquake – we want no more of ‘em in ours. One such as that last night will last us a long time. Persons who have had much San Francisco experience say that ours last night was quite as big as any they ever encountered there. We are glad to hear that – glad that it has not been beaten in San Francisco. We are willing, however, to quit even – don’t want to go the least ahead.

#### THE EXTENT OF THE EARTHQUAKE.

The earthquake was slightly felt in San Francisco, was quite severe in Sacramento, very severe at Fort Churchill, and strongly shook-up Carson City, Washoe City, Gold Hill, Silver City, Dayton, Austin, and in short was felt in every town in this State and California. The vibrations are thought by most persons who observed them to have been in a northerly and southerly direction.

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INSURE YOUR PROPERTY. – Read the advertisement of the North British and Mercantile Insurance Company in another column. They will insure your buildings against everything but earthquakes, and will doubtless insure against them as soon as they know that we are of sufficient importance to be noticed by such things.

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THE EARTHQUAKE IN SILVER. – Dr. Holmes, who was attending a Masonic meeting in Silver City, says that the earthquake was much more severe there than here. The Masons were in the upper story of the Sierra Nevada Hotel, a stone building, and all rushed out thinking the building was surely about to fall. In one house the first shock threw a child out of its cradle upon the floor. The shocks lasted longer than here. The Doctor says he has experienced over fifty earthquakes in San Francisco, but never one as heavy as was the one last night in Silver City. Doubtless it was worse everywhere in this vicinity in the valleys than here, as earthquakes usually are more severe in plains than high up in the mountains.

\*\*\*\*\*

MISTAKEN ON BOTH SIDES. – Last night when the first shock of the earthquake came and the printers and all hands of us had tumbled from the fourth story of the ENTERPRISE Building down to the sidewalk, the first thought of every one was that the boiler in the basement,

used for running the presses, had blown up. About the same time that we got down to the street Mike, the pressman, came rushing up the steps from the basement. "Mike," cried several voices, "has the boiler blown up!" "Blown up? h\_\_l, no!" cried Mike, "what are you fellows doing up stairs?"

### **Territorial Enterprise** **May 31, 1868**

MORE ABOUT THE EARTHQUAKE. – Yesterday everybody was talking about the big earthquake of the night previous – comparing notes as it were – and what is strange is all acknowledge to being pretty badly scared. Nobody is particularly brave when the danger is of a kind that cannot be seen or in any way guarded against. There is no end of funny earthquake stories to be heard on the streets. Among the effects of the earthquake not mentioned by us yesterday morning we may mention that it increased the flow of water from the Cole tunnel some sixteen inches (measured without the pressure of a head) and the water is quite hot, whereas it was before about the temperature of common spring water. If this flow continues it will be quite a gain to the company, to the Gold Hill and Virginia Water Company, and the city. At Gold Hill, on the contrary, it caused a very considerable decrease in the volume of water which has been rushing from the ledge into the drifts of the Imperial-Empire shaft. The earthquake so stirred up the Steamboat Springs that they were yesterday vomiting hot mud instead of hot water, as usual. The shocks that were felt in the vicinity of Steamboat Springs were much more severe than here. At Washoe City bottles were thrown from the shelves in the drug stores, and things were sent dancing generally; while at the Magnolia House, at the foot of the Geiger grade, dishes were thrown from a table to the floor. One of the large boiling springs at Steamboat was clogged up and burst out in a new place. The people of that vicinity were a good deal frightened, for at the best they are well aware that there is but a very thin crust between them and the region of fire and brimstone. Drivers on the Donner Lake stages did not feel the shake, but about the time it occurred, and while the stages were coming across the Truckee Valley, some of the horses suddenly dropped to the earth – four in one team and three in another. On the Overland route, Baldy Green, while driving across a desert this side of Ragtown, was considerably surprised to see three of his horses suddenly fall to the ground; and not knowing or suspecting such thing as an earthquake, thought it rather a curious proceeding on the part of his stock. The first heavy shock was felt very sensibly at the bottom of the Bullion shaft, which is the deepest in the country, being 1200 feet below the surface. The men felt very much like coming up, and the foreman had to go down to reassure them. While he was in the drift at the bottom the second shock took place. He says it sounded as though everything in the mine was being pushed violently from the east to the west – no damage was done, however, in this or any other mine. Sheriff Mulcahy says the prisoners in the county jail were very uneasy. At the second shock one of them seized his coat and putting it on cried out: "Boys, let's go?" – forgetting that "going" was not so easy. A story is told of a fellow who went into a saloon after the first shock to take something to brace his nerves and who had just poured out a half tumbler full of brandy straight when "boo-m-m ri-i-p!" came the second, just as he was raising the stimulant to his lips. To drink or not to drink was a question he had but little time to decide, and thrusting glass, liquor

and all into the side pocket of his coat he bolted for the street, being bound to save the precious stuff if possible. How he succeeded can be guessed.

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ANOTHER SHOCK. – At 9 o'clock last night a light shock of an earthquake was felt here. It was of short duration and resembled the shock and vibration of a heavy blast. We expect next to see old Mount Davidson vomiting forth fire, smoke and "burning lather," as Mrs. Partington would call it. For a young State we are doing well. We can get up about as large earthquakes as they can raise anywhere; all we want now is a first-class volcano – we are just about sick for a volcano.

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#### FROM SAN FRANCISCO

A remarkable series of earthquake shocks was experienced in the interior of this State about 9 o'clock last evening, of which nothing was felt at San Francisco, or north and south of a line from Sacramento to Fort Churchill. No damage is recorded.

#### **Territorial Enterprise** **June 2, 1868**

At twelve minutes past nine o'clock last evening says the Sacramento *Union* of May 30, an earthquake was felt in this city. There were three shocks, lasting, from first to last, about six seconds. The first shock was the severest, and sensibly unsettled the writer of this as he sat in his chair in the third story of the Union office. The second was somewhat lighter, but still heavy enough to cause the windows to rattle as they do in a high wind, and the gas-burners to vibrate several inches. The third shock was very light and hardly perceptible. The vibrations were from northeast to southwest. We learn that the vibration was observed by many of our citizens, and especially by those who happened to be at the time in the second or third stories of their buildings.

#### **Territorial Enterprise** **June 6, 1868**

MORE EARTHQUAKES. – Night before last, at 9 ½ o'clock, a slight shock of an earthquake was felt in this city, and another, a pretty lively one, yesterday morning at 6 ½ o'clock. It is thought by many that we may have been having these slight shocks occasionally ever since the settlement of the country, but that people not looking for anything of the kind here, they passed unnoticed. A gentleman informs us that in February, 1860, he was engaged in herding stock near Pyramid Lake, when a shock occurred which was so severe that it caused large boulders to roll down the hills. The large crevices to be seen at Steamboat Springs, running north and south for nearly a mile, were undoubtably opened by an earthquake. On the whole, we

are beginning to think that we may safely reckon earthquakes among the other interesting spontaneous productions of this State.

**Territorial Enterprise**  
**June 9, 1868**

MORE EARTHQUAKE. – At 7 ½ o'clock yesterday morning we were treated to a pretty smart shock of an earthquake. It was sufficiently heavy to cause dishes, bottles, windows, etc., to rattle at a lively rate; to shake up and muddy ale at the saloons and cut other such pranks, but not heavy enough to wake any but light sleepers. We presume we shall have one worth mentioning one of these days. They are very nice to have and are very good for items, as a change from hay and pack-trains – there is something more exciting about them and they are always of general interest – while they are under headway, especially.

**Daily Tresspass**  
**May 30, 1868**

**The Great Earthquake**

The first shock of earthquake ever felt in this State since its settlement by whites visited us last night - and stirred up things quite lively. This first intimation of telluric colic was a very faint tremor of the earth about 8:56 o'clock p.m., followed by another, a little more distinct, at 9:05; twelve minutes and a half afterwards a sever shock was felt, which caused buildings to rock and creak, chandeliers to oscillate violently, table lamps to dance, and excited people to rush into the streets. At 9:27 another equally severe, but of less duration - a short sudden jump up as it were, of the whole surface of the earth - sent everybody pell-mell into the streets, women and children screaming, men running in all directions, and dogs howling piteously. Two other slight tremors were felt, one at 9:30 and the other at 10:08 o'clock - being the sixth and last. The first of these was so slight that it was barely discernable to persons sitting quietly in a still room; the second was quite distinct to persons similarly situated, but was noticed by but few and not taken for an earthquake by any - because such a thing was so unexpected in this part of the Country. The third shock was the longest and severest of all - lasting about three seconds - and consisted of a violent and indefinite 'shake,' a sudden movement of the earth four or five inches to the northeast, with a kind of jerk, a terrible rumbling noise, and quivering farewell. The fourth was violent and noisy, and produced upon persons standing square upon their heels on solid ground the same sensation as if standing upon a floor when the blow is struck from beneath with a heavy hammer. The fifth and sixth were lighter than the second, and would not had been noticed at all if every nerve had not been strained to catch the slightest perceptible oscillation of the earth. The shake was felt at Sacramento, Washoe, Silver City, Gold Hill, Fort Churchill, and Austin - apparently running from the southwest to the northeast - and was felt (so far as heard from) along this belt for about four hundred miles. The shock was felt at Carson at 9:11, and Reno at 9:04.



### **Incidents.**

Many ludicrous and some rather affecting scenes were witnessed. Quite a panic was experienced at the Opera House, it being filled with people on the occasion of Billy Robinson's benefit. Several ladies fainted, and two or three women leaped from the private boxes onto the stage. One German lady, who has acquired but little of the English language, seized a gentleman by the shirt bosom, and staring breathlessly at him for a moment exclaimed, 'Mein Got! Vot ish dosh?' Several gentlemen used every effort to quiet the audience and check the panic, but when the second heavy shock came, not even the check-man at the door could 'check' them as fast as they came out. A big 'cullud gem 'man' rushed up the steps furiously from the pit, with huge drops of perspiration starting from every pore, when the door-keeper asked if he wanted a check. No boss; I doesn't come back here agin!' and the lamps fluttered in the hall as he whistled past them like the wind. In a certain law office two young men were reading by the same lamp; one sat leaning against the wall, facing the closed door, while the other sat astride his chair, with his back to the door, leaning over his book on the table; a shuddering of the building was felt, then a heave, and the lamp tottered away from the book, the young man gave one bound over the back of the chair, lit upon the knob of the door, and piled upon the sidewalk in a shapeless mass, from which he sprang, like a string of twisted India-rubber, into the middle of the street. Just after the second heavy shock, a gentleman was passing the open door of a brick house, when five ladies, mistaking the noise of his footsteps for the rumbling of a coming 'shake' rushed frantically into the street, one of them dropping a child from her arms, and each exclaiming, 'Thats another!' 'I knew it!' 'Why *don't* he come?' The gentleman told them it was all over - no more danger, when one of them said, 'Well, I want to go somewhere - I don't know where: down on C street, where all the people are.' On being assured that C street shook worse than the one on which she lived, she appeared perfectly satisfied and remained at home. One barkeeper, leaning upon his bar was thrown back violently among the bottles upon the shelving behind him - but he did stay there. An exciting game of billiards was being played in the Washoe Exchange, when one of the players, by a aingle shot (from the earthquake), counted up all the billiards on his string - and the game closed. Two gentlemen were playing chess in the third story of a brick building, when the knights and queens began skyugling promiscuously around the board - and the gentlemen jumped the game. A spiritual circle was seancing in a rickety wooden building, calling up spirits from 'the vasty deep' and finally barpooned one old fellow that shook them up a little too lively - and the circle dispersed. An enterprising ink-slinger, on the upper floor of a three-story brick, hearing some noise (on the street), gained the sidewalk in a couple of bounds, eagerly looking for an item and inquiring 'W-w-what's the matter?' Drivers on the Donner Lake stages did not feel the shake, but about the time it occurred, and while the stages were coming across the Truckee Valley, some of the horses suddenly dropped to the earth - four in one team and three in another. At Silver City, a child was thrown from its cradle upon the floor.

### **The Miners Stand It.**

The greatest anxiety was felt, amid all the consternation, for the safety of the six or seven hundred men 'delving in the dingy caverns of Mount Davidson,' in the various mines along the Comstock. And yet but few of them felt the shocks, and paid little attention to the peppering of loose earth around them. The pumps at the new Ophir and Savage works stopped working, from

the sudden jar, but the timbers stood the shake and not a cave occurred. The shock was quite heavy and created considerable consternation in the 1200-feet level of the Chollar-Potosi. The men started up the incline on the double quick, thinking an extensive cave had taken place in some part of the mine, and say their sensations while ascending were indescribable; sometimes the incline itself seemed to be rushing upward and sometimes descending. Many of the mines piped all hands on deck, for safety, but soon work resumed as usual. In the Cole tunnel, from which a large stream of water has been pouring for months, the volume was increased sixteen cubic inches by the earthquake, and the flow has been steady all day at that figure - coming out steaming hot, where before the water was cold. 'Not more than a mile away,' many exclaimed, alluding to the 'upper level' of the infernal regions.

### **Theories and Effects.**

Nobody appeared willing, during the excitement, to admit that we had been visited by an earthquake - that we could have so dire an affliction added to our abominable storms and dovetailed winters - and they conjured up all kinds of accidents and calamities - anything but that: a mill had blown up, a mine had caved, the 32-pounder at Fort Homestead had exploded, the Giant powder was at work in the mines - 'where's the man that introduced it?' - all these and a thousand other things were said, as people congregated in the middle of the streets, just after the first heavy shock, when - r-r-rip came another thundering old wave, and Mount Davidson trembled to its base and looked ominously high, and steep, and alarmingly affectionate - as though it might bend over and kiss one. Then everybody weakened - 'it's no use; it's one of them things!' they exclaimed, 'we'll have to git!' The state of the atmosphere at the time gives plausibility to the 'atmospheric pressure' theory of earthquakes - by which it is claimed that the pressure upon the earth's surface, amounting to several million tons to the square mile, is sometimes temporarily removed from large belts of country, when the earth rises to fill the vacuum and is forced back to its place by the law of gravitation. When the shocks came last evening there was not a breath of air stirring, but the night was chilly and the sidereal display magnificent. We hope this theory is correct; it will always give us timely warning; when the wind lets up the earthquake begins, because the 'pressure' is removed; and besides, faith in this theory will reconcile the people to the 'zephyrs' which whistle daily over our heads. The handiwork of earthquakes may be seen in the Sierra near us - as the crater in which Lake Bigler nestles; the huge basaltic columns and immense masses of shattered granite that crown the loftiest peaks of the western summit and lie in chaotic confusion a-down their sides.

### **Daily Trespass**

**June 2, 1868**

### **Earthquake**

Perhaps for a little diversion, we were favored at 9:14 o'clock last evening with a very perceptible shock of earthquake, lasting several seconds. From the vibration of the pendant gas-burners in this office, it was shown that the shock came from the west, and oscillations were from west to east. Upon the street or in the lower stories of buildings the shock was scarcely perceptible; but top those roosting high, very plainly felt. - *Sac. Reporter*, 30th.

**Carson Daily Appeal**  
**May 29, 1868**

SAN FRANCISCO DISPATCH.

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From the Enterprise of yesterday.

SAN FRANCISCO, May 27. – A smart shock of an earthquake was felt in this city at half past 10 o'clock last evening.

**Carson Daily Appeal**  
**May 30, 1868**

AN EARTHQUAKE.—Two very distinct shocks of earthquake occurred here last evening. The first was a double shock with a continuous vibration between the more distinct quakes – thought to have lasted about nine seconds. It occurred at eleven minutes past 9 o'clock, Magnolia standard time. The second shock occurred ten minutes later, at twenty-one minutes past 9. The more sensitive or imaginative report three or four shocks. But of two there is no question. Many person rushed out of doors into the street, the better to feel the land shake, and await the result of other shocks that might occur. Doors, windows and lamps oscillated and vibrated to an extent never before experienced from the same cause here. In fact we believe but one earthquake was ever previously reported in Carson ; that occurred in '59 or '60. We are informed that a telegraphic dispatch reported two shocks in Gold Hill – the operator at that office saying the building he was in oscillated like a cradle. No damage being done here, the principal effect was to give the citizens a new sensation and make people wonderfully lively and social.

**Carson Daily Appeal**  
**May 31, 1868**

THE EARTHQUAKE IN VIRGINIA.—The Enterprise of yesterday says : Last night four distinct shocks of an earthquake occurred in this city between the hours of 9 and 10 o'clock. The first shock lasted about three seconds and was very severe indeed, sending everybody into the streets ; the second was almost if not quite as severe as the first, while the third and fourth were tolerably light. The shocks were felt very plainly by those in the underground works, and there was a terrible rumbling heard. Some of the miners say that it sounded as though the whole upper part of the mine had caved in and immense quantities of rock were tumbling down the shaft. The big 300-horse power engine of the Savage works was stopped by the first shock, and it was with difficulty started up again. David Bowie, superintendent of the Gould & Curry mine, informs us that the earthquake was felt at the lowest point of the Bonner shaft. The men thought something was falling down the shaft and got out of the way. At the 250-foot level it was felt very perceptible. The earthquake was slightly felt in San Francisco, was quite severe in Sacramento, very severe at Fort Churchill, and strongly shook-up Carson City, Washoe City, Gold Hill, Sliver City, Dayton, Austin, and in short was felt in every town in this State and California. The vibrations are thought by most persons who observed them to have been in a northerly and

southerly direction.

**Carson Daily Appeal**  
**June 10, 1868**

VIRGINIA ITEMS.

At 7 ½ o'clock on Monday morning the citizens of Virginia were treated to a pretty smart shock of an earthquake.

**Carson Daily Appeal**  
**June 16, 1868**

UNDERGROUND CHANGES.—A correspondent of the Enterprise says: I have no personal knowledge that either of your pet earthquakes shook our Pine Grove foundations, but this I do know, that a new spring has broken through almost impenetrable rock in our canon, a few hundred feet above Toombs & Abraham's mill, which jets out water enough in different places on the hillside, to supply a dozen mills—and also that all but two of our wells have caved in.

**Daily Trespass**  
**May 30, 1868**

THE QUESTION OF THE MORNING. — We begin to regret, or deplore, or deprecate the earthquake of last night. Everywhere we go, kind friends affectionately greet us, wringing our hand and looking sympathizingly up ask us, tearfully, 'How did you enjoy the earthquake?' Everything has earthquake about it today, and we're waiting with an agonized sort of desperation for Sunday, that balm of the overwrought, soulsick, or sinsick, or sunset citizen, to come and inaugurate (they 'inaugurate' everything now) another week.

**Daily Trespass**  
**June 1, 1868**

THE LAST.—Two slight shocks of earthquake occurred in this city Saturday evening about 9 o'clock—at least people with very susceptible organizations so declare. Saturday, about 10 o'clock A.M., Mr. George W. Hopkins informs us that quite a severe shock was experienced in Steamboat Valley: the boiling springs were not materially affected, however, the only damage noticeable being in one where the vibrations caused the water to appear muddy. It may be all right. Doubtless is all right. A friend at our elbow suggests as a mild restoration to people of unquiet nerves that it is nearly h-l.

**Daily Trespass**  
**June 4, 1868**

OUR PIONEER EARTHQUAKE.—In mentioning the earthquake here on the 29<sup>th</sup>, we spoke of it as the first positive shake of the sort that had ever visited our footing in Nevada. Gen. Noteware writes to correct us; and informs us that about the 1<sup>st</sup> of June, 1860, a shock fully equal to that of the 29<sup>th</sup> was felt by many persons in Carson Valley. It occurred at about 2 o'clock in the afternoon; and was sufficiently severe to set crockery on the shelves to dancing.

**Daily Trespass**  
**June 4, 1868**

ABOUT THE EARTHQUAKE.—Many nervous people feared a volcano would lift its fiery crest above our city when they heard that boiling water issued from the Cole tunnel, after the shake, where the water was cold before. This fear might have reasonable foundation in the neighborhood of the Steamboat Springs, but not here. In that vicinity, where the crust of the earth is rent with fissures extending for miles, and from which great jets of boiling water, hissing steam and sulphurous smoke arise, the shock of an earthquake might release the subterranean fires and start the flow of lava; not that the volcano is stronger there than elsewhere, but that it is less confined. The great earthquake that shook the valley of the Mississippi with such terrible destructiveness, many years ago, causing large tracts of land to rise several feet, remain for days, and then subside again, opened fissures in the earth several feet in width, of unknown depth, and extending east and west for hundreds of miles. People felled large trees across the course of these chasms and sought safety upon the trunks, as the earth kept opening and closing, swallowing up whatever was small enough to gain admittance. We opine that one such opening about Steamboat Springs would concentrate all the force that now finds vent through a thousand fissures, and make it very lively in the valley below. But we do not anticipate that Steamboat will ever put on any such airs if left alone—by 'outside' earthquakes. The late shake doubtless had its seat in the Sierra Nevada mountains—say, about the volcanic region thirty miles southwest from the outlet of Lake Bigler. The vast chasm through which the waters of the Rubicon dash to the south branch of the Middle Fork of the American, has the appearance of having been formed by some terrific throe of nature; while the stream into which it leads is lined with igneous rocks and huge columns of basalt, standing hundreds of feet high, cemented together and extending along the mountain sides for miles, with an evenness of front, and a mathematical precision in height and form of prism, that is truly wonderful. Nearer to us, along the Truckee and the north side of the lake, large masses of lava may be seen—one along the Truckee being several hundred feet high, four miles long and two miles through the base. All this has been spewed up at some remote period, and the force which ousted it doubtless still exists, and make another effort to get fee last week—but only shook the earth from Sacramento to Austin.

**Daily Trespass****June 5, 1868**

## THE WEATHER.—

...By the by—some people think they felt another shock of earthquake at twenty minutes past 9 last night.

ANOTHER SHOCK.—We are assured by several persons of undoubted veracity that quite a sensible vibration of the earth was experienced this morning at 6:35. So sensible was the shock that crockery in cupboards and iron ware on stoves, jarred perceptibly.

**Daily Trespass****June 6, 1868**

EXASPERATED, ENTIRELY. — Our meteorologico-earthquake reporter has been looking after the interests of this people for some time; and after great research, close study, minute and extended observations, has become thoroughly exasperated at the outrageous conduct of the weather and turbulence of the earth, and gives the following as his final report: The earth has four motions — first, the diurnal, in which the globe turns on its axis every 24 hours, causing day and night; second, its revolution around the sun, which takes 365 days, 5 hours, 48 minutes, 57.7 seconds to accomplish, causing the year; third, the motion of the whole solar system in space, i.e., the earth, with all the planets and stars, moving around what is supposed to be a central sun, causing the phenomenon called the procession of the equinoxes, in virtue of which the first point of Aries recedes upon the ecliptic about 50 seconds in a year, gradually causing a complete change in the seasons: fourth, a motion in which, through a long period of years, the poles of the earth are changed, the equatorial region in time becoming the polar region, and vice versa, causing h—ll. He further says that, basing his calculation upon these movements, and taking into account the trillionth part of a second of time, he has ascertained that after the lapse of 10,500 years, or about the year 12,368, the seasons on our globe will be exactly reversed—when Spring time will come, gentle Annie, and the sage-brush blossom on the plain. He says, however, that before the above-mentioned year arrives, the terrestrial globe may break the reins of centrifugal and centripetal forces and go shooting madly from its orbit and plunging through the endless abysses of the Universe—in which event, unless we can have a change of weather, he would suggest that the audience sing the sockdollager:

‘Ah, yes, poor orb, go mixing up and jumbling,  
     In topsy-turvy style, thy nights and days;  
 And, like a kite with broken string, fall tumbling,  
     And sinking, turn and turning, sink always.

‘Spin through all space that hath no paths nor periods,  
     Rush at a sun, and smash thyself to snuff—  
 Or, say you quench it, there are others, myriads;  
     Let us have done—this world is old enough.’

## LOCAL JOURNAL ACCOUNTS

From **Journals of Alfred Doten**, Reporter for the Virginia Daily Union, Territorial Enterprise, and Gold Hill Evening News

Friday, May 29, 1868 (Virginia City)

...Went home & took Mrs M to Opera House - Billy Robinson's Benefit - Crowded House - "ladies night" - Plays were "Soldier's Bride" and "Love up a Tree," with an interlude in which Leslie gave his local "stump speech" - funniest I ever heard - Sue Robinson sang "I'll meet thee at the Lane" and "Happy be thy Dreams" - C H Rea danced the Highland Fling, and Otto Burbank sang and danced "Gunboat Sam" - In the plays, Sue Robinson did the leading female character - At 20 minutes past 9, while the first piece was playing, a strong shock of an earthquake started a heavy rush of all hands for the doors - Shook theater very much as a boiler explosion or firing of a very heavy cannon might do - People got quieted down after awhile, but in about 15 minutes another shock just like the first, came - 2<sup>nd</sup> panic worse than 1<sup>st</sup> - 3 whores jumped from lower right hand stage box to the stage in a heap, and dress circle folks rushed as before - some fell, but luckily none hurt - I think I felt 1 or 2 other very light shocks about that time - Both big shocks alike - I & Mrs M sprang to our feet like everybody else, both times, but I would not let her rush - Frank Farington quieted most people by rising and stating that the shocks were merely the result of the firing of a big gun just cast at Greeley's foundry - weighing 3,000 lbs - Plays all went on but many people left - Entertainment 1<sup>st</sup> rate, but spoiled by the alarm people were in - People stampeded in all parts of the City, especially those living in brick buildings - Many would not return to their bricks tonight but took refuge elsewhere - Telegraph says shocks severely felt at Carson, Washoe, Dayton, Ft Churchill, & Sacramento - Theater out at 11 - Home, & to bed at 12 - blustery clear night - No earthquake weather today or evening - clear cool & blustery - These are the 1<sup>st</sup> shocks of earthquake here since settlement of State...

## RESEARCH NOTES

At Virginia City, two foreshocks and several aftershocks were reported, and the earthquakes were distinctly felt at various depths in the mines, indicating the earthquakes were centered nearby. At Steamboat Springs, an additional aftershock reported as quite severe was felt the following morning, indicating that area was located near the epicenter as well. A similar pattern occurred during the December, 1869 earthquakes, suggesting the 1868 earthquakes marked the onset of a sequence lasting two years or more.

The *Territorial Enterprise* (5/31/1868) contains two accounts of horses falling down, suggesting very strong ground motion. In neither case did the driver feel the earthquake. In the first account, while the Donner Lake stages were crossing the Truckee Valley [Meadows], some of the horses suddenly dropped to the earth – four in one team and three in another. A specific

location was not given, but the southern Truckee Meadows is immediately north of Steamboat Springs, one of the areas hardest hit by the earthquakes. In the second account, three horses of a team crossing “a desert west of Ragtown” suddenly fell to the ground (TE 5/31/68). The reference to “a desert” suggests a salt flat, implying this may have occurred no further westward than the area around Silver Springs, more than 30 km east of Virginia City.



## 1868 Earthquake Intensity Summaries

(modified from Toppozada and others, 1981)

Earthquake: Date: 1868, May 30  
 Time: 05:10 GMT; May 29, 21:10 PST  
 Location: 39.3 N, 119.7 W Virginia City Area, Western Nevada

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### Nevada

#### Carson City

Carson City Int. = VI  
 Many people rushed out. *Carson Daily Appeal*, 30 May 1868, p. 3.

#### Lander County

Austin Int. = II  
 Felt by very few. *Daily Reese River Reveille* (Austin), 1 June 1868, p. 1.

Reese River (Austin) Int. = severe  
 Severe. *Daily Alta California* (San Francisco), 3 June 1868, p. 1.

#### Lyon County

Dayton Int. = heavy  
 Strongly shook up. *Territorial Enterprise* (Virginia City), 30 May 1868, p. 3.

Fort Churchill Int. = heavy  
 Heavy. *Daily Alta California* (San Francisco), 3 June 1868, p. 1.  
 Very Severe. *Territorial Enterprise* (Virginia City), 30 May 1868, p. 3.

Silver City Int. = VI  
 Threw a child out of its cradle; people ran out. *Territorial Enterprise* (Virginia City), 31 May 1868, p. 3.

#### Mineral County

Aurora Int. = N  
 Not felt. *Esmeralda Union* (Aurora), 6 June 1868, p. 2.

#### Nye County

Belmont Int. = N  
 Not felt. *Silver Bend Reporter* (Belmont), 6 June 1868, p. 2.

#### Pershing County

Humboldt Int. = felt  
 Bad. *Daily Alta California* (San Francisco), 3 June 1868, p. 1.

## Storey County

Gold Hill Int. = VI?

Kerosene lamp knocked over; pile of barley sacks knocked over; coil of rope moved. *Gold Hill News*, 30 May 1868, p. 2.

Gould and Curry Mine (Virginia City) Int. = felt

Not felt. *Daily Alta California* (San Francisco), 3 June 1868, p. 1.

Felt at the lowest point of the Bonner shaft. *Territorial Enterprise* (Virginia City), 30 May 1868, p. 3.

Savage Mine (Virginia City) Int. = V

Felt by all the miners; stopped a pump. *Daily Alta California* (San Francisco), 30 May 1868, p. 1.

Virginia City Int. = VII

Bricks shaken from the top of the Court House; brick buildings cracked; plaster knocked off the ceilings of nearly every brick building. *Territorial Enterprise* (Virginia City), 30 May 1868, p. 3.

## Washoe County

Magnolia House, at the foot of Geiger Grade Int. = V-VI

Dishes thrown from a table. *Territorial Enterprise* (Virginia City), 31 May 1868, p. 3.

Reno Int. = felt

Felt. *The Daily Trespass* (Virginia City), 30 May 1868, p. 3.

Steamboat Springs Int. = VI+

Flow changed from hot water to hot mud. *Territorial Enterprise* (Virginia City), 31 May 1868, p. 3.

Truckee Valley (Meadows?) Int. = VII?

Horses knocked from their feet. *Territorial Enterprise* (Virginia City), 31 May 1868, p. 3.

Washoe City Int. = V-VI

Bottles knocked from shelves. *Territorial Enterprise* (Virginia City), 31 May 1868, p. 3.

## County Unknown

Between Ragtown and Virginia City Int. = VII?

Horses knocked from their feet. *Territorial Enterprise* (Virginia City), 31 May

1868, p. 3.

## California

### Alameda County

Oakland Int. = felt

Very distinctly felt. *Sacramento Daily Union*, 3 June 1868, p. 3.

### Lassen County

Susanville Int. = V-VI

“It created quite a commotion among furniture and rocked buildings about...” *The Sage Brush* (Susanville), 6 June 1868, p. 3.

### Mono County

Bridgeport Int. = felt

Felt. *Esmeralda Union* (Aurora), 6 June 1868, p. 2.

### Nevada County

Grass Valley Int. = IV

Felt by many people. *The Daily National* (Grass Valley), 30 May 1868, p. 3.

Nevada City Int. = IV

Violent. *Nevada Daily Gazette*, 1 June 1868, p. 1.

Felt by many. *Nevada Daily Transcript*, 31 May 1868, p. 3.

### Placer County

Auburn Int. = III

Felt by a number of people. *The Placer Herald* (Auburn), 6 June 1868, p. 1.

Iowa Hill Int. = severe

Violent. *Stars and Stripes* (Auburn), 4 June 1868, p. 3.

### Sacramento County

Sacramento Int. = IV

Gas burners swung; windows rattled. *The Daily Bee* (Sacramento), 30 May 1868, p. 3.

### San Francisco County

San Francisco Int. = II

Not Felt. *Daily Evening Bulletin* (San Francisco), 30 May 1868, p. 2.

Slightly felt. *Territorial Enterprise* (Virginia City), 30 May 1868, p. 3.

## San Joaquin County

Stockton      Int. = heavy

Heavy. *Stockton Daily Independent*, 1 June 1868, p. 2.

## Yuba County

Marysville      Int. = V

Opened a few doors. *Marysville Daily Appeal*, 31 May 1868, p. 3.

# 1869, December 27 Virginia Range Earthquakes

## EARTHQUAKE SUMMARY

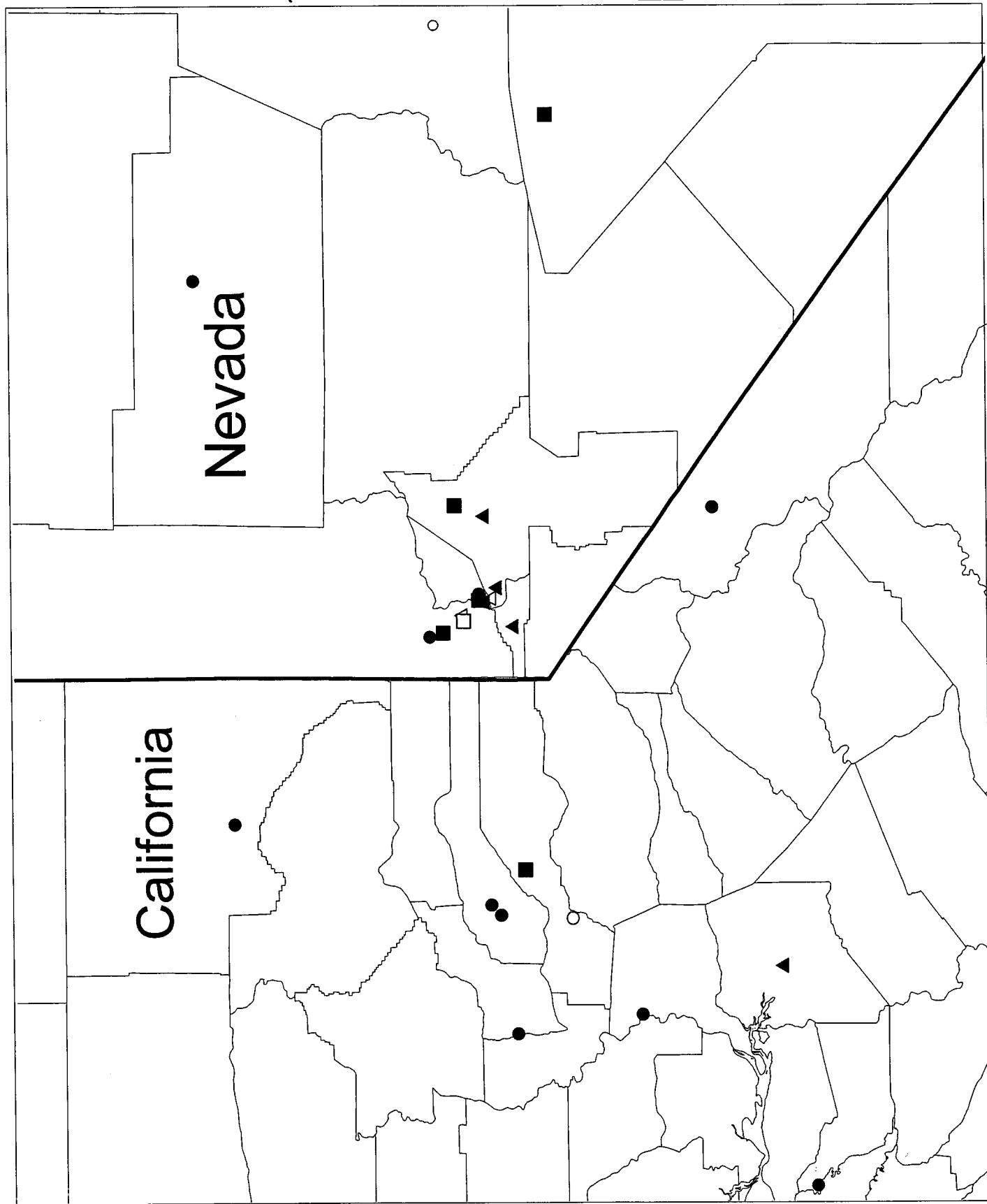
The December, 1869 sequence included two large earthquakes about eight hours apart, and numerous aftershocks over a one month period. The larger earthquakes caused considerable damage in the Virginia City, Steamboat Springs, and Washoe Valley areas, and were strongly felt from Sacramento to Unionville. Damage occurred during both of the two main earthquakes, but in many cases is difficult to attribute to a particular event.

The first large earthquake of the sequence occurred about 6:00 P.M. (PST) on Sunday, Dec. 26, 1869, and was reported to have lasted from 6 to 20 seconds (in one account nearly 40 seconds). Most accounts indicate only a general time of “about” 6 P.M. for the earthquake, while a few indicate specific times ranging from 5:53 P.M. to 5:55 P.M. In Virginia City, the shock was preceded by a sort of rumbling sound of very short duration before the main quake came in full force (TE 1/5/70). At the foot of Geiger Grade, the earth shook to such an extent that persons were thrown to the ground while running from Wright’s house, and the ground in the valley seemed to roll in waves like the waters of a lake (TE 1/5/70). One man who was driving horses between Carson City and Lake Bigler [Tahoe] thought they had come upon a slippery bit of road, and another said that the shock knocked one of his mules right down on the road (DA 12/29/69). Large rocks rolled onto the railroad tracks in the Truckee River Canyon east of Reno, one of which a train struck, suffering minor damage (DA 12/28/69), and in Sixmile Canyon below Virginia City, a ten-ton boulder rolled down off the mountain into the road (TE 1/5/70). People in both Virginia City and Gold Hill sought the streets in a great hurry, and the end of all things was thought to be close by (GHN 12/27/69). The streets were everywhere crowded with men, women and children – all in momentary expectation of a second shock, and afraid to venture back into their houses and places of business (TE 1/5/70). Many persons in Virginia City walked the streets all night, afraid to go to bed (GHN 12/27/69).

Some accounts indicate the first earthquake occurred as a series, rather than a single event. The *Enterprise* described it as a succession of jolts, and a series of shocks that might be divided into three distinct throbs (TE 1/5/70). In Sacramento, two very severe shocks of earthquake were felt about seven minutes to six o’clock—one followed the other at an interval of about ten seconds (DA 12/28/69). Other accounts mention shocks minutes apart. Six minutes after the first shock, another occurred, but much lighter, and two minutes later a third shock was felt, a little heavier than the second (IE 12/28/69).

From Virginia City came an intriguing report of possible “earthquake lights,” a poorly

# Virginia City Earthquake - May 30, 1868



understood, but commonly reported phenomenon. The *Enterprise* described it as such:

“We are informed by parties who saw the strange sight, that about the time of the first heavy earthquake shock there appeared just above the western horizon three bright lights, presenting the appearance of large stars, each furnished with a tail about a foot in length, with all the tails pointing southward. In two or three minutes the stars, tails and all, merged into one body, with a veil of haze overspreading it. The glowing globe of fire thus shrouded is said to have presented a very beautiful appearance. It moved off in a northwesterly direction and in a few minutes passed away. This strange sight was observed by quite a number of persons in the city.”

The second large earthquake occurred during early morning hours on Monday, Dec. 27, 1869. There is some uncertainty as to the timing of this second event, with reports ranging from 2:00 A.M. to 3:20 A.M. The *Enterprise*, which offers the most lengthy and detailed accounts of the sequence, indicates the second earthquake occurred at 3:20 A.M. (TE 1/5/70). However, several other accounts indicate that it occurred about 2:00 A.M. (DA 12/28/69; RC 1/1/70; HR 1/1/70; NDG 12/28/69). The *News* mentions an earthquake at 3:10 A.M. (GHN 12/27/69), which is likely the same event as that reported in the *Enterprise*, but is unspecific as to the event's severity. These two papers also mention “a very heavy shock, or series of shocks [that] was a long, heavy fellow” at 1:45 A.M. (TE 1/5/70), and three shocks at 1:40 A.M. (GHN 12/27/69). The *News* refers to the “second heavy one” as occurring at that earlier time. The accounts of a 2:00 A.M. occurrence come from areas in all directions from the apparent epicenter (e.g., Reno, Genoa, Winnemucca, and the Sierra Nevada), so it is unlikely that this confusion arises from two different events occurring in different localities. Although the *Enterprise* specifically indicates this event occurred at 3:20 A.M., we believe the multiple accounts of “about 2:00 A.M.” are too coincidental, and place a higher weight on the earlier time.

Several accounts specifically describe the second earthquake as being larger than the first. In Virginia City, most persons agreed the second was the heaviest shock of all...it was perhaps no heavier at any time than the first, but lasted much longer and its vibrations were much more eccentric (TE 1/5/70). In Genoa, the second was reported as being of equal or greater force (DA 12/28/69). In mining towns throughout the Sierra Nevada, this was also the case: at Camptonville (Yuba County), the second shock was of longer duration, and much heavier than the first (IE 12/31/69); at Marysville (Yuba County), the second was reported by those who felt both to have been the heaviest of the two (MDA 12/28/69); and at both Washington (Nevada County) and West Point (Calaveras County), it was heavier than the first (NDG 12/28/69 and WCC 1/1/70, respectively).

The 1868 earthquake was still fresh in many minds, causing some to compare the two. The shock at Reno was not heavier than that experienced in 1868, though of longer continuance (RC 1/1/70). Alfred Doten, who felt both earthquakes, referred to the 1869 quake in his journals as, “the heaviest yet here.” From these descriptions and accounts of damage, it is clear that the 1869 quakes were substantially larger than those in 1868.

## Virginia City

In Virginia City, the earthquake caused the plastering of buildings to drop from walls, and pried type in the Territorial Enterprise office (HR 1/1/70). The *Enterprise* (1/5/70) issued the following account of damage caused by the event:

“[The first earthquake] took a bite of about forty feet in length out of the fire-wall of the B street front of the old Taylor building, corner of Taylor and B streets, occupied as a hardware store by Smith & Wagner. A gentleman who saw it fall says that the whole building appeared to be pushed some two feet to the westward, then was suddenly drawn back, when the fire-wall stayed behind and fell to the pavement in an unbroken mass. Luckily no one was passing at the moment. Bricks were thrown from the rear wall of Piper’s building, corner of B and Union streets, and quite a break was made in the fire-wall of the old Farrington building, North B street. Some of the bricks struck upon an awning and bounded thence through a window into the interior of the house. At Dr. C. C. Green’s office, South C street, a heavy bookcase was thrown into the middle of the floor, and all along down the street bottles and jars dropped by dozens from the shelves of stores and saloons.”

The heavy brick front to the vault or safe in the Wells Fargo & Co.’s Express office, in Virginia City, was badly cracked and shattered (GHN 12/27/69). Regarding the Taylor building, the *News* gave a more conservative estimate that the firewall was thrown down to the extent of 12 or 15 feet (GHN 12/27/69).

## Gold Hill

Gold Hill was also severely hit by the earthquakes. It is difficult to say at which place it actually was the heaviest, although at Virginia there was the greatest alarm and damage (GHN 12/27/69). Several brick buildings were cracked or damaged, including the front and rear walls of the Gold Hill Exchange building, the rear wall of the *News* office and others (GHN 12/27/69). The *News* also stated, “In most of the grocery, drug or liquor stores, more or less shelf goods were thrown down and smashed, and in two or three instances from \$10 to \$20 damage being done,” but was not specific as to whether this referred to Virginia City, Gold Hill, or both.

## Steamboat Springs/Washoe Valley

Several accounts indicate that shaking was strongest in the vicinity of Steamboat Springs, Geiger Grade, and Washoe City. According to the *Enterprise* (TE 1/5/70), “In the vicinity of Steamboat Springs the earthquake seems to have been more severe than in any other place in the country. The house at the Springs is a perfect wreck, though it was not thrown down. At Wright’s, at the foot of the Geiger Grade, everything was demolished in the bar, and the earth shook to such an extent that persons were thrown to the ground while running from the house. The ground in the valley seemed to roll in waves like the waters of a lake.” In a letter to the *Enterprise*, a reader claimed, “It is a fact worthy of notice, that the late internal commotions have been more sensibly



felt in the vicinity of [Steamboat Springs] than elsewhere...I have recorded 31 separate and distinct shocks, seven of which have been quite severe.” (TE 1/5/70)

Aftershock reports indicate that both the Steamboat Springs and Virginia City areas were in the vicinity of the epicenter. “Counting little and big, tremors and all, some persons made the number for the night of the 26<sup>th</sup> of December and the morning of the 27<sup>th</sup>, 26 shocks, and this was the number counted at the foot of the Geiger Grade for the same period, where the shocks were more distinct than here.” (TE 1/5/1870)

At Washoe City the shocks were “very severe, disturbing the equanimity of brick and stone buildings, breaking bottles, cracking plastering, sealing doors, etc. I. S. Bostwick’s store, a stone building, is said to have been cracked from coping to foundation. The front wall of McFarland’s block sprung off from the side walls so that a man could insert his hand in the opening. Hammer’s drug store was so shaken that sundry and diverse bottles of patent medicines came to grief. The Court House suffered damage in the plastering.” (RC 1/1/70)

### **Empire**

At Empire City the shocks were very severe. An oil lamp was thrown down in the City Hotel, setting the building on fire (TE 1/5/70). Although there was plenty of water across the street, in the Yellow Jacket flume, the consternation among the people seems to have been so great that the flames got the upper hand of all subsequent exertions to subdue them, and the whole house and furniture were burnt up (DA 12/28/69).

### **Dayton**

The shocks were also very severe at Dayton, shaking bottles and crockery from shelves and creating a general panic (TE 1/5/70). A lamp in the drug store was shaken down, setting fire to the premises; in this case, the fire was overcome after destroying about \$200 worth of property (RC 1/1/70).

### **Carson City**

In Carson City the shocks were very severe, and brittle ware had to suffer (TE 1/5/70). Brick walls were damaged to some extent, and other buildings were slightly injured (DA 12/28/69). Several were affected as if sea-sick (DA 12/29/69).

### **Reno**

The shock at Reno was not heavier than that experienced in 1868, though of longer duration; no damage was done that we have heard, except for the scare and stoppage of pendulum clocks; the shock was far heavier at and about Glen Dale [Sparks] than at Reno, which is explained by the greater depth of the soil and its lighter and more porous nature (RC 1/1/70).

### **Truckee River canyon east of Reno**

Several large boulders tumbled down from the hills east of Reno and lodged upon the Central Pacific Railroad tracks; the Pacific Express train was unable to stop in time and bumped into one of the boulders, suffering minor damage and being delayed for fifty minutes (TE 1/5/1870; DA 12/28/1869).

### **Unionville**

At Unionville, the shock was quite severe, swaying lamps to and fro and displacing crockery to the utter dismay and consternation of the denizens of that usually tranquil locality (HR 1/1/70).

### **Effects on springs**

They say that Steamboat Springs and the hot springs down in Douglas County “boiled like a pot” (DA 12/29/69). In one account, at the time of the first shock 15 or 20 jets of water were thrown up at Steamboat Springs to a height of 20 feet (TE 1/5/70), and in another the springs were reported to be spouting forth most furiously to the height of 10 or 15 feet (GHN 12/27/69).

### **Effects on mines**

The men working in the mines, especially at Virginia City, felt the first shock very sensibly, and general hurrying to the surface was the result; however, none of the mines were injured (GHN 12/27/69), and the men resumed working.

The earthquakes also had large effects on water in the mines. Each of the heavy earthquakes caused the water to increase and rapidly raise in both the old and new works of the Ophir mine (GHN 12/31/69). They also caused water to start booming out of the Cole tunnel, the main supply of Virginia City; the increase in flow from the tunnel was at first reported as being 20 to 30 inches, but “good authority” indicated it was not more than six or eight inches; the increase stirred up clay in the tunnel and ditches to such an extent that “the water supplied by the Water Company might have passed for a weak article of milk for some days.” The shocks started a stream of water running from the old Irvine tunnel, about 1½ miles north of Virginia City – a perfect God-send for Hall’s Pioneer Laundry and the Philadelphia Brewery, located a short distance below, water having previously been a scarce article in the ravine; the shocks also caused quite a heavy flow of water into the Virginia Consolidated, where it was not so heartily welcomed. (TE 1/5/70)

## **EARTHQUAKE SEQUENCE (PST)**

Dec. 26, 1869	6:00PM	<b>1<sup>st</sup> main event</b> ; 10-20 seconds; general alarm; Much lighter shock six minutes later. A little heavier one two minutes after that.
Dec. 26, 1869	6:00-10:00PM	numerous tremors
Dec. 26, 1869	9:50PM	<b>principal aftershock</b> ; heavy
Dec. 26, 1869		numerous tremors
Dec. 27, 1869	1:45AM	very heavy shock, or series of shocks
Dec. 27, 1869		numerous tremors
Dec. 27, 1869	3:10AM	<b>2<sup>nd</sup> main event</b>
Dec. 27, 1869	6:00AM	light shock
Dec. 27, 1869	10:00AM	light shock
Dec. 27, 1869	6:05PM	lively shock
Dec. 27, 1869	9:30PM	solid jar like firing of heavy gun
Dec. 27, 1869	11:40PM	noted by Doten
Dec. 28, 1869	AM	few light shocks
Dec. 29, 1869	11:00PM	slight shock, plainly felt
Dec. 29, 1869	11:45PM	<b>principal aftershock</b> ; ~10 sec.; awakened/alarmed many
Dec. 30, 1869	2:00-3:00AM	noticeable shock
Dec. 30, 1869		“barely perceptible” tremors; “few trifling shakes”
Dec. 31, 1869	12:00-3:00AM	two or three slight tremors
Dec. 31, 1869	7:15PM	distinct shock
Dec. 31, 1869	11:10PM	lively jolt
Jan. 3, 1870	12:00-5:00AM	2 or 3 distinct shocks; one rattled windows and crockery, and awoke some
Jan. 5, 1870	12:00-5:00AM	2 or 3 light shocks
Jan. 29, 1870	1:00PM	heavy shock; rattled doors and windows (Doten)
Jan. 30, 1870	4:40AM	sharp jolt; Doten wakened from sound sleep

## EARTHQUAKE CATALOG ACCOUNTS

### Holden (1898)

poss. foreshocks:

#### 1869. December 19; p.m.

Several shocks at Mariposa, Cal. And in the mines of Virginia City, Nevada. Also a.m.  
December 20. - Fuchs.

mainshock:

**1869. December 26: 5½ p.m.**

Three shocks at Marysville; others in Stockton, etc. In Sacramento, two shocks in the daytime; at 9 p.m., another shock here and at Grass Valley, etc. Twenty-six shocks at Mariposa during the night - Fuchs Nevada City and Grass Valley. - B. Ms.

Mokelumne Hill, Calaveras County, Cal. A house near Railroad Flat (VIII?)[RF] was lifted bodily several times. - B. Ms. Lowe Hill; Stockton 5:52 p.m.; Truckee; Grass Valley; Nevada; Chico; Mariposa. - Perrey. Nevada City. - B. Ms.

**1869. December 27**

This day is a maximum for the California earthquakes of this month; 2 a.m., very heavy shocks in Marysville (VIII)[RF]; 2:10 a.m., houses thrown down in Sacramento, etc. (IX)[RF]. - Fuchs.

**Topozada and others (1981)****27 December 1869 (1:55 GMT) M6.1**

Masonry walls were seriously damaged in Virginia City and Washoe City, Nevada (VII MM). Minor damage was done in Calaveras County. Plaster fell at Mokelumne Hill (VI MM); a stone chimney fell at Spring Gulch (unlocated). A house in Calaveras County is described as being lifted bodily from its foundation several times. The later account may be an exaggerated description of the sensation inside the house. There is also a report of damage to buildings in Oroville, Butte County, but the local papers do not confirm this. Our location for this earthquake does not support Slemmons' (1977) and Sanders and Slemmons' (1979) location on the Olinghouse faults, about 30 km northeast of Reno. The Olinghouse location is based on the verbal report from a prospector to Dr. Vincent Gianella that faulting had been observed following the December 1869 earthquake. After joint discussions with Dr. Slemmons, Dr. Gianella, and Mr. Sanders, we jointly concluded that the report of rupture on the Olinghouse fault in December 1869 was questionable. An epicenter near Steamboat Springs is consistent with the distribution of damage, the numerous aftershocks reported at Virginia City, and the occurrence eight hours later of a second large earthquake near Carson City.

**27 December 1869 (10:00 GMT) M5.8**

This is the second of the pair of earthquakes which struck the Virginia City area. Very little damage was attributed to this earthquake in the newspaper accounts. The intensity distribution of these two earthquakes resembles that of the 30 May 1868 earthquake.

**NEWSPAPER ACCOUNTS****Gold Hill Daily News**

**Dec. 27, 1869**

### **Heavy Earthquake Last Night - The Heaviest Yet - A decidedly Shaky Night**

Last night a series of earthquake shocks of greater or less force and duration visited this section, commencing at 6 o'clock in the evening and continuing at intervals until a little past 3 o'clock this morning. There were ten perceptible shocks in all and some people think they distinguished even more. They came in series of three at a time within a few seconds or minutes of each other, and according to the best of our knowledge and belief occurred successively about as follows: At 6 o'clock, three shocks; at 10 minutes of 10, three shocks; at 20 minutes of 2 three shocks, and at 10 minutes past 3, one shock. The vibrations of the first appeared to be in a northerly and southerly direction, but the latter ones seemed to be more east and west.

#### *The First Shock*

Occurred at just about 6 o'clock, town time, and was the most severe yet experienced since the land of Washoe has belonged to Uncle Sam. It was very strongly felt throughout Gold Hill and Virginia, and it is difficult to say at which place it actually was the heaviest, although at Virginia there was the most alarm and damage. In both towns the population sought the streets in great hurry, and the end of all things was thought to be close by. Some became suddenly and unusually devout, others hilarious, some faint, and very many were much frightened, especially the denizens of brick hotels and dwellings. The least frightened were good mechanics within wooden buildings, or persons walking the streets.

#### *General Alarm*

The duration of the first shock was from 10 to 20 seconds, and none of the others match, if any exceeded that length of time. Each shock invariably ceased just when people had just got properly into a state of fright thereat. The alarm was general, and the streets were alive with safety-seekers - men, women, and children. Even the horses in the stables were almost shaken from their feet by the first shock, and were much frightened. The six horses attached to the Gold Hill 'bus, standing in front of Vesey's Exchange, started to run, but were directly checked. The miners in the mines, especially at Virginia, felt the first shock very sensibly, and a general hurry to the surface was the result. At the Virginia House on south C street, three or four of the lady boarders fainted, and the scene is described as heart-rending and serio-comic in the extreme. Many persons in that city walked the streets all night, afraid to go to bed. The prisoners in the county jail were much frightened, but had to stand it. Door bells were rung and many clocks stopped running.

#### *Damages*

Several buildings were more or less cracked and damaged, as for instance, the front and rear walls of the Gold Hill Exchange building, the rear wall of the News office and others. The cornice or fire wall of the big brick building corner of Taylor Street, Virginia, fronting on B

Street, to the extent of 12 or 15 feet was thrown down upon the sidewalk, fortunately, however, injuring no one. The heavy brick front to the vault or safe in Wells Fargo & Co.'s Express office, in that city, was badly cracked and shattered. In most of the grocery, drug or liquor stores more or less shelf goods were thrown down and smashed. In two or three instances from \$10 to \$20 damage thus being done. Pretty much all the damage sustained was from the first shock. The second heavy one at 20 minutes of 2 o'clock, was of less force, yet it was powerful enough to throw a bar of bullion weighing 20 pounds out of a pigeon hole down upon the floor in Wells Fargo & Co.'s Virginia office, throwing it directly west; the piles of coin in the boxes were also shaken and thrown east and west, showing the vibrations of that shock to have been in that direction. In many houses the globes and chimneys of kerosene lamps were thrown off and smashed, but fortunately no lamps were broken, otherwise a conflagration might have ensued. None of the mines were at all injured.

### *Outside Effects*

The earthquake was sensibly felt at Sacramento, Carson, Reno and elsewhere, as may be seen by our telegrams in another column. Considerable damage was done to shelf goods in the drug store at Dayton, and a chandelier thrown down came near creating a big fire, but it was quenched in time. The stage drivers from Reno this morning report Steamboat Creek as flowing full to the banks and difficult to ford, and the stage between Carson and Reno was detained over an hour on account of it, but whether this is attributable to the earthquake, or sudden rains, or melting snow, we are not exactly prepared to say. The Steamboat Springs are reported to be spouting forth most furiously to the height of 10 to 15 feet. For further earthquake particulars, see other items in this paper.

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### *Dreams Verified*

... On Saturday night she dreamed about a most terrible earthquake, and at the dinner table yesterday afternoon, where a number of guests were assembled, she related her strange dreams, causing considerable speculation regarding them. Last night, sure enough, her dream was very plainly demonstrated - which would indicate that there is something in dreams not altogether superstitions. ...

\*\*\*\*\*

### *Increase of Water*

As an evident effect of the earthquake last night, the water in the Cole tunnel at Virginia this morning is found to have increased about 30 inches, quite a valuable addition to the water supply of Virginia and Gold Hill.

[Need to revisit paper to get dispatches]

**Gold Hill Daily News**  
**December 29, 1869**

**The Earthquake, December 26**

The region affected by it is not less than 250 miles long by 60 to 80 wide, and includes almost as much territory as east of the Sierra Nevada, though the shocks were most severe on the eastern side of the mountains. The Sacramento *Union* says that it is not unreasonable to assume that we have an earthquake system of our own, quite distinct in its operations and causes from that which occasionally shakes up San Francisco and the towns around the bay and coast line as far to the south as Santa Cruz.

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*Earthquakes All Around*

[this is basically a San Francisco article declaring they are not the only ones with earthquakes] ... And how strange it is that the wisest of the scientific men of this enlightened age know no more of this visitant than did Job or Solomon. The earthquake holds all men in equality.

**Gold Hill Daily News**  
**December 30, 1869**

**Piute Earthquake Ideas**

Captain Charley, the well known Piute Sachem, paid us an official visit yesterday, as is his usual custom when he comes to town. He was rigged out in full regimentals of bobtailed coat and red stripes, plug hat trimmed with brass buttons, and numerous chunks of brass and clamshells dangling in his long tresses. Commanding his staff to await him on the porch, he entered our sanctum and gave us important official information of the late earthquake and its general effect upon the Piute Nation. He was just in from camp near Washoe Lake, and the following were his answers to our eager and interested questionings:

“Did you feel that earthquake pretty strong - the shakum up of the ground, you know?”

“Oh! Yes; heap catchum shake; ground git pooty sick; heap scarum squaw.”

“What do the Injuns talkee about it?”

“Piutee no says nottin.”

“But what does Piutee think about this big shake up that scare all the white folks - the pale faces, you know?”

“Piutee no tink nottin.”

“Didn’t any of ‘em get down - like this - and pray?”

“No sabe”

“What Piutee ‘spose make the ground shakum?”

“Piutee don’t spose nottin; he don’t know. Some white mans tell ‘em, heap fire way down in the ground, and devil he gone stir ‘em up. Me tink its pretty good. Devil heap likum

fire. Don't 'fraid of it."

"Didn't you ever hear about these earth shakums before?"

"Yes, 'bout two years ago."

"Yes, yes, that's so, but before that time didn't you never sabe earthquake shakum?"

"Oh, heap long time way back comes big shakum; ground gittum heap sick - he-e-eap shakum."

"How long ago was that?"

"Me no sabe - me little boy, all same so high."

"How old are you, Charley?"

"Don't know."

"You must be about 30 years old."

"Yes guess so. Me little boy. Heap hear old mans tell 'bout it"

"Well, what old mans say?"

"Oh, heap tellum 'bout big ground shakum. Allee Pitues go catchum pine nut, jackass rabbit. Bime by come from Walker ribber, Carson, Truckee. All Injuns come Sink Carson pishin - heap catchum pish. Ground heap gittum big sick; knock down Injuns, wooh! All 'long ribber brakum banks, fall down. Ground heap break off. You sabe Stillwater station, on ribber? Well, banks heap fall down all 'long ribber; ground heap brakum, so ribber run 'nudder way, all same now. 'Spose, it's all right; pish don't likum pooty good, I tink. Well, good bye, now; me go Virginia. Bime by, me come again. Goodbye."

### **Territorial Enterprise**

**Jan. 1, 1870**

MORE SHOCKS.—Night before last we had nothing that could be called an earthquake shock, though there were two or three barely perceptible tremors. Last evening, however, there was quite a distinct shock at about 15 minutes past 7 o'clock, and another at 10 minutes past 11 o'clock. They will keep on fooling till somebody gets hurt.

### **Territorial Enterprise**

**Jan. 4, 1870**

MORE SHOCKS.—The earth still continues very shaky hereabouts. Night before last there were two, and some say three, very distinct shocks, one of which caused windows and crockery to rattle at a lively rate, and awoke persons who were asleep at the time of the "shocking" visitation. Some who were up all night watching by sick beds, and in a situation to make minute observations, say that the earth was in a constant tremor from midnight until 5 o'clock in the morning. Although we felt neither of the shocks, we have the evidence of so many who did feel and note them, that we are satisfied that at least two pretty lively shocks occurred between the hours named. Whether the quakes will weaken and gradually die out, or whether they will end in one grand old shake up remains to be seen.

### **Territorial Enterprise**



Jan. 5, 1870

## A SEASON OF EARTHQUAKES

### ----- CONSTANT SUCCESSION OF SHOCKS FOR TEN DAYS -----

The night of December 26, 1869, was a night of terror to the people of this city and all the neighboring towns and villages, owing to the heavy and alarmingly frequent earthquake shocks experienced throughout the country. Many persons walked the streets the greater part of the night, fearing to remain indoors, while those who stayed in their dwellings were unable to sleep and were dressed and ready for a rush for open ground in case of a heavy shock coming.

#### THE FIRST SHOCK!

Occurred about 6 o'clock Sunday evening, December 26, and was a very heavy one. Its coming was most sudden and unexpected. It lasted ten or fifteen seconds, and thoroughly aroused and alarmed the whole city, in fact the whole country hereabouts. It was such a rousing jolt, or succession of jolts, and withal was so unlooked for that people were for a minute or two completely stunned and bewildered. Everybody rushed pell-mell into the streets, and it was devil (and the earthquake) take the hindmost. The shock was preceded by a sort of rumbling sound of very short duration, when down came the main "quake" in full force, which after shaking us up for a few seconds it went rumbling away. It appeared to come from the southwest and pass away toward the northeast. This shock took a bite of about forty feet in length out of the fire-wall of the B street front of the old Taylor building, corner of Taylor and B streets, occupied as a hardware store by Smith & Wagner. A gentleman who saw the fire-wall fall says that the whole building appeared to be pushed some two feet to the westward, then was suddenly drawn back, when the fire-wall stayed behind and fell to the pavement in an unbroken mass. Luckily no one was passing at the moment. Bricks were thrown from the rear wall of Piper's building, corner of B and Union streets, and quite a break was made in the fire-wall of the old Farrington building, North B street. Some of the bricks struck upon an awning and bounded thence through a window into the interior of the house. At Dr. C. C. Green's office, South C street, a heavy bookcase was thrown into the middle of the floor, and all along down the street bottles and jars dropped by dozens from the shelves of stores and saloons. The streets were everywhere crowded with men, women and children – all in momentary expectation of a second shock, and afraid to venture back into their houses and places of business. Some even cast glances toward the summit of old Mount Davidson, half expecting to see the peak break off and roll down upon the city. Gradually, however, the majority got over their fright and went in doors to talk over the big shock, or rather series of shocks, as it might be divided into three distinct throbs.

#### ANOTHER STAMPEDE.

At about 10 minutes to 10 o'clock, just when some had succeeded in chasing the pallor from their cheeks and were saying that they rather liked earthquakes, rumble, rumble, rattle, bang! came another shock, and there was another grand stampede for the streets. This shock was neither so heavy nor did it last so long as the first, yet no one knew what it would turn out to be, and no one cared to wait to see. Again the streets were filled with people, pale and trembling, their eyes cast upward toward the tops of the houses and their ears open to catch the slightest

rumble. This shock seemed to come more directly from the west than the first. Between these main shocks there were numerous tremors, scarcely amounting to distinct shocks ; in fact, from 6 o'clock Sunday evening until 3 o'clock Monday morning the earth was at rest scarcely ten minutes at a time – so say close observers and person delicately constituted.

#### MORE BIG JOLTS.

At about 15 minutes to 2 o'clock Monday morning there occurred a very heavy shock, or series of shocks, causing most of those who had retired to arise, dress and seek the open air – this was particularly the case with persons lodging in brick buildings. This shock or earthquake wave appeared to come from about the same quarter as the others, and was a long, heavy fellow.

#### A REGULAR SNORTER.

About 20 minutes past 3 o'clock Monday morning, December 27, came what most persons agree was the heaviest shock of all. It was perhaps no heavier at any time than the first one was for a second or two, but it lasted much longer and its vibrations were much more eccentric. It shook up and down, sidewise and every other way, and caused a great falling of plaster, smashing of bottles and other brittle ware, but did no serious damage. After this there were a few thrills and throbs and all calmed down for a time, though it is said that there were two slight shocks yesterday forenoon – one about 6 and the other about 10 o'clock.

#### A FEW INCIDENTS.

A great many ladies were so badly frightened that they fainted ; children cried and hung to the garments of their parents ; dogs howled, and the horses and mules in the stables broke their halters, and crowding together, raised a terrible hubbub. In one hotel up town, three ladies fainted at one time; one made a dash to jump out of the window, while another in slippers and night clothes, made a break out into the street with her husband in full chase. In the big hotel down town the ladies got into the parlor and held a grand pow wow, which was about half prayer meeting and half "lunatic asylum." The prisoners in the county jail were terribly frightened, as they well might be, for the jail is on the first floor of the Court house – a very tall building. Among the prisoners confined is a colored woman – half Indian and half negro – known as "Bell Creole." This woman was almost frantic at times, and in herself a whole camp meeting. She prayed some powerful prayers, but occasionally got off the track and outswore "our army in Flanders." At the Washoe Exchange Billiard Saloon a man was seen to rush out the back way into a passage leading up to B street, where he dropped upon his knees and was just getting warmed to his work when another shock came and he concluded that a nimble pair of heels would be of more service to him just then than all the prayers at his command, so he took up one foot after the other and immediately became an absent man. In the station house the prisoners were much alarmed and begged to be let out of their cells in order that they might have a chance to run in case Mount Davidson should begin rolling down. A Chinaman, who was in for 15 days unless he could raise \$30, was so terribly frightened at the first shock that he became about the whitest Celestial ever seen, and he began to talk about going down to Chinatown to get the coin to pay his fine. Finally his scare wore off and he concluded to stick it out where he was. Some of the boys got behind a partition against which he was leaning, and by springing the floor up and down so startled the poor devil that he cried out lustily for an officer to go with him and get the money. "Me no likee stay, me wantee be Chinatown." An officer went with him and he at once pungled. This is perhaps the first instance on record of a fine being shook out of a Chinaman's

pocket by an earthquake.

In the gambling houses the faro banks were at once deserted, and there was a grand stampede of dealers, case-keepers, lookout men, check guerillas, buckers and bummers, leaving behind stacks of twenty dollar gold pieces, half-dollars and checks of all denominations. Strange to say, we have not heard that any game lost a single dime during the confusion. Even the biggest thieves and most hardened sinners were just then thinking more of their lives than of filthy lucre.

#### NEIGHBORING TOWNS.

At Dayton the shocks were very severe, shaking bottles and crockery from the shelves and creating a general panic. A drug store was set on fire by the falling of a coal oil lamp, and the stock damaged to the amount of \$200. At Empire City the shocks were very severe. A coal oil lamp was thrown down in the City Hotel, when the building was set on fire and totally consumed. We did not learn the value of the property destroyed. In Carson City the shocks were also very severe, and brittle ware had to suffer. On Six-mile Canyon, a short distance above the Empire State mill, a boulder weighing some ten tons rolled down off the mountain into the road, where it now lies.

A large boulder also rolled down the side of Mount Davidson, coming down upon the Divide and passing quite near to a gentleman on horseback. Several boulders of large size were tumbled down from the hills east of Reno and lodged upon the track of the Central Pacific Railroad. The cars ran close upon one of the first that was met with, and had they not been checked in time there probably would have been a serious railroad accident to chronicle ; as it was the train received a pretty heavy bump.

#### STEAMBOAT SPRINGS ON THE RAMPAGE.

In the vicinity of Steamboat Springs the earthquake seems to have been more severe than in any other place in the country. At the time of the first shock jets of water, 15 or 20 in number and of great volume, were thrown up to the height of 20 feet, and during the night 26 shocks were felt—four very heavy ones. The house at the Springs is a perfect wreck, though it was not thrown down. At Wright's, at the foot of the Geiger Grade, everything was demolished in the bar, and the earth shook to such an extent that persons were thrown to the ground while running from the house. The ground in the valley seemed to roll in waves like the waters of a lake. The people were all frightened half out of their wits, and one man mounted his horse and came over to this city, to find things but little better than at home.

#### STILL MORE SHOCKS.

At five minutes past 6 o'clock P.M., December 27, the ball opened again with quite a lively little shock. From that time till 9½ o'clock there were only a few little quivers, then came one good solid jar like that caused by the firing of a heavy gun. As we were writing in the fourth story of a brick building, with a considerable quantity of plaster lying about, the debris of former shocks, we did not feel quite as happy as the "Big Sunflower." We may here say – as we omitted it in the proper place – that the ENTERPRISE building has as yet stood the battle bravely – only a little plaster thrown down and a few type pied. No cracks have been made in the walls, and the chances are that we are good for all the shocks that will come. There were also several shocks felt early in the morning of the 27<sup>th</sup>, commencing shortly after midnight. Between the hours of 1 and 2 o'clock A. M. a slight shock was felt, and a few minutes before 3 o'clock quite a heavy and

prolonged one. It is also asserted that there was a light “shake” about 10 o’clock in the morning. The one at 3 o’clock awoke many persons from their sleep, and caused some alarm among the nervous ones.

#### STILL ANOTHER BIG SHAKE.

On the night of December 30, shortly before 12 o’clock, we were visited by another pretty lively earthquake shock. It lasted about ten seconds, and caused a great rattling of windows, crockery and glassware. Many persons rushed out into the streets, and some who had retired for the night arose, dressed and remained up waiting for another big shock. But no big shock came, though there were two or three slight tremors of the earth noticed between the midnight shock and 3 o’clock A. M. About three quarters of an hour before the 12 o’clock shock there was a slight shock which was plainly felt by persons in bed or seated in quiet rooms. Some left their rooms in brick houses after the heavy shock and took lodgings in frame buildings. In Gold Hill the shocks were about the same horse power as here. In Dayton and other valley towns the shakes were doubtless even stiffer than here.

#### A FEW MORE SHAKES.

On the evening of December 31, at 15 minutes past 7 o’clock, there was a very distinct shock, and at 10 minutes past 11 o’clock quite a lively jolt. When this last shock occurred a long-legged fellow rushed from a restaurant into the middle of the street with a big chunk of pie in his hand, and remarked as he gazed upward at the big pile of bricks and mortar before him, that “They’ll keep on with this foolin’ till somebody gets hurt.”

#### THE EARTH STILL UNSETTLED.

On Monday morning, January 3, two or three very distinct earthquake shocks were felt between midnight and 5 o’clock. Some who were in quiet rooms and had an opportunity for making accurate observations, assert that the earth was scarcely at rest a moment between the hours named. The night of the 3d and morning of the 4<sup>th</sup> we heard of nothing but a few slight tremors, probably imaginary at that.

#### EFFECT ON THE MINES.

The mines have not been in the slightest degree injured by the earthquake. The men working below felt all the shocks, but were but little alarmed and continued working. On the surface at each shock all the boilers at all the works would blow off steam, though not enough steam by twenty pounds was in the boilers to raise the safety valves. This circumstance at first caused some consternation among the engineers and others, as they supposed an accident had happened to the boilers. At the Savage the engineer stopped the big pumping engine, and this in turn frightened the men in the mine, and for some time there was considerable confusion.

#### THE FOUNTAINS BROKEN UP.

The late series of severe earthquake shocks experienced in this vicinity has had the effect to start the water booming out of the Cole tunnel, from which comes the main supply of the city, and also caused a rapid rise of the aqueous fluid in the Ophir shaft in spite of pumps and bailing tanks. Yesterday, however, they were getting a little the best of it, and will probably soon get it down to where it stood when the earthquake occurred. The increase in the flow from the Cole tunnel was at first reported as being 20 to 30 inches, but we learn from good authority that it was not more than six or eight inches. The increase, the earthquake jolts, or something else, stirred up the clay in the tunnel and ditches to such an extent that the water supplied by the Water

Company might have passed for a weak article of milk for some days. The shocks also started a fine stream of water to running from the old Irvine tunnel, about a mile and a half north of the city. This timely supply of water was a perfect God-send for Hall's Pioneer Laundry and the Philadelphia Brewery, located a short distance below, and was welcomed as such, water having previously been a scarce article in the ravine. The shocks also caused quite a heavy flow of water into the Virginia Consolidated, where it was not so heartily welcomed.

#### THE NUMBER OF SHOCKS.

We believe no one has kept an accurate account of the number of shocks that have occurred since the setting in of our earthquake season. Counting little and big, tremors and all, some persons made the number for the night of the 26<sup>th</sup> of December and the morning of the 27<sup>th</sup>, 26 shocks, and this was the number counted at the foot of the Geiger Grade for the same period, where the shocks were more distinct than here. Of late nobody has bothered about counting the quakes – we simply say “there's another of 'em,” and go on with whatever we are about.

#### A SINGULAR PHENOMENON.

We are informed by parties who saw the strange sight, that about the time of the first heavy earthquake shock there appeared just above the western horizon three bright lights, presenting the appearance of large stars, each furnished with a tail about a foot in length, with all the tails pointing southward. In two or three minutes the stars, tails and all, merged into one body, with a veil of haze overspreading it. The glowing globe of fire thus shrouded is said to have presented a very beautiful appearance. It moved off in a northwesterly direction and in a few minutes passed away. This strange sight was observed by quite a number of persons in the city. Whether it had anything to do with the earthquake business of the evening and night we are not prepared to say.

#### EARTHQUAKE THEORIES.

Every man has his pet earthquake theory, and occasionally some lively discussions occur between persons holding opposite theories. Some believe the quakes to be caused by electricity in the earth shifting from pole to pole or from one section of the earth to another, while others say they are caused by the shifting of immense volumes of gas from one huge cavern in the bowels of the earth to other huge caverns and crevices separated only by slight partitions, while some others take a little gas and a little electricity and mix to suit. Then there are still others that maintain that the shocks are the result of the atmospheric pressure being suddenly withdrawn from certain portions of the earth's surface, thus allowing it to bulge up and bob round. The Chinese say that the shocks are caused by their big god wrestling with a huge bear ; when the god throws the bear upon his back it jars all creation. The Indian's idea is very different. At the time New Madrid, on the Mississippi River, was destroyed by an earthquake – lakes formed where before there was dry land and the country was torn to pieces generally – a party of whites who were looking about came upon an Indian and asked his opinion in regard to the matter : “Ugh!” grunted Mr. Injun, “Great Spirit too much whisky!”

#### WINTER THE NATURAL SEASON FOR EARTHQUAKES.

All accurate earthquake statistics go to prove that earthquakes are of much more frequent occurrence in all countries during the winter months than during summer, the prevailing opinion to the contrary notwithstanding. It has also been ascertained that during winter months

earthquakes are more apt to occur about the time of the winter solstice or in other words when the days begin to lengthen. Our earthquaky season has been in accordance with this rule.

#### CORRESPONDENCE FROM STEAMBOAT SPRINGS.

In conclusion we give the following letter from a gentleman at Steamboat Springs, or rather from the foot of the Geiger Grade, in the immediate vicinity of the Springs. It will be seen that he too has a theory :

#### TO THE EDITOR OF THE ENTERPRISE.

The extraordinary number and severity of earthquake shocks which have lately so startled everybody in this section, must necessarily cause much speculation as to the cause of these frightful visitations. With a view to make some observations on this point, I yesterday, (December 29,) spent an hour or two at Steamboat Springs,—immediately after a very sensible shock (at 10 A.M.)—watching the changes and variations in the quantity of hot water, steam and gases which constantly exude from this locality. It is a fact worthy of notice, that the late internal commotions have been more sensibly felt in the vicinity of these springs than elsewhere, in this State at least. Since 6 o'clock P.M. of the 26<sup>th</sup> instant until the present time, 1 o'clock P.M. 30<sup>th</sup>, I have recorded 31 separate and distinct shocks, seven of which have been quite severe. During the above mentioned time I have been absent at Virginia, for over 40 hours; besides, have spent some 20 hours in so sound a sleep that only the most positive shocks would arouse me to sufficient consciousness to make a note of them. I could add materially to the above that during my absence and unconsciousness, from the well authenticated report of residents here, but prefer to rely wholly upon my own personal knowledge of the facts.

In visiting the vicinity of the springs, I was somewhat disappointed in not finding more changes and greater disturbances after what had been reported by those who were in close proximity to them during the remarkable night of the 26<sup>th</sup>. Nevertheless, I found some undoubted changes in several localities. In two or three places the volume of water has visibly increased ; while in others, particularly at the highest points, the quantity of steam emitted was much greater; and instead of its usual clear, white appearance, presents a much darker hue, reminding one somewhat of the smoke from burning bituminous matter. In one place the heretofore continuous roaring, rumbling sound has changed to a sort of intermittent, spasmodic commotion — one moment almost frightening the most resolute from the spot by its intensity, and the next dying out entirely. But the most marked change of all is the almost unbearable sulphurous odor emitted from every fissure of the ground. This feature has been noted by every one, whether visiting the locality, or passing the immediate vicinity.

From the above observations I am more than ever convinced that the theory which ascribes the cause of upheavals and vibrations of the earth's crust to electrical disturbances, is decidedly erroneous—"Caxton" to the contrary notwithstanding—and that the old established theory which shoulders the responsibility of these startling commotions on the effort of pent up gases of interior earth ever generating from a constant combustion and bound by the laws of nature to escape into air or space, to be the correct one.

If the converts to the former, or newly established theory, cannot see sufficient cause for whatever of electrical phenomena attends earthquakes, they would do well to consider that a power that topples to earth the strongest works of art, rocks to their foundations the grandest hills and mountains, upheaves from unknown depths the solid granite beds, shakes the whole land and

moves the sea in one grand tidal wave, can but disturb the electrical currents of the earth.  
SHOCK.

Foot of Geiger Grade, Dec. 30, 1869.

### **Territorial Enterprise**

**Jan. 5, 1870**

#### **A FULL HISTORY OR OUR EARTHQUAKES.**

On the first page of to-days's ENTERPRISE will be found a full and complete account of our late earthquaky times up to date. Nearly the whole history of the "quakes" has been re-written and arranged in the order in which the shocks occurred, with correct dates, etc., while much new matter has been added – it contains all that has appeared in the Daily since the first shock was felt. It will be found to be the best and most comprehensive account of our late earthquakes yet written, then the shocks are all arranged day after day in the order in which they occurred. For those who wish to send an account of the "visitation" to their friends in the East it is just the thing: For sale in wrappers, stamped all ready for mailing, at the ENTERPRISE business office ; also at Burrall's Pioneer Book Store, and at Fred Boegle's Postoffice Book Store. Price, twenty-five cents.

### **Territorial Enterprise**

**Jan. 6, 1870**

CALM WEATHER.—It is a somewhat remarkable fact that since our earthquake season set in, eleven days ago, we have not had even the mildest symptom of a Washoe zephyr. It has been almost a dead calm all these shaky days and night. Should a regular roaring old zephyr waltz down from the slopes of old Mount Davidson, we should say, "good bye quakes, shakes and shocks." In other respects the weather is such as we should feel justified in recommending to any community, being clear and bright, and during the greater part of the day as warm as spring. It is just the kind of weather for all kinds of work out of doors, and teaming, building, etc. goes on the same as in the summer season.

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THE "QUAKES" STILL CONTINUE. – Two or three light earthquake shocks were felt in this city yesterday morning between midnight and five o'clock. We are beginning to care but little for these mild shakes, and hunger for something more exciting in the earthquake line. Should Cedar Hill begin throwing out burning "lather" and Mount Davidson sink and leave a nice lake just back of town, it would be something to the purpose.

### **The Daily Appeal**

**Dec. 25, 1869**

#### **BRIEF ITEMS.**

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A severe earthquake shock was felt in Downieville on Monday night.

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SAN FRANCISCO, December 24. – A slight earthquake shock was felt here at 3 o'clock this morning.

**The Daily Appeal**  
**Dec. 28, 1869**

### **THE EARTH QUAKES.**

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There were several shocks of earthquake, night before last. The first occurred about six o'clock in the evening, and was the shakiest ever experienced by white people in this State. Its vibrations varied but little from south to north. This shock brought with it much trembling, and occasioned not a little alarm. A goodly portion of the quiet inhabitants of this town suddenly became very nervous, and were active in getting into the streets, and alert in ascertaining the effect of the commotion upon other people. Brick walls were damaged to some extent, and other buildings were slightly injured. But it has not come to our knowledge that any serious accident therefrom occurred to life or limb. Another and lighter shock was felt about 10 o'clock; and yet another, and nearly as severe as the first, transpired about 2 o'clock yesterday morning. The ones above mentioned were the principal shakes, but lighter quakes are reported at frequent intervals during the night. The effect elsewhere is thus reported in the Gold Hill Hews, and by telegraph :

#### **IN GOLD HILL.**

Last night a series of earthquake shocks of greater or less force and duration visited this section, commencing at 6 o'clock in the evening and continuing at intervals until a little past 3 o'clock this morning. There were 10 perceptible shocks in all, and some people think they distinguished even more. They came in series of three at a time within a few seconds or minutes of each other, according to the best of our knowledge and belief occurred successively about as follows: At 6 o'clock, three shocks; at 10 minutes of 10, three shocks; at 20 minutes of 2, three shocks, and at 10 minutes past 3, one shock. The vibrations of the first appeared to be in the northerly and southerly direction, but the latter ones seemed to be more east and west.

#### **IN SACRAMENTO.**

Two very severe shocks of earthquake were felt in the city last night about seven minutes to six o'clock, causing a great deal of excitement—one shock followed the other at an interval of about ten seconds. The vibration in each case was as near as could be ascertained from north to south.

#### **IN SILVER MOUNTAIN.**

At five o'clock and twenty five minutes, last evening, a shock of earthquake was felt here, lasting about seven seconds. Another was felt at about three o'clock this morning.



#### IN GENOA.

A shock of an earthquake was felt here last night at 6:25, lasting about 6 seconds. The sensation experienced was of a rotary motion, from the south toward the north, vibrating bird cages to and fro in that direction. There was also another of equal or greater force, and was felt about 2 o'clock this morning.

#### ON THE RAILROAD NEAR RENO.

The Pacific Express train bound west left here at thirty-five minutes past 10 p.m.—fifty minutes late. It was detained on the road between here and Wadsworth on account of the earthquake. Large rocks rolled on the track, caused by the earthquake this evening. The engine was slightly damaged.

#### AT EMPIRE.

The shock of the earthquake at Empire City, at 6 o'clock last evening, upset an oil lamp, the fluid igniting on the floor and setting fire to the house. Although there was plenty of water across the street, in the Yellow Jacket flume, the consternation among the people seems to have been so great that the flames got the upper hand of all subsequent exertions to subdue them, and the whole house and furniture were burnt up.

**The Daily Appeal**  
**Dec. 29, 1869**

#### THE EARTHQUAKE.

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The subject indicated in the heading is so prolific; so full of suggestions; so replete with incidents; so well calculated to shake up whatever of sense there may be in a man, that it is possible that we are excusable for referring to it again—for, indeed, so interesting a subject cannot be too well sifted; cannot be too strongly shaken; cannot be too thoroughly digested. One of our contemporaries says that the characteristic motion was “rotary”—like a “Wheeler pan;” another says it was from the north to the south; still another commentator remarks that it was plainly and undoubtedly east and west! Now we have had some motions and emotions; and we think we know what we are talking about; and when we say what we are about to say, we say it as one should speak who has a due respect for Faraday and Maury and Morse and Espy and Agassiz and the balance of the theorists who have never been further inside of the world than those of us who have discussed the Cardiff Giant and been puzzled by the exhalations of Steamboat Springs—near which locality the vulgar, Missourian mind has located the fathomless depths of an endless perdition!

There are various theories with regard to earthquakes. The ancients had a notion that the earth got this abnormal and startling shock by reason of its coming suddenly in contact with some loose and drifting sphere which was (so far as space is concerned) indifferently regulated. Then the idea prevailed that the heat becoming intense on the inside of the crust of the earth, the world cracked from sudden beats and violent contractions of cold—like a hot rock which bursts when you pour water on it. Then again there is the theory that the great sea of molten matter which constitutes the “yolk” of the world gets shaken up sometimes by the falling off, into its abysses, of chunks of the undercrust of *terra firma*, like a boy throwing pebbles into a puddle; or, better,

like throwing a boulder into a well.

Be these theories as they may, we had a fearful night of it. Those who say they did not feel their littleness; they who boast that they felt no alarm; they who say they liked it and wanted some more, are untruthful; they are not gifted in expression of candor. It was a terrible night; and it seemed not impossible that the wide world would break in two!

It is singular what effects were produced. Several of our friends were affected as if sea-sick. One man who was driving a span of horses between here and Lake Bigler says he thought they had suddenly come upon a slippery bit of road—icy; and another says that the six o'clock shock knocked one of his mules right down on the road. They say that Steamboat Springs and those hot water springs down in Douglas County “boiled like a pot.” It was a memorable and fearful night. (The rumor that it shook an idea into certain official heads, and that it jerked the truth out of Andrew Johnson are doubtless some of the idle fabrications of the times.)

**The Daily Appeal**  
**Dec. 31, 1869**

ANOTHER EARTHQUAKE occurred about 12 o'clock night before last. The shock was sufficiently severe to awaken many, and to send the occupants of brick buildings into the streets.

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THE EARTHQUAKE, DECEMBER 26—The region affected by it is not less than 250 miles long by 60 to 80 wide, and includes almost as much territory west as east of the Sierra Nevada, though the shock was most severe on the eastern side of the mountains.

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MORE EARTHQUAKES.—There was quite a lively shock of earthquake last night about quarter of twelve o'clock, which was felt throughout Gold Hill and Virginia. It caused windows to shake, door bells to ring, crockery to rattle, some clocks to stop, and created quite a commotion generally, not a few people rushing from their beds to the street in alarm, especially at Virginia, where there is more wickedness than in Gold Hill. One or two light shocks succeeded it within a few minutes, and there was a noticeable shock between 2 and 3 o'clock this morning — G.H. News 30<sup>th</sup>.

**Gold Hill Daily News**  
**Dec. 21, 1869**

**FROM SACRAMENTO.**

SACRAMENTO, December 21.

A heavy shock of earthquake was felt at 8 o'clock last evening at Grass Valley, Alta, and other places. Also very perceptible here.

**Gold Hill Daily News**  
**Dec. 31, 1869**

### LOCAL MINING ITEMS.

#### OPHIR.

Water in new shaft about 200 feet deep, and being slowly reduced by reason of the late earthquakes having shaken open fresh sources of water. The heavy shocks of last Sunday night and also the one of night before last, on each occasion caused the water to increase and rapidly raise in both the old and new works, despite the most active and efficient pumping and bailing efforts to the contrary. They have it all right again now, and will get it pretty well reduced in the course of another week, unless more big earthquake shocks interfere.

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THAT OTHER EARTHQUAKE. – The first notable earthquake occurring in this section since its occupation as a silver mining country was that of May 29<sup>th</sup>, 1868. That of Sunday last was the second one.

NO MORE SHOCKS– We have no special earthquake shocks to report during the last 24 hours–only a few trifling shakes.

**Gold Hill Daily News**  
**Jan. 4, 1870**

MORE EARTHQUAKE SHOCKS.–Since New Year's several light shocks of earthquake have been experienced in this section, showing that they were something more than mere holiday arrangements. They hold out well.

**Reno Crescent**  
**Jan. 1, 1870**

### THE QUAKE

On Sunday evening last Reno in common with other localities suffered a slight shaking up. The first shock came upon us unexpectedly, at or about six o'clock in the evening, lasting as near as we could judge about ten seconds. Most people say the motion was from south to north ; our opinion is that the motion was from a little north of east to the west by south. The shock at Reno was not heavier than that experienced about two years since, though of longer continuance. In this place no damage of any kind was done that we have heard from, save(?) the scare, and the

stoppage of the pendulum clocks. We learn that the shock was far heavier at and about Glen Dale than at Reno, which circumstance is explained by the greater depth of the soil and its lighter and more porous nature. According to our experience, there were but two shocks, one at six o'clock Sunday evening, the second at or about two o'clock Monday morning. There are, however, plenty of witnesses to establish any number from two to twenty, according to the condition of the nervous system of the witness.

#### WASHOE.

At Washoe City nine distinct shocks are reported, some of them very severe, disturbing the equanimity of brick and stone buildings, breaking bottles, cracking plastering, sealing doors, etc. I. S. Bostwick's store, a stone building, is said to have been cracked from coping to foundation. The front wall of McFarland's block sprung off from the side walls so that a man could insert his hand in the opening. Hammer's drug store was so shaken that sundry and divers(?) bottles of patent medicines came to grief. The Court House suffered damage in the plastering and the resident of *Fish-als*(?), some of them, became so alarmed—on account of failing health—that they immediately selected better ventilated lodging rooms, in which the atmosphere was not contaminated by the lungs of growing plants.

#### CARSON.

The citizens of Carson were greatly alarmed, but suffered no serious damage. The most notable effect was on the columns of the *Appeal*, which were graced the next morning with a lengthy article on the evils of moderate drinking. No application of the said article could be made to the editor as he is not chargeable with the sin of moderation under any circumstances.

#### EMPIRE CITY,

Less fortunate than her sister towns, not only suffered a scare, but the shock threw down a coal oil lamp in the city hotel, from which the premises took fire and were entirely destroyed.

#### DAYTON,

Also suffered from fire, a lamp in the drug store being shaken down, set fire to the premises. The fire was overcome, destroying only about \$200 worth of property.

#### GOLD HILL,

Is satisfied(?) with her share of the shake, and her citizens, with the exception of Lynch, stood the test manfully. The facts are, that Lynch never thought of earthquakes, but imagined that the commotion in the earth was occasioned by some devilish device of Sutro's, by which the core of that tunnel was to be torn out instantaneously without the aid of Congress, and before he could secure a share of the stock or comp. with Sutro. Frightened nearly to death, Lynch rushed furiously to the nearest saloon and called for a champagne cocktail, affording the last exemplification of the ruling passion strong in death.

#### VIRGINIA.

Between the quakes and Dan's imagination, Virginia got nine shakes, bigger and better shakes coming thicker and faster than anybody. We believe that Virginia, probably by reason of the greater height of her buildings, suffered more damage from the direct effects of the earthquake than all the balance of the State. Several firewalls were thrown down, much glass broken, but fortunately no person injured. The last shock of any importance felt in Virginia, occurred at twenty minutes past three o'clock Monday morning not heavier than the others, but of longer duration, throwing down considerable plastering and breaking many bottles. Now that,

as the Chinaman says, the big snake has turned over and fallen asleep, the whole affair is rather ludicrous than otherwise ; still we all have some tremors, not knowing what may yet be in store for us.

#### STILL ANOTHER

On Wednesday night about twelve o'clock, Reno experienced a shake not equal in intensity or duration to previous ones ; just heavy enough to remind us that as we were not yet out of the woods, it was not worth our while to get up any particular demonstration. We are waiting for further developments.

**The Inland Empire**  
**Dec. 28, 1869**

#### FROM VIRGINIA CITY

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#### Violent Shock of Earthquake

VIRGINIA, December 26. – A very severe shock of an earthquake was felt here at 5 o'clock this evening. It was a much heavier shock than the one we had here a year ago last June. The vibrations were north and south and lasted about ten seconds. Firewalls were thrown down; door bells rang, and almost all the pendulum clocks hanging on east and west walls were stopped. The shock was felt severely in the lower levels of all the mines. Dogs commenced howling, and horses snorted with fright.

Six minutes after the first shock, another occurred, but much lighter. Two minutes later a third shock was felt, a little heavier than the second.

At Dayton the shock was very severe. At the telegraph office a lamp was thrown down, setting the office on fire, which was extinguished with great difficulty, before doing much damage.

At Austin the shock was not felt.

**The Inland Empire**  
**Dec. 30, 1869**

#### THE EARTHQUAKE IN VIRGINIA AND VICINITY.

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Below we give, from the Gold Hill News of the 27<sup>th</sup>, full particulars of the earthquake which visited the western part of the State on last Sunday evening.

Last night a series of earthquake shocks, of greater or less force and duration, visited this section, commencing at 6 o'clock in the evening, and continuing at intervals until a little past 3 o'clock this morning. There were ten perceptible shocks in all, and some people think they distinguished even more. They came in series of three at a time within a few seconds or minutes of each other, and according to the best of our knowledge and belief occurred successively about as follows: At 6 o'clock, three shocks; at 10 minutes of 10, three shocks; at 20 minutes of 2, three shocks, and at 10 minutes past 3, one shock. The vibrations of the first appeared to be in a northerly and southerly direction, but the latter ones seemed to be more east and west.

### THE FIRST SHOCK

Occurred at just about 6 o'clock, town time, and was the most severe yet experienced since the land of Washoe has belonged to Uncle Sam. It was very strongly felt throughout Gold Hill and Virginia, and it is difficult to say at which place it actually was the heaviest, although at Virginia there was the greatest alarm and damage. In both towns the population sought the streets in a great hurry, and the end of all things was thought to be close by. Some became suddenly and unusually devout, others hilarious, some faint, and very many were much frightened, especially the denizens of brick hotels and dwellings. The least frightened were good mechanics in wooden buildings, or persons walking the streets.

### GENERAL ALARM.

The duration of the first shock was from ten to twenty seconds, and none of the others much, if any, exceeded that length of time. Each shock invariably ceased when people had just got properly shaken into a state of fright thereat. The alarm was general, and the streets were alive with safety seekers – men, women and children. Even the horses in the stable were almost shaken from their feet by the first shock, and were much frightened. The six horses attached to the Gold Hill bus, standing in front of Vesey's Exchange, started to run, but were directly checked. The men in the mines, especially at Virginia felt the first shock very sensibly, and general hurrying to the surface was the result. At the Virginia House, on South C street, three or four of the lady boarders fainted, and the scene is described as heartrending and seriocomic in the extreme. Many persons in that city walked the streets all night, afraid to go to bed. The prisoners in the County Jail were much frightened, but had to stand it. Door bells were rung and many clocks stopped running.

### DAMAGES.

Several brick buildings were more or less cracked or damaged, as for instance, the front and rear walls of the Gold Hill Exchange building, the rear wall of the *News* office and others. The cornice or firewall of the big brick building corner of Taylor street, Virginia, fronting on B street, to the extent of 12 or 15 feet was thrown down upon the sidewalk; fortunately, however, injuring no one. The heavy brick front to the vault or safe in Wells Fargo & Co.'s Express office, in that city, was badly cracked and shattered. In most of the grocery, drug or liquor stores, more or less shelf goods were thrown down and smashed, and in two or three instances from \$10 to \$20 damage being done. Pretty much all the damage sustained was from the first shock.. The second heavy one, at 20 minutes to 2 o'clock, was of less force, yet it was powerful enough to throw a bar of bullion weighing 20 pounds out of a pigeon-hole down upon the floor, in Wells Fargo & Co.'s Virginia office, throwing it directly west; the piles of coin in the boxes were also shaken and thrown east and west, showing the vibrations of that shock to have been in that direction. In many houses the globes and chimneys of kerosene lamps were thrown off and smashed, but fortunately no lamps were broken, otherwise a conflagration might have ensued. None of the mines were at all injured.

### OUTSIDE EFFECTS

The earthquake was sensibly felt at Sacramento, Carson, Reno and elsewhere, as may be seen by our telegrams in another column. Considerable damage was done to shelf goods in the drug-store at Dayton, and a chandelier thrown down came near creating a big fire, but it was

quenched in time. The stage drivers from Reno this morning report Steamboat Creek as flowing full to the banks and difficult to ford; and the stage between Carson and Reno was detained over an hour on account of it, but whether this is attributable to the earthquake, or sudden rains, or melting snow, we are not exactly prepared to say. The Steamboat Springs are reported to be spouting forth most furiously to the height of 10 or 15 feet. For further earthquake particulars see other items in this paper.

### **The Inland Empire**

**Dec. 31, 1869**

THE EARTHQUAKE AT CAMPTONVILLE. – A correspondent of the Marysville *Appeal* says:

A heavy shock of earthquake was felt in Camptonville on Sunday evening, December 26<sup>th</sup>, about 6 o'clock, lasting nearly 40 seconds. It was very heavy, causing quite an excitement. No damage was done except to lamps and crockery. A second shock was felt during the night, about half-past 2 o'clock, which was of longer duration, and much heavier than the first. The course was from north to south, accompanied by a heavy rumbling noise.

### **The Inland Empire**

**Dec. 31, 1869**

THE EARTHQUAKE AT DOWNIEVILLE, CAL. – The Downieville *Messenger* of December 25 says:

The hardest earthquake that was ever felt in this section passed here about 8 o'clock on Monday night, running north. It was quite a "trembler," and lasted several seconds.

### **Humboldt Register**

**Jan. 1, 1870**

**An Earthquake.** – About 6 o'clock on the evening of December 26<sup>th</sup>, a shock of an earthquake was experienced throughout the western portion of this State, extending as far East along the Humboldt as this point, and West as far as Stockton, California. It was from all accounts most severe in the vicinity of Wadsworth, Reno, Truckee and Virginia City, apparently following the line of the Central Pacific Railroad down the Truckee and up the Humboldt to Winnemucca, where it appears to have ended in a slight vibration, scarcely perceptible. At Unionville, fifty miles west from here, the shock was quite severe, swaying lamps to and fro and displacing crockery to the utter dismay and consternation of the denizens of that usually tranquil locality. In Virginia City the tremor caused the plastering of some buildings to drop from the walls, and pied type in the Enterprise office. Fortunately however, no loss of life, or serious damage to property resulted from the shake in any portion of the territory over which it extended. At 2 o'clock on the morning of the 27<sup>th</sup>, the shocks were repeated at several points along the Railroad from Wadsworth to Stockton. The disturbance of the earth which appears to have been confined to a belt of the Sierra Nevada range and the territory bordering on its eastern and western base, was

not felt at San Francisco or anywhere on the bay, which leads theorists to assume that there is a mountain earthquake system different in its operations and causes from that which gives San Francisco such a lively stirring up occasionally. We are not disposed up in these parts where “shakes” other than those made at Truckee, and used as a substitute for shingle are considered quite a novelty, to attempt to disprove the correctness of the theory. However, we are decidedly of the opinion that the San Francisco article is much more durable than those of Truckee manufacture.

## LOCAL JOURNAL ACCOUNTS

From **Journals of Alfred Doten**, Reporter for the Virginia Daily Union, Territorial Enterprise, and Gold Hill Evening News

Sunday, December 26, 1869 (Virginia City)

... At 6 PM violent shock of an earthquake - heaviest yet here - followed within a few minutes by 2 others - shook houses terribly - shook fire wall down off Taylor's brick building corner of B & Taylor St, etc, etc - (See News?) Mrs M much frightened, as well as everybody else - I went downtown to gather the (times?) - home again ... Everybody this evening was talking about the big earthquake sensation

Monday, December 27, 1869

... several shocks of earthquake felt this PM and evening - I felt one at 20 minutes of 12 at home while sitting at my table writing ...

Tuesday, December 28, 1869

... a few light shocks of earthquake reported this morning, but I did not experience any of them

Wednesday, December 29, 1869

... shocks of earthquake this morning, and at 20 minutes of 11 this evening - tolerable smart one at 15 minutes of 12 -

Thursday, December 30, 1869

<no mention of earthquakes>

Friday, December 31, 1869

... (No earthquake shocks worth speaking of today - or last night)

Saturday, January 29, 1870

... At 1 PM today we felt a heavy shock of earthquake - rattled doors and windows and startled everybody -



Sunday, January 30, 1870

... At 20 minutes of 5 this morning a sharp jolt of an earthquake - waked me out of a sound sleep

## RESEARCH NOTES

Accounts indicating 2<sup>nd</sup> event larger than 1<sup>st</sup> everywhere, not just at Carson

### VIRGINIA CITY

About 20 minutes past 3 o'clock Monday morning, December 27, came what most persons agree was the heaviest shock of all. It was perhaps no heavier at any time than the first one was for a second or two, but it lasted much longer and its vibrations were much more eccentric... *Territorial Enterprise 1/5/1870*

The last shock of any importance felt in Virginia, occurred at twenty minutes past three o'clock Monday morning not heavier than the others, but of longer duration, throwing down considerable plastering and breaking many bottles. *Reno Crescent 1/1/1870*

### CARSON CITY

...and yet another, and nearly as severe as the first, transpired about 2 o'clock yesterday morning... *Carson Daily Appeal 12/28/1869*

The citizens of Carson were greatly alarmed, but suffered no serious damage. *Reno Crescent 1/1/1870*

### GENOA

There was also another of equal or greater force...felt about 2 o'clock this morning. *Carson Daily Appeal 12/28/1869*

### CAMPTONVILLE (Yuba County)

A second shock was felt during the night, about half-past 2 o'clock, which was of longer duration, and much heavier than the first. *Inland Empire 12/31/1869*

Heavier than the one at 1:55GMT. *Marysville Daily Appeal, 12/28/1869, p. 3*

### MARYSVILLE (Yuba County)

"...there was a second shock, which is reported by those who felt both to have been the heaviest of the two." *Marysville Daily Appeal, 12/28/1869, p. 3*

## WASHINGTON (Nevada County)

Felt by a number [2:00AM]; heavier than the one at 1:55 GMT. *Nevada Daily Gazette* 12/28/1869

## WEST POINT (Calaveras County)

Distinctly felt; heavier than the one at 1:55 GMT. *Weekly Calaveras Chronicle* 1/1/1870

## SACRAMENTO

Knocked down some plastering; stopped a few clocks. *The Daily Bee* 12/27/1869, p. 3

Accounts indicating shaking was strongest in Steamboat/Geiger Grade/Washoe City area:

In the vicinity of Steamboat Springs the earthquake seems to have been more severe than in any other place in the country. At the time of the first shock jets of water...were thrown up to the height of 20 feet, and during the night...four very heavy [shocks were felt]. The house at the Springs is a perfect wreck, though it was not thrown down. At Wright's, at the foot of the Geiger Grade, everything was demolished in the bar, and the earth shook to such an extent that persons were thrown to the ground while running from the house. The ground in the valley seemed to roll in waves like the waters of a lake. *Territorial Enterprise* 1/5/1870

Counting little and big, tremors and all, some persons made the number for the night of the 26<sup>th</sup> of December and the morning of the 27<sup>th</sup>, 26 shocks, and this was the number counted at the foot of the Geiger Grade for the same period, where the shocks were more distinct than here. *Territorial Enterprise* 1/5/1870

It is a fact worthy of notice, that the late internal commotions have been more sensibly felt in the vicinity of [Steamboat Springs] than elsewhere...I have recorded 31 separate and distinct shocks, seven of which have been quite severe... *Letter to Territorial Enterprise* 12/30/1869

At Washoe City nine distinct shocks are reported, some of them very severe, disturbing the equanimity of brick and stone buildings, breaking bottles, cracking plastering, sealing doors, etc. I. S. Bostwick's store, a stone building, is said to have been cracked from coping to foundation. The front wall of McFarland's block sprung off from the side walls so that a man could insert his hand in the opening. *Reno Crescent* 1/1/1870

...about the time of the first heavy earthquake shock there appeared just above the western horizon three bright lights... *Territorial Enterprise* 1/5/1870 (Virginia City)

Accounts indicating Steamboat Springs/Washoe City/Virginia City were in near epicentral area:

The shock was preceded by a sort of rumbling sound of very short duration... *Territorial Enterprise 1/5/1870* (Virginia City)

...from 6 o'clock Sunday evening until 3 o'clock Monday morning the earth was at rest scarcely ten minutes at a time... *Territorial Enterprise 1/5/1870* (Virginia City)

A gentleman who saw the fire-wall (of the B street front of the Taylor building, corner of Taylor and B streets) fall says that the whole building appeared to be pushed some two feet to the westward, then was suddenly drawn back, when the fire-wall stayed behind and fell to the pavement in an unbroken mass. *Territorial Enterprise 1/5/1870* (Virginia City)

In this place no damage of any kind was done that we have heard from, save the scare, and the stoppage of the pendulum clocks. *Reno Crescent 1/1/1870* (Reno)

We learn that the shock was far heavier at and about Glen Dale than at Reno, which circumstance is explained by the greater depth of the soil and its lighter and more porous nature. *Reno Crescent 1/1/1870* (Reno)

[At] Winnemucca...it appears to have ended in a slight vibration, scarcely perceptible. At Unionville, fifty miles west from here, the shock was quite severe, swaying lamps to and fro and displacing crockery to [peoples] utter dismay and consternation... *Humboldt Register 1/1/1870*

At Austin the shock was not felt. *Inland Empire 12/28/1869*

### 1869 Earthquake Intensity Summaries (01:55 GMT)

(modified from Topozada and others, 1981)

Earthquake:   Date: 1869, December 27  
                   Time: 01:55 GMT; Dec. 26, 17:55 PST  
                   Location: 39.4 N, 119.7 W                   Virginia City Area, Western Nevada

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#### Nevada

##### Carson City

Carson City                   Int. = VII  
                   Very severe; brittle ware broken; brick walls damaged, and other buildings  
                   slightly injured. *Carson Daily Appeal*, 28 Dec. 1869, p. 3.

Empire                       Int. = VI-VII?  
                   Very severe; lamp knocked over. *Carson Daily Appeal*, 28 Dec. 1869, p. 3.  
                   “The shake of 1861 was the first to crack it [Senator William’s brick house].”  
                   [There was no major Nevada earthquake during 1861, so Topozada and others  
                   (1981) inferred this was a report for the 1860 earthquake; however, Senator  
                   William M. Stewart did not establish his residence in the Carson City area until  
                   1861 (Stewart, 1908), so this is more likely a report for the 1869 sequence.]  
                   *Virginia Evening Chronicle*, 7 June 1887, p. 3.

##### Douglas County

Genoa                       Int. = VI-VII  
                   Equal to 10:00 GMT earthquake. *Carson Daily Appeal*, 28 Dec. 1869, p. 3.

##### Elko County

Elko                       Int. = N  
                   Not felt. *The Elko Independent*, 29 Dec. 1869, p. 2.

##### Humboldt County

Winnemucca               Int. = II-III  
                   Scarcely perceptible. *The Humboldt Register* (Winnemucca), 1 Jan. 1870, p. 3.

##### Lander County

Austin                   Int. = N  
                   Not felt. *The Elko Independent*, 29 Dec. 1869, p. 2.

##### Lyon County

Dayton                   Int. = VI  
                   Shook crockery and bottles from shelves. *Territorial Enterprise* (Virginia City),  
                   28 Dec. 1869, p. 3.

“Considerable damage was done to shelf goods in the drug store...and a chandelier thrown down...” *Gold Hill News*, 27 Dec. 1869, p. 3.

#### Mineral County

Aurora Int. = V

Set movable things in motion; alarmed some people. *Sacramento Daily Union*, 3 Jan. 1870, p. 2.

#### Pershing County

Unionville Int. = IV-V

Lamps swayed; displaced crockery. *The Humboldt Register* (Winnemucca), 1 Jan. 1870, p. 3.

#### Storey County

Gold Hill Int. = VII

Several brick buildings more or less cracked, including the front and rear walls of the Gold Hill Exchange building, the rear wall of the *News* office and others. *Gold Hill News*, 27 Dec. 1869, p. 3.

Hall's House (1.5 mi north of Virginia City) Int. = VI+

Water flow increased. *Territorial Enterprise* (Virginia City), 30 Dec. 1869, p. 3.

Mariposa Mill Int. = felt

Felt. *The Daily Examiner* (San Francisco), 28 Dec. 1869, p. 2.

Sixmile Canyon (near the Empire State Mill) Int. = VI+

Large (10 ton) boulder rolled down off the mountain. *Territorial Enterprise* (Virginia City), 28 Dec. 1869, p. 3.

Virginia City Int. = VII-VIII

Everybody rushed into the streets; a great many ladies so badly frightened that they fainted. *Territorial Enterprise* (Virginia City), 5 Jan. 1870.

Part of a fire-wall fell; bricks knocked from a few walls. *Territorial Enterprise* (Virginia City), 28 Dec. 1869, p. 3.

Heavy bookcase thrown into the middle of the floor. *Territorial Enterprise* (Virginia City), 5 Jan. 1870.

#### Washoe County

Glen Dale [Sparks] Int. = VI?

Far heavier than at Reno. *Reno Crescent*, 1 Jan. 1870, p. 3.

Huffaker Station (between Reno and Virginia City) Int. = severe

Very violent. *Sacramento Daily Union*, 28 Dec. 1869, p. 1.

Reno Int. = V

Stopped clocks. *Reno Crescent*, 1 Jan. 1870, p. 3.

Steamboat Springs Int. = VII-VIII

Seems to have been more severe here than in any other place in the country.

*Territorial Enterprise* (Virginia City), 5 Jan. 1870.

Water thrown up 15 to 20 feet; house was a perfect wreck though not thrown down. *Territorial Enterprise* (Virginia City), 28 Dec. 1869, p. 3.

Springs increased the amount of steam being put out. Report of water being thrown up 15 or 20 feet was false. [This is actually a report of the springs two days after the quake.] *Gold Hill News*, 30 Dec. 1869, p. 3.

Truckee River Canyon (between Reno and Wadsworth) Int. = VI+

Large rocks rolled onto railroad tracks. *Carson Daily Appeal*, 28 Dec. 1869, p. 3.

Verdi Int. = severe

Severe. *Sacramento Daily Union*, 27 Dec. 1869, p. 2.

Washoe City Int. = VII

Broke bottles; cracked plaster; sealed doors; cracked a stone wall; a front wall was sprung from the side walls; damaged plaster. *Reno Crescent*, 1 Jan. 1870, p. 3.

Wright's (at the foot of Geiger Grade) Int. = VII-VIII

Everything in the bar demolished; people thrown to the ground. *Territorial Enterprise* (Virginia City), 28 Dec. 1869, p. 3.

Shocks were more distinct than at Virginia City. *Territorial Enterprise* (Virginia City), 5 Jan. 1870.

White Pine County

White Pine Int. = N

Not felt. *The Elko Independent*, 29 Dec. 1869, p. 2.

County Unknown

Hot Springs (208 mi. east of Sacramento) Int. = felt

Felt. *The Yolo Democrat* (Woodland), 1 Jan. 1870, p. 2.

## California

Alpine County

Silver Mountain Int. = severe

Severe. *The Alpine Chronicle* (Silver Mountain), 1 Jan. 1870, p. 3.

## Amador County

Foster's Ranch                      Int. = felt  
 Felt. *The Amador Dispatch* (Jackson), 1 Jan. 1870, p. 2.

Jackson                              Int. = felt  
 Felt very distinctly. *The Amador Dispatch* (Jackson), 1 Jan. 1870, p. 2.

## Butte County

Chico                                  Int. = IV-V  
 Many people were startled; doors shook and windows rattled; not felt by at least some people outside. *Northern Enterprise* (Chico), 1 Jan. 1870, p. 3.

Oroville                              Int. = IV-V  
 Rattled doors and windows; attracted universal attention. *The Weekly Butte Record* (Oroville), 1 Jan. 1870, p. 3.  
 "Several buildings on Montgomery Street are a complete wreck." (This report is from the section containing telegrams from other parts of the state, and is not corroborated by any other article.) *The Weekly Butte Record* (Oroville), 1 Jan. 1870, p. 3.

## Calaveras County

House of W.V. Clark, 1 mi. south of Railroad Flat                      Int. = VII?  
 "House...was lifted bodily from its foundation, several times..." (See discussion.)  
*Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan. 1870, p. 3.

Hall's Ranch near Mosquito Gulch (Glencoe)                      Int. = felt  
 Very perceptible. *Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan 1870, p. 3

Mokelumne Hill                      Int. = VI  
 Plaster shaken down; many not aware of the shock. *Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan 1870, p. 3.

Spring Gulch                              Int. = VII  
 Stone chimney thrown down. *Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan 1870, p. 3.

West Point                              Int. = felt  
 Distinctly felt. *Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan. 1870, p. 3.

## Colusa County

Colusa                                      Int. = felt  
 Not felt. *The Weekly Colusa Sun*, 1 Jan. 1870, p. 2.  
 Felt. *Nevada Daily Gazette*, 27 Dec. 1869, p. 3.

## Lassen County

Susanville                      Int. = felt  
Felt. *Lassen Sage Brush* (Susanville), 29 Dec. 1869, p. 2.

## Nevada County

Birchville                      Int. = felt  
Felt. *Nevada Daily Transcript*, 29 Dec. 1869, p. 3.

Forest Springs                Int. = IV-V?  
Quite severe; "It jarred the house and heaved it up and down, just as if it were lifted from beneath." *Nevada Daily Transcript*, 29 Dec. 1869, p. 3.

Grass Valley                  Int. = V-VI  
People ran out. *Grass Valley Daily Union*, 28 Dec. 1869, p. 3.

Liberty Hill                    Int. = IV  
Severe; shook the furniture and dishes. *Nevada Daily Gazette*, 31 Dec. 1869, p. 3.

Nevada City                    Int. = V  
Some people ran out. *Nevada Daily Gazette*, 27 Dec. 1869, p. 3.  
Pictures swung back and forth; windows rattled; a gas burner vibrated more than an inch. *Nevada Daily Transcript*, 28 Dec. 1869, p. 3.

[North] San Juan              Int. = VI?  
Stovepipe disjointed. *Nevada Daily Transcript*, 28 Dec. 1869, p. 3.

Truckee                        Int. = heavy  
Quite a heavy shock. *The Semi-Weekly Tribune* (Truckee), 1 Jan. 1870, p. 1.

Washington                  Int. = heavy  
Quite heavy. *Nevada Daily Gazette*, 28 Dec. 1869, p. 3.

## Placer County

Auburn                        Int. = II-III  
Very slight [no time given]. *The Placer Herald* (Auburn), 1 Jan. 1870, p. 3.

Colfax                         Int. = II-III  
Felt but slightly [no time given]. *Nevada Daily Gazette*, 28 Dec. 1869, p. 3.

Iowa Hill                      Int. = heavy  
Of the heaviest ever known. *Sacramento Daily Union*, 27 Dec. 1869, p. 2.

Yankee Jim's                 Int. = felt



Felt. *Sacramento Daily Union*, 28 Dec. 1869, p. 2.

Plumas County

Quincy Int. = severe

Severe. *Plumas National* (Quincy), 8 Jan. 1870, p. 2.

Round Valley Int. = severe

Severe. *Plumas National* (Quincy), 8 Jan. 1870, p. 2.

Sacramento County

Folsom Int. = N?

Not felt [no date given]. *Sacramento Daily Union*, 3 Jan. 1870, p. 2.

Sacramento Int. = V

Some people ran out. *The Daily Bee* (Sacramento), 27 Dec. 1869, p. 3.

People ran out; not felt by many on the streets; door bells rang. *Sacramento Daily Union*, 27 Dec. 1869, p. 3.

San Francisco County

San Francisco Int. = N

Not Felt. *The Weekly Colusa Sun*, 1 Jan. 1870, p. 3.

San Joaquin County

Stockton Int. = V

Stoves moved; glass rattled; pendant gas burners oscillated. *Daily San Joaquin Republican* (Stockton), 27 Dec. 1869, p. 3.

Many did not feel the quake. *Daily San Joaquin Republican* (Stockton), 27 Dec. 1869, p. 3.

Severe. *Daily Evening Herald* (Stockton), 27 Dec. 1869, p. 3.

Sierra County

Downieville Int. = II-III

Very light. *The Mountain Messenger* (Downieville), 1 Jan. 1870, p. 3.

Yolo County

Woodland Int. = N

Not felt. *The Yolo Democrat* (Woodland), 1 Jan. 1870, p. 2.

Yuba County

Camptonville Int. = V-VI

"No damage was done except to lamps and crockery." *Marysville Daily Appeal*, 28 Dec. 1869, p. 3.

Marysville                      Int. = V

Stopped some clocks; a number of people ran out. *Marysville Daily Appeal*, 28  
Dec. 1869, p. 3.

# 1869 Earthquake Intensity Summaries (10:00 PST)

(modified from Toppozada and others, 1981)

Earthquake:   Date: 1869, December 27  
                   Time: 10:00 GMT; 02:00 PST  
                   Location: 39.1 N, 119.8 W                   Virginia City Area, Western Nevada

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## Nevada

### Carson City

Carson City                   Int. = VI-VII  
     Nearly as severe as the one at 1:55 GMT. *Carson Daily Appeal*, 28 Dec 1869, p. 3

### Douglas County

Genoa                       Int. = VII  
     Stone underpinning of a house partly shaken down. *Sacramento Daily Union*, 28 Dec. 1869, p. 1.  
     Of equal or greater force than the one at 1:55 GMT. *Gold Hill News*, 27 Dec. 1869, p. 3.

### Storey County

Gold Hill                   Int. = VI  
     Many lamp chimneys thrown over. *Gold Hill News*, 27 Dec. 1869, p. 3.

Mariposa Mill              Int. = felt  
     Felt. *The Daily Examiner* (San Francisco), 28 Dec. 1869, p. 2.

Virginia City              Int. = VII  
     Very heavy; awoke those who had retired. *Territorial Enterprise* (Virginia City), 28 Dec. 1869, p. 3.  
     Threw a gold bar out of a pigeon hole. *Gold Hill News*, 27 Dec. 1869, p. 3.  
     Most persons agree was the heaviest shock of all; caused a great falling of plaster; smashed bottles and other brittle ware. *Territorial Enterprise* (Virginia City), 5 Jan. 1870.

### Washoe County

Huffaker Station (between Reno and Virginia City)              Int. = V-VI  
     Alarmed the inmates at the station; owner ran out. *Sacramento Daily Union*, 28 Dec. 1869, p. 1.

Reno                       Int. = felt  
     Felt. *Reno Crescent*, 1 Jan. 1870, p. 3.

## County Unknown

On the stage road to Reno, 5 mi. from Virginia City      Int. = VII  
Rock fall. *Sacramento Daily Union*, 28 Dec. 1869, p. 1.

## California

### Alpine County

Silver Mountain      Int. = felt  
Felt. *The Alpine Chronicle* (Silver Mountain), 1 Jan. 1870, p. 3.

### Calaveras County

Hall's Ranch near Mosquito Gulch (Glencoe)      Int. = V  
Awoke people at the ranch. *Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan. 1870, p. 3

West Point      Int. = felt  
Distinctly felt; heavier than the one at 1:55 GMT. *Weekly Calaveras Chronicle* (Mokelumne Hill), 1 Jan. 1870, p. 3.

### Nevada County

Grass Valley      Int. = V  
Awoke all light sleepers. *Grass Valley Daily Union*, 28 Dec. 1869, p. 3.

Liberty Hill      Int. = V-VI  
Upset the kettles on a stove at a ranch; aroused everybody. *Nevada Daily Gazette*, 31 Dec. 1869, p. 3.

Nevada City      Int. = V  
Awoke about half the people. *Nevada Daily Gazette*, 28 Dec. 1869, p. 3.

Truckee      Int. = heavy  
Heavy. *The Semi-Weekly Tribune* (Truckee), 1 Jan. 1870, p. 1.

Washington      Int. = VI+  
Felt by a number [2:00 AM]; heavier than the one at 1:55 GMT. *Nevada Daily Gazette*, 28 Dec. 1869, p. 3.

### Placer County

Auburn      Int. = light?  
Very slight [no time given]. *The Placer Herald* (Auburn), 1 Jan. 1870, p. 3.

## Sacramento County

Folsom Int. = N?

Not felt [no date given]. *Sacramento Daily Union*, 3 Jan. 1870, p. 2.

Sacramento Int. = VI

Knocked down some plastering; stopped a few clocks. *The Daily Bee* (Sacramento), 27 Dec. 1869, p. 3.

## San Francisco County

San Francisco Int. = felt

Not Felt. *Daily San Joaquin Republican* (Stockton), 28 Dec. 1869, p. 3.Felt. *Nevada Daily Transcript*, 28 Dec. 1869, p. 3.

## San Joaquin County

Stockton Int. = light

Hardly perceptible. *Daily San Joaquin Republican* (Stockton), 28 Dec. 1869, p. 3.

## Sierra County

Downieville Int. = light

Very light. *The Mountain Messenger* (Downieville), 1 Jan. 1870, p. 3.

## Yuba County

Camptonville Int. = VI?

Heavier than the one at 1:55 GMT. *Marysville Daily Appeal*, 28 Dec. 1869, p. 3.

Marysville Int. = V?

“...there was a second shock, which is reported by those who felt both to have been the heaviest of the two.” *Marysville Daily Appeal*, 28 Dec. 1869, p. 3.

# 1887, June 3 Carson Valley Earthquake

## EARTHQUAKE SUMMARY

This was a violent earthquake in western Nevada's history, with damaging effects spanning from Carson City to Genoa. Several buildings were likely torn down or parts rebuilt because of earthquake damage.

The earthquake began at about 2:40 to 2:47 A.M. on Friday, June 3, 1887 (PST). It was reported to have lasted from 3 to 10 seconds (in one account 30 seconds) and was preceded by a heavy rumbling sound (which is described as resembling a dead-axe freight wagon driven rapidly over frozen ground, CDI 6/7/87). There are no foreshocks reported, and only three slight shocks were reported immediately following at about 3 A.M. (Table \_ lists 12 reported aftershocks from 20 days following the event). Miners coming off work from Gold Hill could plainly see the buildings of Virginia City vibrating and felt the earth moving under their feet (VEC 6/3/87). Some that were outside looked at the moon and noted that the vibration was as plainly visible to the organ of sight as it was to the sense of feeling (VEC 6/7/87). James Raycraft was rushing for a doctor in Carson City when the shock threw him face forward to the ground (MA 6/3/87). Other people on the streets of Carson City were also thrown to the ground (TE 6/4/87). There was general hysteria in Carson City, Genoa, and Virginia City, and most people vacated their premises wearing only the garments they were sleeping in. "The inhabitants of every house in town were roused from their slumbers, and few sought their beds until morning sun gave evidence that another day was granted" (TNT 6/3/87). The streets were filled with people, some badly frightened, some considerably amused, and all chattering volubly over the occurrence, with each person relating their own personal experience (MA 6/3/87). In Genoa, every man, woman, and child apparently joined together in prayers on Main Street.

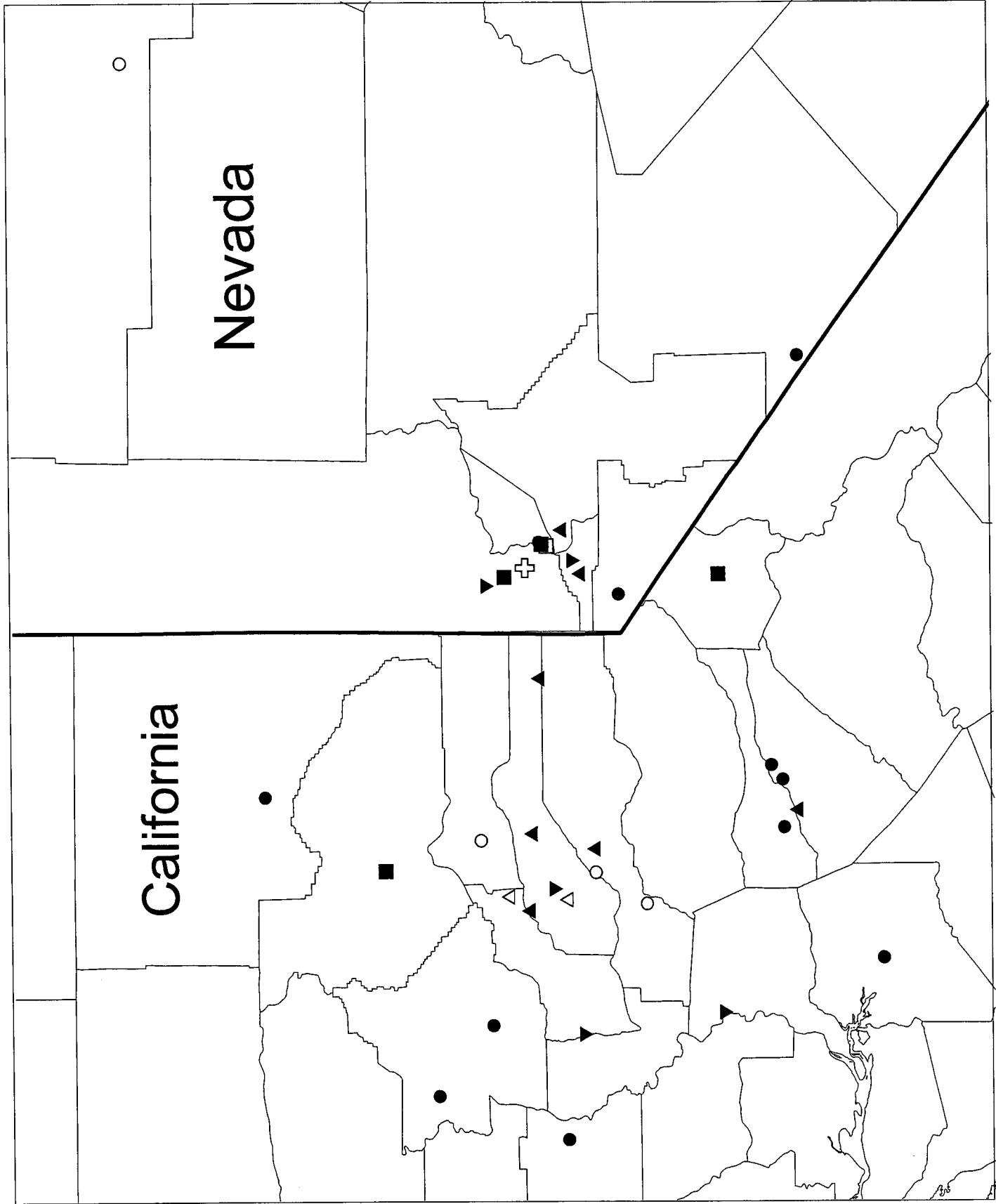
The 1887 earthquake caused damage to buildings in Carson City, Genoa, Carson Valley, and to a minor extent in Virginia City. Nonstructural damage extended westward into Lake Tahoe, and into the central Sierra Nevada.

### Carson City

In Carson City, all stone and brick buildings showed the effects of the earthquake (VEC 6/ /87), and very few houses escaped without some evidence of the quake (CDI 6/4/87). The most damaged appears to be the Rosser Building owned by Otto Schulz, and located opposite the Mint. The building is described as violently cracked, especially on the east-west walls, with a rear wall that will have to be taken down or could come down in another shock (TNT 6/3/87; MA 6/3/87; CDI 6/4/87). It is said of the Rosser Building, "the east-west walls exhibit signs of a very severe shaking, leaving crevices between the north and south walls of two inches in width." (CDI 6/4/87). The wall dividing Muller Schmitt & Co's store from Burlington's was cracked in

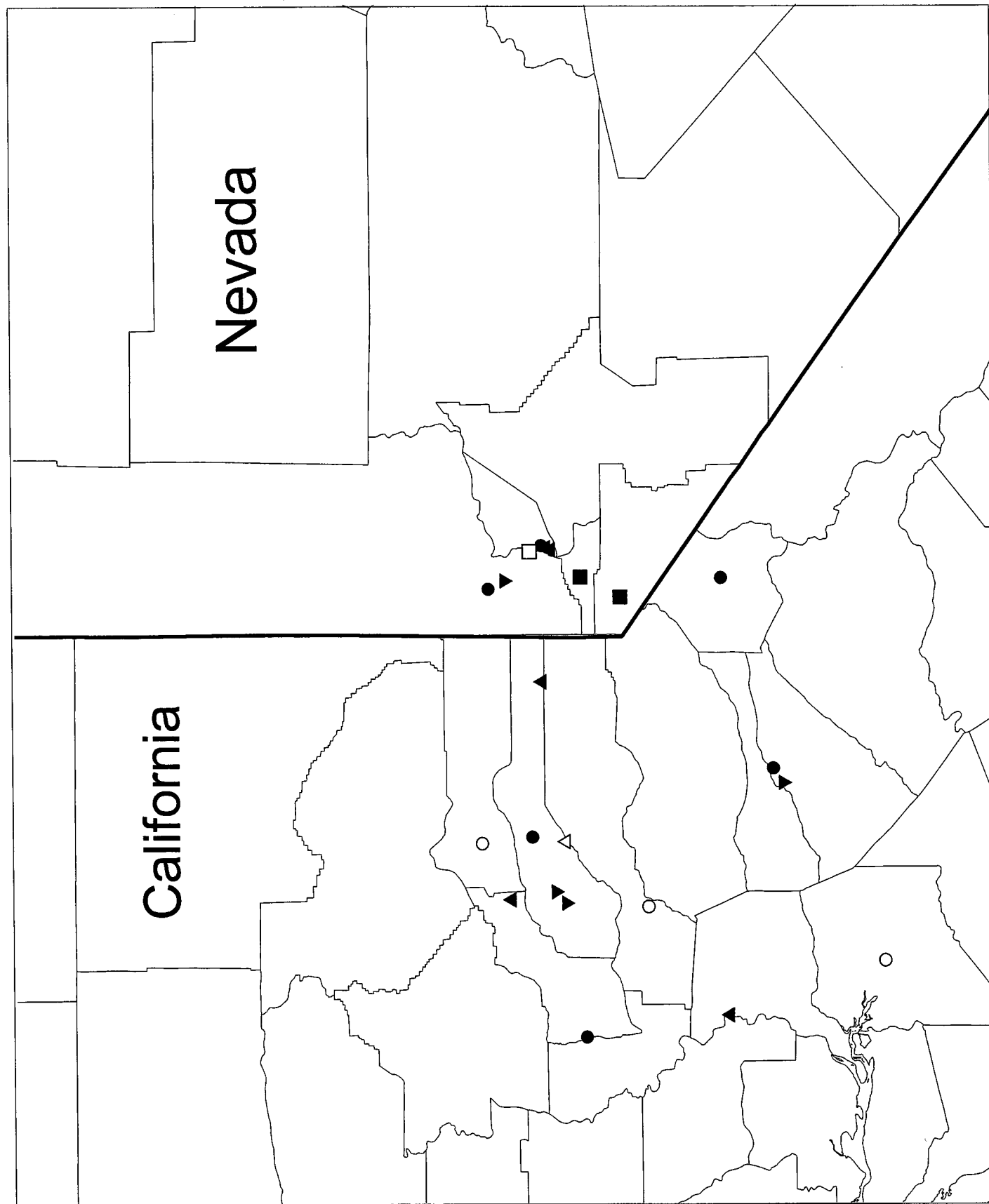
# Virginia City Earthquake - Event Number 1 - 1869

p. 94a



- VC\_1869\_1
- Light
  - Light ?
  - Felt
  - 4
  - 4?
  - 4-5
  - 5
  - ▼ 5-6
  - △ 5-6
  - ▲ 6
  - ▲ 6?
  - ▲ Heavy
  - 6-7
  - 7
  - Severe
  - ⊕ 7-8
  - ▬ NV-CA State Line
  - ▬ NV-CA Counties

# Virginia City Earthquake - Event Number 2 - 1869



- VC\_1869\_2
- Light
  - Light ?
  - Felt
  - ▼ 5
  - △ 5-6
  - ▲ 6
  - ▲ Heavy
  - 6+
  - 7
  - Severe
  - ▬ NV-CA State Line
  - ▬ NV-CA Counties



many places. The building occupied by Mr. Schneider, the banker, and Walter Chedic, grocer, and owned by George W. Kitzmeyer, has a crack in the walls that one can run their hands through (TNT 6/3/87). The Rinckel Building (opposite the post Office) is badly damaged with a rear wall that has separated at least an inch from the main building; the east-west walls are so badly cracked that they could be leveled by another shock (CDI 6/4/87). In the east wall of the Bullion & Exchange Bank building is a crack running from the foundation to the top story (REG 6/4/87). "Dozens of buildings all over the city are slightly cracked." (MA 6/3/87). Ex-Governor Adam's house is the most damaged private residence, being badly wrenched. The stone residence of J.Q.A. Moore (the old school house) was severely cracked in places (CDI 6/4/87). Senator Williams house, to the east near Empire, had damage to the second story (TE 6/4/87).

A considerable amount of nonstructural damage is reported in Carson City. It is noted by the Carson Daily Index (6/4/87) that a considerable amount of crockery was thrown from the shelves in E.B. Rails, M.A. Downey's, and Thaxter & Company's stores. "The pyramid of bottles on top of the refrigerator in the Monarch Saloon was wrecked, and a thousand other little smash-up happened in various stores." (CDI 6/4/87). "Every story in the city lost from \$20 to \$30 on broken crockery and glassware" (MA 6/3/87). Several windows were cracked at the railroad offices and plastering on the wall was knocked down (CDI 6/4/87). Nearly all the buildings mentioned, and many more, had cracked and fallen plaster. For example, a ton or more fell in the office of the Bullion & Exchange Bank building, and nearly all the plaster in the second story of the Rinckel building was shaken down (REG 6/4/87). Considerable plastering was also thrown down in the county building (CDI 6/4/87). Walls in the State Capitol were cracked, with one crack in the west wall that was over a half-an-inch wide, and the plastering in nearly all the rooms, particularly the Supreme Court room, the Senate Chamber, and the Governor's and State Land offices, was cracked and shaken down (CDI 6/4/87; TNT 6/3/87; VEC 6/3/87). In the Mint building, watchmen observed violent shaking of the walls and falling plaster, but the machinery was undamaged (TNT 6/3/87). At ex-Governor Adams' house a mantle piece, valuable vases, and other furniture were ruined, with a total damage estimated at \$300 (CDI 6/4/87). At Judge Belknaps house a clock (\$25) and vase (\$15) were destroyed. The are just a few of the countless personal glassware, pictures, and other fragile items that were lost.

## **Genoa**

In Genoa the 1887 earthquake was very severe with damage to stone and brick buildings, and chimneys. The upper story of the county building was cracked (TNT 6/6/87), and the Court House is badly wrecked (GWC 6/10/87). Adjacent stone and brick buildings belonging to Mr. Harris were jammed against each other, and the rear parts of both were cracked very severely (TNT 6/6/87). It is reported that walls of houses were moved off their foundations (VEC 6/3/87). An early dispatch from Genoa mentions a brick house, just built, that will have to be taken down because of damage (TE 6/4/87). A high brick chimney on the Nevada Hotel was twisted like a corkscrew (TNT 6/6/87), and the chimney at toll house at the foot of Kingsbury grade was thrown down and bricks were scattered in every direction (GWC 6/10/87). Nearly all the

chimneys in town were damaged (TNT 6/4/87). The walls of Harris' store were cracked in a number of places, and the residence of S.A. Kinsey was also considerably damaged, with plaster scattered all over every room (GWC 6/10/87; TNT 6/6/87). The Douglas County Clerk stated that his house was so twisted that the water pipes were useless (MA 6/3/87). Frame buildings escaped, as did the substantially built brick saloon run by Mr. F. Fetic.

The Boyd residence was a two-story brick house beside the Carson River, about one mile east of Genoa (CDI 6/4/87; GWC 6/10/87). After the earthquake there were cracks throughout the building and it was badly wrecked and would likely have to be taken down (GWC 6/10/87). A Nevada Tribune reporter noted, "not a part of the building is as it was, so violent must have been the strike." (TNT 6/6/87). The Boyd house apparently sits near or atop an area that liquefied during the earthquake (see the liquefaction section for further description). Thus, young low-velocity soils that were saturated likely underlaid the site, and contributed to the violent shaking. At the Rosser ranch, a short distance north of the Boyd house, a brick chimney was shaken down (GWC 6/10/87).

In every house in Genoa, pictures and glassware were thrown to the ground (TNT 6/6/87).

### **Carson Valley**

Where Cradlebaugh's bridge crosses the Carson River, the toll house was severely shaken and moved from its foundation from shaking or lateral spreading, and local liquefaction occurred. It is reported the toll house moved two inches from its foundation (GWC 6/10/87). Within the building, lamps, pictures, etc. were violently shaken down. Large cracks and water fountains occurred immediately following the earthquake from local liquefaction (described more completely in the liquefaction section).

### **Sheridan**

The shock was very heavy at the town of Sheridan but because there were no brick buildings, damage was limited (GWC 6/10/87). Issac Cohn lost about \$50 by the earthquake from a couple of large cracks in the rear wall of his store, and broken crockery and glassware (GWC 6/10/87).

### **Glenbrook**

The town of Glenbrook, on the eastern shore of Lake Tahoe, was also quite strongly shaken. Chimneys were in some places torn off at the roof, and ceilings were cracked, plastering torn off, and lamps and dishes were broken (GWC 6/10/87). At Short's store, which is built on a wharf and sits on piles in the lake, damage was the greatest (GWC 6/10/87). All of the glass and crockery ware fell down, and a brick chimney at the end of the store, over the lake, was

completely demolished, with scarcely a brick left standing (GWC 6/10/87). Damage of breakage in Short's store is estimated at \$200 (TE 6/5/87). "The clerks and book-keepers sleeping in the store were completely covered with articles of merchandise. They quickly made their escape and fearing a repetition did not return during the remainder of the night." (GWC 6/10/87). The chimney at the Lake House was turned a quarter of the way around, but did not fall (GWC 6/10/87). At F.S. Jefferson's saloon, bottles and glasses were thrown from the selves in back of the bar, and a new brick chimney was badly cracked (GWC 6/10/87). Large boulders were reportedly dislodged from Cave Rock and thrown into the lake (GWC 6/10/87). It is mentioned that Tahoe boiled like a pot from the earthquake (TE 6/5/87); this was likely the release of gases trapped in the sediments of Lake Tahoe.

### **Virginia City**

The 1887 earthquake was violent in Virginia City, and felt for about eight to ten seconds (TE 6/4/87). Mostly of the damage was nonstructural in nature. The greatest damage reported is the north wall of the Nevada Bank, which inclines inward two feet at the top from perpendicular, and is prevented from tumbling down by stringers supporting the roof (VEC 6/3/87); it is commented that this property should be inspected. There appears to have been quite a bit of damage to plastering in Virginia City. For example, "Persons rooming at the Douglass building, south of the bank of California, made a hurried exit to the street. In the room occupied by Superintendent Curtis the plaster fell from the ceiling, almost burying him." (VEC 6/3/87). There were also large cracks in the wall fronting U street of the Douglass building, and there was a call for "competent mechanics to inquire into the safety of this building at once" (VEC 6/3/87). "In the upper stories of buildings mantel and bureau ornaments were hurled to the floor and crystal pendants of swing chandeliers in saloons [were] violently agitated." (VEC 6/3/87). At Major Huffaker's residence, on the corner of A and Taylor streets, a number of valuable ornaments fell and were broken, and Madam Huffaker was thrown from her bed onto the carpet by the first shock (VEC 6/3/87). Miners underground in the mines along the Comstock distinctly felt the earthquake down to at least the 1,500 foot level, and most thought there had been an explosion in their mine or an adjacent mine (VEC 6/3/87; TE 6/4/87). Some of the men said the earthquake in the mine swept through the mine like a big wind (TE 6/4/87). In general the mines were undamaged, but there were some cave ins, such as about twenty feet of the tunnel from the mouth of the Voltaire Mine (CDI 6/10/87).

### **Reno**

No damage is reported to have occurred at Reno from the 1887 earthquake (TE 6/4/87). The shaking did ring the bells of locomotives parked on the tracks (TE 6/4/87), and the earthquake was plainly felt.

## **Liquefaction Accounts**

There are at least two clear accounts of liquefaction that were reported from the 1887 earthquake. These are important because they are among the few historical examples of liquefaction that we have for western Nevada.

In northern Carson Valley, near Cradlebaugh's bridge over the Carson River, several fissures varying in width from a quarter of an inch to three inches opened in the ground, out of which hot water and dirt were thrown into the air for some time (CDI 6/4/87; TNT 6/4/87). Some of these fissures were said to be up to 50 feet deep (MA 6/3/87). The ground was badly cracked (described as demoralized) for a distance of 50 to 65 feet (TE 6/4/87; TNT 6/4/87). The toll house located at the bridge was shifted off its foundation by two inches (CDI 6/4/87), which may have been the result of lateral spreading, or shaking.

At the Boyd's house, about a mile east of Genoa, near the Carson River, there was also clear evidence of liquefaction having occurred. The house was surrounded by large cracks, from an inch to a foot in width, which were filled with sand and water from the river (VEC 6/3/87). It was noted that walking across the corral that the ground seemed hollow, and wherever there was a fissure that black sand, several inches deep, was thrown up (TNT 6/6/87).

There are some nonspecific reports about cracks in roads and new springs appearing that may also have been related to liquefaction; other areas of liquefaction likely occurred.

## **Earthquake Effects on Hot and Cold Springs**

There were many reported changes in the levels and temperatures of hot springs, and some new springs that appeared that are related to the 1887 earthquake. The potential loss of the hot springs seemed to cause quite a concern to the local population, and there is avid mention of the springs and their progress in the newspaper accounts.

The most important and talked about change to a hot spring was at Shaw's Hot Springs (today known as Carson Hot Springs). These were a very popular spring that boasted relief from rheumatic conditions. The springs fell several inches a few weeks before the earthquake and were acting strangely causing Mr. Shaw to spend a good deal of money having them repaired (MA 6/7/87). "On the fatal night of the earthquake they received a shock that gave them quietus." (MA 6/7/87). The flow of the Shaw's spring fell off rapidly following the earthquake, although there apparently was still a little flow of water (MA 6/5/87). By seven days following the earthquake, Shaw has a force of men at work sinking into solid rock in search of water with some success (MA 6/10/87). Mr. Shaw was also hoping for another earthquake that might bring the springs to life again (MA 6/7/87).

The hot springs at the State Prison were reported by Warden McCullough to have raised about six inches, and that the increased flow was white with soda and sulphur (MA 6/3/87). Four days later they appeared to double this increase, being a foot deeper (CDI 6/7/87).

The flow of water at Walley's Hot Springs increased and became hotter since the earthquake (GWC 6/10/87).

Reports are conflicting as to exactly what happened at Steamboat Hot Springs. The Territorial Enterprise reported early on that the flow of water had increased at Steamboat Springs, and a new fissure was made and another big hot spring added (TE 6/4/87), and defends that position later (TE 6/10/87). The Virginia Evening Chronicle, in contrast, reports accounts of the springs drying up (VEC 6/3/87). The Carson Daily Index also reports Steamboat Springs as having a diminished capacity (CDI 6/4/87), as does the Morning Appeal, say the water had dried up to an extent to threaten the resort (MA 6/3/87). Six days after the earthquake it is reported that the springs are now flowing as well as ever, and that charges that only papers that are not advertised in reported the springs were damaged are false, and that reputable citizens who visited Steamboat Springs said they were dry (MA 6/9/87).

At Lawton's hot springs, west of Reno, the flow of water was slightly diminished, but became hotter (TE 6/4/87).

Springs also apparently increased flow in the southwest part of Carson City. Mr. Gilbert's springs in the southwest portion of the city flowed hot water for several hours after the shock, then gradually became cold (MA 6/10/87). A new hot spring is reported to have started near Mr. Gilbert's residence (CDI 6/4/87). Also in the southern part of town, Mr. Gardner reports the flow of his springs increased five times in volume since the earthquake (MA 6/10/87). The Nevada Tribune notes that it is surprising how the flow of water at the south end of town has increased since the earthquake (TNT 6/16/87); they comment, "The hills west of M.C. Gardner's house look as though old man Moses had come to life and struck them with his divining rod."

A couple other changes in wells are noted in the newspapers. Cagwin's artesian well increased its flow (MA 6/3/87). The artesian well belonging to the writer of the Morning Appeal also increased flow and became colder (MA 6/10/87).

### **Surface Breakage**

A report of surface breakage is reported for the 1887 earthquake. Exactly where and what this disturbance was we will likely never be sure, but it may be either gravity-related such as a landslide or slump, or it could possibly be a surface rupture from a fault. The initial account is in the Virginia Evening Chronicle of June 4,

A resident of Washoe Valley who visited the city yesterday, arriving [by] Ophir Grade, reports a tremendous upheaval of the earth in the vicinity of Dead Man's Ranch, located south of the roadway about two miles northwest of the tollhouse. He represents that the ground in places was raised more than three feet above its natural level by the earthquake shock on Friday morning. He is of the opinion that careful inspection of the earth's surface in that locality might reveal more important disturbances. Investigation at that point may demonstrate that Dead Man's Ranch was the scene of the greatest terrestrial disturbance during the late severe shock.

In the following paragraph in the newspaper, the writer calculates the velocity of the shock wave to Reno, assuming the shock originated on the west slope of Mount Davidson, near Dead Man Ranch, four miles west of Virginia City, as the crow flies.

There is at least one other cursory report of a ground disturbance in the eastern part of Eagle Valley, though this may be local land failure, spring activity, liquefaction, or as a remote possibility, surface rupture expression. More weight is placed on this account than perhaps usual because we (dePolo and Ramelli) have observed a young-looking fault scarp just south of the reported area, that looked so fresh that it could be historical. The account is in the June 5 Morning Appeal and is, "It has been ascertained that the aqueduct at the City of Mexico was cracked in some places by the earthquake of Sunday, and a curious phenomena is reported. The water first became heated and afterwards cold."

### **Fire Following Earthquake**

Only one fire that could be related to the 1887 earthquake was reported. This was at a hotel at Mound House, east of Carson City, built by Mrs. Maggie Coburn and leased to George Martin (CDI 6/5/87). The hotel and wayside resort was totally destroyed by fire; a fire engine from the Virginia railroad yards was dispatched, but to no avail (CDI 6/5/87). The fire began at about a half past nine when the flames of a stove fire leapt through a separation in the stove pipe and set fire to the woodwork behind (CDI 6/5/87). It is surmised that the joints were separated by the shaking from the earthquake (CDI 6/5/87). The loss is estimated to be \$1,500, though only \$500 was insured (CDI 6/5/87).

### **Minimum Cost of the Earthquake**

There is enough information to make an intelligent guess as to the minimum cost of the 1887 earthquake. The cost is minimal, because not everything that was damaged was reported.

### Costs:

#### Carson City

- damage estimates are \$1,000 to \$5,000 (MA 6/3/87); not sure if this includes nonstructural damage,
- possible that there is an additional \$1,000 damage to minor nonstructural items.

#### Virginia City

- \$1,000 damage estimate, plaster repair and minor nonstructural losses

#### Mound House Hotel

- \$1,500 loss to fire (CDI 6/5/87)

#### Genoa

- \$1,500 damage to chimneys & minor nonstructural losses; loss of Boyd house

#### Lake Tahoe

- \$500 damage to chimneys & minor nonstructural losses

Therefore a good minimum estimate of the losses from the 1887 earthquake is \$10,500, in 1887 dollars. There are many factors to think about when considering this value. Population was sparse, but construction was of likely of poor to average quality.

## EARTHQUAKE SEQUENCE (PST)

June 3, 1887 (Fri.)	2:45 to 2:50 A.M.	Mainshock; 3 to 30 secs. shaking
	3:00 A.M..	three slight shocks
June 5, 1887 (Sun.)	midnight	a slight shock at Carson
June 8, 1887 (Wed.)	between 3 and 4 o'clock A.M.	three light quivers
	between 11 and 12 o'clock P.M..	light earthquake shock
June 11, 1887 (Sat.)	~9:00 A.M.	light shock of earthquake
June 18, 1887 (Sat.)		two light shocks
June 23, 1887 (Thur.)	3:00 A.M.	lively, valley-wide shake (largest aftershock)

## EARTHQUAKE CATALOG ACCOUNTS

### Holden (1898)

#### 1887. June 3; 2:48 a.m.

Carson (Nev.), S.W. and N.E. (VIII)[RF]. Very severe, lasting 6 to 7 sec.; rotary motion,

preceded by a noise like thunder. Stone and brick walls were cracked, etc.

**1887. June 18; 1:20 a.m.**

Carson (Nev.), two light shocks. - C.W.F.

**Toppozada and others (1981)**

**3 June 1887 M6.3**

Bricks were thrown down and houses shifted on their foundations (VIII MM) at Genoa, Nevada. At Carson City, chimneys were reported in bad condition and brick and stone walls were cracked. Near Cradlebaugh's Bridge, Nevada, large fissures opened and spouted water and sand. At Deadman Ranch near the toll house on Ophir grade (north of Carson City), the ground was reported to have been raised three feet above the old level. A fault displacement of 3 feet is reasonable for M6.3, but the possibility of secondary ground failure cannot be ruled out. The water level at Shaw's Hot Springs near Carson City dropped several inches a few weeks before the earthquake, and dried up completely after the shock. This earthquake is comparable to the 27 December 1869 earthquakes.

**NEWSPAPER ACCOUNTS**

**Territorial Enterprise**

**June 4, 1887**

**A BIG SHAKE / a first class earthquake shock**

The whole Pacific coast in a tremor - What it was like on the Comstock - The shake-up at Carson, Reno, Genoa, Silver City and down along the Carson River - It was felt throughout California.

Yesterday morning, at ten or twelve minutes to 3 o'clock, this city was visited by an earthquake shock that was probably the severest ever felt here. It awoke nearly everyone in the city. From first to last it continued eight to ten seconds. It began with a sort of tbrill or quiver that lasted only a fraction of a second, then came the big thump or shock, which was sudden and as soon over as the report of a cannon. Had half a dozen such jerks as the big one occurred in succession, many buildings would have suffered. The big shock was followed by a long, throbbing tbrill that finally died out. Those who were up and awake at the time say that the first tbrill came from the southeast and passed on toward the northwest. That this was very brief and was followed by a sort of rotary motion out of which the big shock seemed to spring and dart squarely off to the eastward. This is the account the firemen at the Corporation House give and many others were similarly impressed. Accounts differ, however, not a few claiming that the shock was from west to east. This is probably because they were not awoken till the big thump came which was in that direction. To the writer it seemed like a kick coming out of a big rope that was stretched from south to north and then suddenly hauled taut.



*The quake on the Comstock - much fright and small damage.*

On the Comstock about the only effect of the shake was the bringing down of plaster in several buildings and the breaking of articles thrown down from shelves, but it brought persons down out of tall brick buildings in a hurry. It is said that not all of these took time to get up elaborate outfits[?]. The lodgers at the International Hotel tumbled down and out upon the streets in a very brief space of time, as did those in the Douglas Building and other large buildings. Not a few in substantial frame houses also got out, and some remained up all night looking for another shock. In scores of house small articles - generally mantle ornaments or articles standing on brackets - were thrown down and broke. Miners who were on the street say that they plainly saw buildings swaying and that when the big shock came it seemed to them that their knees were giving way or that they were sinking into the ground. They say that there was a slight shock from southeast to southwest three or four seconds before the big shock came that was noticed by persons who were in bed. Chief Pennison, of the fire department says the same. The clocks in the Bank of California and Nevada Bank were stopped at twelve minutes to three o'clock, Dozens of clocks were stopped at almost the same time, and we heard of one that was pitched from a mantle to the floor and had its face smashed. In nearly every house in the city there was a great racket and commotion, and women were everywhere very much frightened.

*The shock underground*

The shock was felt in most mines along the Comstock. A miner who was on the 1500 level of the Consolidated California and Virginia says it seemed to him that the ground under him was "all alive." Miners at work in the Best and Belcher thought there had been a big explosion of gas in the bulkheaded portion of the Consolidated California and Virginia. At the Ophir the miners on the 1300 level thought some kind of explosion had occurred and hastening to the main shaft were hoisted out. Some of the men say that it seemed to them that something had swept through the mine that was "like a big wind."

*At Carson City*

And everywhere in the valleys the shock was much more severely felt than here on the mountains where we have beneath us a foundation of solid rock. *The Tribune* says that at Carson the shock occurred at 2:47, and that the big jerk or throb was from the southwest to northeast. Down there many buildings were cracked and much plastering thrown down. At the Mint plaster was thrown down; a stone building opposite the Mint was so badly cracked that another shock would have thrown down its rear wall. Half a dozen other buildings were considerably cracked. *The Tribune* says: "In the store of E.B. Bail the most peculiar state of things occurred. Many lamps were thrown from the shelves and broken and chinaware was toppled over in almost every conceivable shape."

In the livery stables at Carson the horses made a great noise, plunging and neighing. Some persons in town who were on the streets at the time of the shock say it threw them on the ground.

At the Capitol plaster was thrown down in several rooms and a slight crack was made in the building itself.

In Carson many remained in the streets the remainder of the night, fearing to return to their houses.

#### *Along the Carson River*

The shock was everywhere severely felt. At the Mexican mill it was very severe. Robert Logan, who has charge of the mill in the absence of Senator Williams, was on the Comstock yesterday. He says that the upper story of the residence of the Senator is so badly racked that it is necessary to take it down. The building was badly cracked by the earthquake of 1868; that of yesterday morning threw bricks out of the wall and about ??? up the upper story.

#### *At Genoa*

A valley town, the shock occurred at 2:50 and was particularly severe. A dispatch received from that place last evening says:

The shock lasted three seconds and was followed within ten minutes by three slight shocks. The vibrations were from southeast to southwest. Bottles and dishes were shaken from shelves and bricks thrown from chimneys. Plaster fell from the ceilings and walls of houses were moved from their foundations. One bricks house near the Carson River was so badly shaken as to nearly fall. This house was surrounded by large cracks, from an inch to a foot in width, which were filled with sand and water from the river. Another shock equally as heavy would have destroyed every brick house in town.

A brick house in Genoa, just built, will have to be taken down. A deep fissure was left in the ground in Douglas County from which hot water is flowing.

#### *To the Southwad*

The shock seems to have been most violent. It is probable that in Owens Valley about Lone Pine, and at Cierro Gordo - old earthquake regions - it was much more severe than up this way.

A gentleman who came to Carson from Wellington's station yesterday morning states that he saw several large fissures in the road.

It is said that at Cradlebaugh's bridge, Douglas County, the shock was very violent , shaking down lamps, pictures, etc. in ??? building, and badly cracking the ground for three or four rods. [1 rod = 16.5 feet]

### *The Shock Struck Reno*

At 2:47, and is put down as the heaviest ever experienced in the place. There the vibrations are said to have been from east to west, and that in all there were seven shocks - the big one and six small shakes. Down there it rang bells of locomotives standing on the railroad track. No damage to buildings is reported at Reno.

### *The Effect on Hot Springs of the Country*

It is said that the water at Shaw's hot springs, near Carson, had almost dried up. This - if there shall not come another shock to start the water again - will be as great loss to Mr. Shaw, who is said to have paid \$10,000 for the property not long ago.

At the State Prison the shocks increased the flow of water very materially.

At Steamboat Springs the flow of water was also greatly increased, and all down there is red-hot and booming. A new fissure was made, and another big hot spring is added to the number of those heretofore in action.

At Lawton's hot springs, four miles west of Reno, the flow of water has been somewhat diminished, but it is now hotter than before.

### *At Silver City and Dayton*

The shake-up was quite as lively as in this city, but no great damage was done. There was some breakage of crockery and other brittle ware and a good scare, however, and not a few persons roosted outside till daylight, each moment expecting another big boost. A Silverite says he kept an eye on Mount Davidson and other big peaks, expecting them to shoot up hot stones, flame and smoke.

### *In California*

Dispatches from California show that the shock was felt at San Francisco, Murphy's, Chico, North San Juan, Downieville, Truckee, Jackson and many other places on that side of the Sierra's. There it occurred about the same time as here and lasted from four to thirty seconds. It was also felt in eastern Nevada in many places that have been heard from, and perhaps extended up into Idaho.

### *Last Night*

Many of the more timid in this city expected a repetition of the shake up and almost feared to go to bed. Doubtless not a few retired without disrobing, and perhaps slept with one foot out on the floor ready for a spring.

A gentleman who experienced the heaviest shocks that ever occurred in San Francisco, says the big throb of yesterday morning was the heaviest he ever felt. He says half a dozen such in rapid succession would have tumbled down every brick building in the city.

**Territorial Enterprise**  
**June 5, 1887**

**The Earthquake at Tahoe**

It is said that the earthquake of day before yesterday was particular severe at Lake Tahoe. At the residence of J.M. Short the damage by breakage amounted to about \$200, and in the store of Ramsey at Rowlands, there was a great smashing of brittle ware. Tahoe boiled like a pot. The lake occupies an extinct crater. One of these days all the water will probably be blown out up there, fire and flames taking its place.

\*\*\*\*\*

It is said that every store in Carson City lost from \$20 to \$30 in broken crockery and glassware by the late earthquake shock.

\*\*\*\*\*

The earthquake opened up a new hot spring at Genoa, and another near the residence of Mr. Gilbert, in the southern part of Carson City.

The Piutes say: "Ground heap sick - heap belly-ache - no good!" The earthquake doubtless rolled them about on the hillsides at a lively rate.

**Territorial Enterprise**  
**June 7, 1887**

**The Big Earthquake Shock**

Professor Friend, of Carson, says that the exact time of the earthquake on Friday morning was 2:49 A.M. mean time or 2:48 A.M. standard time. That was the time in this city, as recorded by the clocks in both of our banks, which stopped exactly at twelve minutes to 3 o'clock. Also, it was very near the time everywhere on the Pacific Coast, making allowance for the differences in timepieces. The "big throw" came everywhere almost at the same instant. This is good evidence of the electrical theory of earthquakes. Nothing else than electricity could so quickly pass through the many kinds of rock and various other materials of which the crust of the earth is composed.

**Territorial Enterprise****June 8, 1887****Will Yet Be Swallowed Up.**

At Carson they had another shock of earthquake Sunday night. This shows that the powers that dwell in subterranean places are after the Carsonites. Their "City of the Plain" will presently be swallowed up as were in ancient times those "cities of the plain," Sodom and Gomorrah.

**Territorial Enterprise****June 9, 1887**

Our people are still in dread of more earthquake shocks. Several persons insist that there were three light quivers yesterday morning between 3 and 4 o'clock.

**Territorial Enterprise****June 10, 1887****Steamboat Springs**

The report has been published in several state newspapers that the recent earthquake damaged Steamboat Springs. The fact is that Steamboat has as full and hot a flow of water as it ever had. Under Farnum & Murphy's management the springs are a delightful resort.

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The earthquake of June 3 was the severest ever felt in Mason Valley.

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At Carson, night before last, they had another light shock between 11 and 12 o'clock.

**Virginia Evening Chronicle****June 3, 1887****A LIVELY SHAKE\_UP****Severe Earthquake Shock at Daybreak**

It Rocks Buildings from Cornice to Foundation

Stops Clocks and Causes General Consternation

The Vibration Felt 1,500 Feet Below the Surface

## How it Affected the Towns of Carson and Genoa

### Reports from Eastern Nevada and California

The severest shock of earthquake ever experienced in this locality was felt a few minutes before 3 o'clock this morning. The vibration was from the east to west and continued for the space of four to five seconds. The shock set every building in the city vibrating from cornice to foundation. The first motion was not swaying, like that of trees rocking in a gale, but the sensation produced was similar to that experienced by the earth upheaving suddenly and striking some object more bulky and solid than itself, causing it to vibrate and tremble from the rebound.

#### THE SHOCK ON THE SURFACE.

In an incredible short period after the shock the streets were thronged with people, many of them appearing in the most pronounced dishabille. Professor Gross, who roosts on the first floor from the roof in the International Hotel, was the first inmate of that building to reach the street. He was attired in a linen duster and a pair of second-hand overshoes. The hallways and entrances of lodging-houses were crowded with frightened ladies and children clothed in the scanty apparel in which they hastily left their beds.

The clocks in the Nevada Bank and Bank of California, which have never ceased ticking for a moment during the past ten years, suddenly stopped at precisely twelve minutes to 3 o'clock. The floor of the Nevada Bank in the vicinity of the rear wall was covered with mortar dust shook from the masonry work.

#### THE FIRE BELL RUNG.

The shock caused the bell in the cupola of the Corporation House to ring several strokes.

At the Philadelphia Brewery, on Geiger grade, Bill Schaum, the proprietor, was awake at the time of the disturbance and counted [counted] 28 rapidly while the vibration continued. It loosened several boulders on the hill above the brewery and sent them crashing into the ravine below.

In the upper stories of buildings mantel and bureau ornaments were hurled to the floor and crystal pendants of swing chandeliers in saloons violently agitated.

In Major Huffaker's residence, on the corner of A and Taylor streets, a number of valuable ornaments were broken through falling to the floor from brackets on the walls. Madame Huffaker was thrown from her bed to the carpet by the first shock. Miners coming the Divide, who had just come off shift in the Gold Hill mines, say they plainly saw buildings vibrating, and the earth seemed moving from under their feet. Other persons claim to have been affected with nausea similar to sea sickness.

#### CEILINGS FRACTURED.

Persons rooming in the Douglass building, south of the bank of California, made a hurried exit to the street. In the room occupied by Superintendent Curtis the plaster fell from the ceiling, almost burying him. In the hallway, leading to the Washoe club room about a wheelbarrow load of plaster fell to the floor and the ceiling was cracked in a majority of the rooms in that building.

The County Commissioners should employ competent mechanics to inquire into the safety of the building at once. There are large cracks in the wall fronting on U street and the

brick work looks as though it might tumble down any moment.

The north wall of the Nevada Bank inclines inward at the top two feet from the perpendicular, and is apparently only prevented from tumbling down by the stringers supporting the roof. That property should also be inspected.

#### THE SHOCK UNDERGROUND.

Men employed underground in the mines on the load distinctly felt the vibration and observed timbering of the drifts moving. In Con. Cal. & Va. The first impression created among the miners was that an underground magazine had exploded, but missing the concussion of the air that would have resulted, they rightly concluded it was an earthquake. The shock was felt more perceptibly underground close to shafts than in the face of long drifts. As far as ascertained the vibration did not force the timbering of the shafts or guides out of line. This is the first earthquake shock ever felt by miners employed in underground workings of the lode.

At Ophir mine the cage was rung [rung] down to the 1,300, where the miners working on that level were found at the station having felt the shock and surmised that it was caused by a terrific explosion at some point in the mines. They were all hoisted to the surface although the shift was only about two-thirds over.

Some of the miners who were underground at different points on the load at the time though the shock arose from an explosion of gas in the Con., Cal., & Va.. Mine.

#### STEAMBOAT SPRINGS

An arrival from the Truckee Meadows reports that the disturbance has resulted in drying up the water at Steamboat Springs to an extent that threatens to destroy that place as a bathing resort.

#### Reports from Neighboring Towns

Special to the Chronicle.]

#### GENOA BADLY SHAKEN.

GENOA, Nev., June 3.-A severe shock of earthquake was felt here at 2:50 this morning. The shock lasted three seconds and was followed within ten minutes by three slight shocks. The vibrations were from northeast to southwest. Bottles and dishes were shaken from shelves and bricks thrown from chimneys. Plastering fell from the ceilings, and walls of houses were moved off their foundations. One brick house near the Carson River was so severely shaken as to nearly fall. This house was surrounded by large cracks, from an inch to a foot in width, which were filled with sand and water from the river. Another shock equally as heavy would have destroyed every brick house in town.

A brick house in Genoa just built will have to be taken down. A deep fissure was left in the ground in Douglas county from which hot water is pouring.

#### CARSON CITY

[Special to the Chronicle.

Carson, June 3.-A heavy shock of earthquake occurred here at 2:45 this morning. All the stone and brick buildings show the effects of it. The Capitol walls were cracked and two to three other buildings badly wrenched. The destruction of property, however was slight. General alarm prevailed. The shock and the oscillations lasted 30(?) seconds; direction northeast and southwest.

A large amount of plaster fell in the Supreme Court room, Capitol building. Several

stone and brick buildings were badly cracked. Shultz's stone market was most seriously damaged of all. Shaw's hot springs are reported dried up. The hot springs at the State Prison have largely increased in flow. The most damaged private house was ex-Gov. Adams's. A good deal of glassware and crockery was broken. The direction of the shock was rotary.

#### CALIFORNIA AND EASTERN NEVADA

Special dispatches to the Chronicle from Murphy's Chico, North San Juan, Downieville, Truckee, Jackson and Marysville, California, state that a severe shock of earthquake occurred at those points this morning simultaneously with that felt in this city; the vibrations lasted from four to thirty seconds.

The shock was also felt at Reno, Brown's Station, east of Wadsworth, at Winnemucca and other points in Eastern Nevada.

It is conceded by old residents that the shock this morning was the most violent that ever occurred in Western Nevada.

Exaggerated reports of serious damage to buildings in San Francisco were current this morning, but no dispatches confirming them have been received.

#### **Virginia Evening Chronicle June 4, 1887**

Silver City was visited by the severest shock of earthquake known for many years on Friday morning about 2:50 o'clock.

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A severe shock of earthquake was felt at Dayton Friday morning. Dishes were shaken down in closets, clocks stopped and women scared half to death. The shock came from the east and lasted but three or four seconds.

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#### **YESTERDAY'S SHAKE-UP**

##### **The Greatest Disturbance at Deadman's Ranch-Velocity of the Shock Wave.**

A resident of Washoe Valley who visited the city yesterday, arriving Ophir Grade, reports a tremendous upheaval of the earth in the vicinity of Dead Man's Ranch, located south of the roadway about two miles northwest of the tollhouse. He represents that the ground in places was raised more than three feet above its natural level by the earthquake shock on Friday morning. He is of the opinion that careful inspection of the earth's surface in that locality might reveal more important disturbances. Investigation at that point may demonstrate that Dead Man's Ranch was the scene of the greatest terrestrial disturbance during the late severe shock.

The shock was perceptible almost simultaneously in Reno. Clocks stopped there at ten minutes before 3 o'clock A.M., two minutes later than at this point. Information so far received indicates that the shock originated on the western slope of Mount Davidson, the most violent point of disturbance being at Dead Man's Ranch on the Ophir grade, four miles west of this city



as the crow flies. The velocity of the shock wave was about 1,500 feet per second, or only 500 feet less than the shock at Lisbon, Portugal, in 1692, in which 200,000 persons perished and a portion of the city buried 600 feet beneath the sea.

**Virginia Evening Chronicle**  
**June 7, 1887**

### **THE LATE EARTHQUAKE**

#### **Statistics Showing the Velocity of the Shock Wave**

By reference to the subjoined statistics it will be seen that the earthquake of June 3 extended west as far as the Pacific Ocean, north to Red Bluff, south to Amador county, Cal., and east beyond Winnemucca..

The points of greatest disturbance were in Storey, Washoe, Ormsby and Douglass counties. The shock appears to have originated between this city and Washoe Lake, the wave radiating east beyond Winnemucca and west to the Pacific Ocean. This is determined by the fact that the vibration was simultaneous at points north and south, while it required seven minutes for the wave to reach Napa and twelve to reach Winnemucca, if the time of the vibration is correctly reported in the following special dispatches to the Chronicle:

CALISTOGA (Napa county), June 3.-An earthquake was felt at five minutes to 3 o'clock A.M.

SACRAMENTO, June 3.-A sharp shock of earthquake was felt at 2:53 o'clock A.M.

COLFAX (Placer county). June 3.-A heavy shock of earthquake was felt at 2:51 A.M. The first motion was up and down as though the earth was being rocked on a wave. The second was much quicker, and was backward and forward, ending in a regular quiver.

At Red Bluff the shock was felt at 2:59 A.M.

AMADOR (Amador county), June 3.-At 5:59 o'clock A.M. an earthquake occurred that caused windows in hard finished houses to rattle.

RENO, Nev., June 3.-Reno was visited this morning at about twelve minutes to 3 o'clock by one of the severest shocks of earthquake ever known in these parts.

The shock wave reached Carson and Genoa within a few seconds after the vibration was felt at this point.

At Pyramid Lake the shock was felt at 2:55 o'clock A.M. and was the severest shock that ever visited that locality. The vibration was from east to west.

At Empire the wave shock was felt at 2:50 o'clock A.M. Senator Williams brick house was so badly rocked by the earthquake that it will have to be taken down. The shake of 1861 was the first to crack it.

The wave shock reached Winnemucca about 180 miles east of this point, at 3 o'clock A.M. and was very severe.

If the time the vibration was felt at Napa is correctly reported in the above dispatches, the greatest point of disturbance was under Mount Davidson, the shock was just seven minutes in traversing that distance, which required a velocity of 3,000 feet per second. The velocity of the radiation of the shock wave east was a little over 1,100 feet per second, equal to the flight of sound, as it required twelve minutes to reach Winnemucca. As the vibration was more violent at

the latter place, causing more people to note the exact time than at Napa, it is probable that the last figures more correctly represent the velocity of radiation of the shock wave than the former. It is hardly probable the velocity exceeded 1,500 feet per second, as the great shock wave which devastated Portugal only radiated at a speed of 2,000 feet per second.

The motion of the shock waves are radiating, that is they radiate from the central or greatest point of disturbance, the same as waves radiate from a point where a stone is dropped into a body of water.

### **Salutary Effect of the Shake-up**

Persons who were on the street at the time of the shake-up on Friday morning say that by looking at the moon the vibration of the earth was as plainly visible to the organ of sight as it was to the sense of feeling. Among those who observed this peculiar phenomena was Mr. Charles Gabriel of the palace clothing emporium, No. 22 South C street. Mr. Gabriel was so awe stricken on realizing the insecurity of the earth as a dwelling place that he vowed he would hereafter sell clothing at less than cost, and relinquish all desire to accumulate wealth, which might vanish in an instant in a slightly more pronounced disturbance of the earth's equilibrium. Since the startling shock of last week he has marked down every article in the clothing line to cost figures.

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### **CARSON'S CALAMITY**

#### **The Flow of Water at Shaw's Hot Springs Ceases-The Earth Cooling Off.**

Yesterday Colonel Patterson of this city visited Shaw's Hot Springs near Carson. He informs the Chronicle that the hot water which made the resort famous as a sanitarium has entirely vanished since the earthquake of June 3, with but little hope that it will return again in the present generation. ...

The Nevada *Union* says: "For many months the water has really decreased in volume, but of late the decrease has been very rapid. The earthquake seems to have something to do with it, but this is by no means certain. ..."

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A slight shock of earthquake is alleged to have occurred at Carson on Sunday night.

**Virginia Evening Chronicle**  
**June 8, 1887**

### **ANOTHER EARTHQUAKE**

#### **The Shock Moves Bottles on the Shelves of a Drugstore.**

A Lernhart noted that bottles of drugs in his store were moved just to the point of tipping over the edges of the shelves by the earthquake shock on the morning of June 3. This morning he noted a further disturbance of the bottles, they having been moved an inch or more out of their accustomed places, indicating that a lighter shock than that of June 3 had occurred during last night or this morning. The walls could not have been disturbed by underground blasting, for in that case it would occur more frequently, whereas bottles that have not been handled never moved from the position in which they were placed on the shelves until the two occasions noted above. There was a peculiar sultriness in the air at sunrise this morning such as invariably precedes the vibration of earthquake shock waves.

\*\*\*\*\*

*Carson Appeal*: Several parties in this city were so badly frightened at the earthquake that they have decided to join the Church. There ought to be a Quaker church established there.

\*\*\*\*\*

The *Carson Tribune* says: The report that the family of Senator Williams has been compelled to leave their Empire home on account of injury done to the building by the earthquake is untrue.

\*\*\*\*\*

At Placerville, June 5, two slight shocks of earthquake were felt.

**Virginia Evening Chronicle**  
**June 9, 1887**

### **Lyon County Locals.**

Last weeks earthquake was the severest ever experienced in Mason Valley.

### **Esmeralda Extracts.**

At Hawthorne, June 3, during the earthquake, a slight rumbling was heard which was mistaken by many for a heavy quartz wagon in motion. In Coryville the shock was felt in the mine, and from all directions reports of the jar come in.

### **Dips, Spurs and Angles**

The shock wave from the earthquake in western Nevada June 3 did not reach Eureka.

**Reno Evening Gazette**  
**June 4, 1887**

### **The Earthquake in Carson.**

The following items concerning the earthquake in Carson were clipped from the *Tribune* of last evening:

In the store of E.B. Rail the most peculiar state of things occurred. Many lamps were thrown from the shelves and broken, and Chinaware was toppled over in almost every conceivable shape.

The wall dividing Muller, Schmitt & Co.'s store from Burlington's was cracked in many places and the chimneys of the Ormsby House are in a badly shaken up condition.

In the east wall of the Bullion & Exchange Bank building a very perceptible crack is visible from the foundation to the top story, and when the office room was opened this morning a ton or more of plaster was found on the floor.

The building occupied by Mr. Schneider, the banker, and Walter Chedic, grocer, and owned by Geo. W. Kitzmeyer, has a crack in the walls that one can run his hands through.

The Rinckel building, opposite the Postoffice, is badly damaged, nearly all the plaster in the second story being shaken down, while the rear wall has separated at least an inch from the main building.

### **The Earthquake in Sacramento**

A sharp shock of earthquake was felt here this morning at 2:47 o'clock. It shook houses, making them rattle as if the blinds and windows were be

**Reno Evening Gazette**  
**June 6, 1887**

On Saturday morning between 9 and 10 o'clock, Martin's Hotel, standing to the southward of the Depot Saloon and main group of railroad buildings at the Mound House, on the Virginia and Truckee Railroad, took fire and burned to the ground. The fire was caused by a disjointed stove-pipe.

### **Cool Men.**

It is impossible to find a man who was scared by the earthquake. They all tell how calmly

the put on their clothes and went out on the sidewalk where they could get the full benefit of the shake and watch large buildings fall over. Some men who stuck their legs through their coat sleeves instead of their pants will tell you how collected they were. Those same men are shivering so bad yet that a 10-acre bed-room would be too small for them if they anticipated another shock.

**Reno Evening Gazette**  
**June 7, 1887**

#### **Local and General News.**

The Carson papers claim a slight earthquake shock at the Capital on Sunday night.

**Reno Evening Gazette**  
**June 8, 1887**

#### **Brevities.** **Local and General News.**

...

The report that Senator Williams' residence at Empire was damaged so bad by the earthquake that it was no longer tenantable is now denied.

**Reno Evening Gazette**  
**June 9, 1887**

#### **Feels Slighted.**

The Walker Lake *Bulletin* deplores the fact that Hawthorne was slighted by the late quake. If public opinion is a safe criterion to be governed by, our Hawthorne friends didn't lose anything. An earthquake is one of those things that distance helps out wonderfully. One shock is entirely sufficient to satisfy the curiosity of any reasonable being unless he or she is fond of promenading the back yard clothed in a night earthquake suit, half of which is made by nature and the remainder of very porous cotton.

**Carson Daily Index**  
**June 4, 1887**

#### **The Earthquake.**

Yesterday morning at nine minutes before 3 o'clock by Prof Friend's regulator, and fourteen minutes to 3 by the railroad regulator, that portion of the earth in this vicinity shook as if the whole terrestrial machine were in the throes of ultimate disintegration; or, in other words, this

little planet of ours had a fit of shakes and threatened to fly to pieces. It was a wake-up-jake nearly as startling as Gabriel's trumpet. Carson never before had such a serious jar, and it is to be hoped that she will never experience the like again. The novelty of such affairs, when we are having them close at home instead of by telegraph from a distant point, wears off with a suddenness that leaves us without interest except that which concerns our own safety.

The quake exhibited various peculiarities. In one place it seemed to oscillate like a pendulum; in another there was a rotary motion like Hark's sausage machine, and then again it seemed to pick up the townsite and slam it down, as a disgruntled schoolboy discards a rotten apple. In other places the sensation experienced was as if the Creator were giving us the grand bounce and kicking us into the illim\_table hence. As Col. Sweeny remarked, "it was nearly hell."

The following incidents were noted by a reporter for the Index:

A flat car standing in the round house yards opposite the gas works had its brake loosened by the shock. The car moved rapidly down the track, and as the gate opening into the yard was shut, the car crashed against it, and demolished itself, the gate, and a portion of the fence.

The railroad offices came in for their share of the general damage. Several windows were cracked; plastering on the wall was knocked down; and the safe in the north wall of George Mills' office and the large vault settled about one half an inch.

A considerable amount of crockery was thrown from the shelves in E.B. Rail's, M.A. Downey's and Thaxter & Company's grocery store; a case of goods was squashed in Fisher & Decker's Saloon, and a similar casualty occurred in Thaxter's drug store; the pyramid of bottles on top of the refrigerator in the Monarch Saloon was wrecked, and a thousand other little smash-ups happened in various stores.

The principal damage was done to some of the stone and brick buildings, the Rosser and Rinckle blocks being the greater sufferers. In the former a considerable pile of plastering was thrown down in the different rooms, and the east and west walls exhibit signs of a very severe shaking, leaving crevices between the north and south walls of two inches in width. Shortly after the disturbance a number of bats were flying about the halls, but where they came from is not known. The Rinckle building suffered almost as severely as did the Rosser, the east and west walls also exhibiting the severe shaking most. The east and west walls in both these buildings have such a frail appearance that one would think another tremor would level them to the ground. In the east wall of the Bank building, there is a perceptible crack running from the ground to the roof. Considerable plastering was thrown down in the county building. There is a crack in the west wall of the Capitol over half an inch wide. The plastering in nearly all the rooms, and particularly in the Supreme Court-room, the Senate Chamber, and the Governor's and State Land offices was more or less cracked. The stone residence of J.Q.A. Moore, the old school house, was severely cracked in places, and S.C. Wright says the walls of his building, the White House, swayed so much that he wonders that the house still stands.

The Arlington and Ormsby Houses and the St. Charles Hotel were as very well shaken, but no material damage was done.

Probably ex-Governor Adams' house is the most damaged private residence in Carson. A large amount of plaster fell from the ceiling and walls, and a mantle piece and some valuable vases, and other furniture were ruined. The total damage is estimated at about \$300.

At Judge Belknap's house a clock, valued at \$25 and a vase at \$15, are said to have been thrown down and destroyed.

At General Clarke's residence considerable damage is also reported to have been done.

It is said that a large fissure was opened in the ground on the road to the State Prison.

A book case at the residence of John G. Fox was dashed to the floor.

A gentleman from Genoa says that he saw a curious spectacle just this side of Cradlebaugh's bridge. Several fissures, varying in width from one-quarter of an inch to one inch had opened in the ground, out of which hot water and dirt were thrown into the air for some time. He also says that the toll house at the bridge had been moved about two inches from its original foundation.

The shock did considerable damage in Genoa by breaking plastering and light household goods. It is reported that the large brick residence of W.H. Boyd is so badly damaged that it will have to be taken down. It is also reported that a well at the house was dried up and filled with sand.

The State Capitol emptied itself suddenly. Oliver Roberts, Holbrook and Diugiterty(?) got outside with extreme suddenness. Both the latter were in undress uniform, but this little informality was not remarked by either when they found that Gilhooley had got out ahead and locked them in. To their clamorous appeals for rescue from the crumbling edifice Gil at last responded, and as they appeared he said, "Scratch a match and see how pale I am." Then he fainted.

Uncle George Tuflv(?), with elephantine agility, wobbled down the front stairs of the St. Charles hotel, an when he struck the sidewalk another earthquake was created, but no damage was done, and our worthy Treasurer retired again, somewhat shaken up by the unwonted exercise.

The vigilant watchman at the mint, startled from refreshing slumber while industriously earning the stipen awarded him by Uncle Sam, rushed out and took a shot at the moon, and then sat down to await the expected catastrophe.

Abe Cohn tumbled out of the Rosser building with nothing on but one sock and a scared look shrieking in anguish: "Save me, for God's sake! Our creditors are after us!" Then seeing a half naked man on the opposite side of the street, he hastened across and accosted him: "Say, boss - lemme sell you one o' them flannel suits for seven dollars and nine bits. Just the thing for earthquake weather."

Professor Friend thinks the shock lasted from three to five seconds. It was preceded by a heavy rumbling sound, which is described as resembling a dead-axe freight wagon driven rapidly over frozen ground. Very few houses in Carson escaped without some evidence of the quake, either in the form of broken plastering, furniture, glassware, etc. The swaying earth stopped nearly all the clocks, and set the fire and door bells ringing.

It is a singular fact that nearly all clocks whose pendulums swung east and west were stopped, while those swinging north and south were not affected by the shock.

A new hot spring broke out near Genoa, another in the southern part of the Carson, near the residence of Mr. Gilbert, and the springs at the State Prison have nearly doubled their flow, while Shaws and Steamboat suffer a serious diminution of volume; but it is probable that it will return in a few days.

A more severe shock has never been experienced in this section. Virginia City was not so roughly shaken up as were Carson and Geona, while Reno had but a slight hint of the affair. It was felt all over the Coast and as far as the towns in Eastern Nevada, but from reports at hand it appears that Ormsby and Douglas counties bore the brunt of the disturbance. The shock was distinctly felt at the depth of 1500 feet in the Comstock mines.

**Carson Daily Index**  
**June 5, 1887**

**Fire at the Mound House**

The building erected at the Mound House by Mrs. Maggie Coburn about three years ago, and which was leased to George Martin, who conducted it as a hotel and wayside resort, was totally destroyed by fire yesterday morning. The fire started at about a half past nine. The earthquake is supposed to be the indirect cause of the catastrophe. It is surmised that the shock separated the joints of a stove, and flames lept out of the break in the pipe and set fire to the wood work back of it. The fire engine in the Virginia railroad yards was dispatched to extinguish the fire, but with no avail. The loss is estimated to be about \$1,500; insured for \$500.

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It would be well for the authorities to have the buildings which are said to be cracked or damaged by the earthquake examined by competent mechanics. By adopting simple precautions now further casualties may be avoided.

**Carson Daily Index**  
**June 7, 1887**

Who felt the earthquake Sunday night? There are a number of citizens of undoubted veracity who positively state they remarked a slight trembling of the earth just a few minutes after 12 A.M. yesterday mording [morning].

**A Good Idea.**

Warden ... State Prison ....The warm springs have greatly increased their volume since the earthquake of Friday, being now one foot deeper than they were before their disturbance. At this time they are discharging quite a large stream of water to an extent never remarked before. If Shaw's Springs should unfortunately subside it would not be a bad idea for the State to make the Prison baths public, charging a nominal fee, and devote the receipts to the work of further developing the famous tracks.



**Carson Daily Index**  
**June 10, 1887**

**The Voltaire Mine.**

Superintendent Clark of the Voltaire mine tells us that work will be commenced some time, perhaps shortly, on the development of the mine, giving employment to from twenty to thirty men. Neither the mine nor the mill has been running for some time. Mr. Clark says the mine was among the sufferers by the recent earthquake, about twenty feet of the tunnel from the mouth having been completely caved in. The debris will not be removed until the above mentioned development of the mine is commenced.

**Carson Daily Index**  
**June 11, 1887**

**Professor Gilhooly**

Professor Friend has appointed Oliver Roberts Special Observer for the Nevada Weather Service and directed him to keep a lookout for nocturnal phenomena that visit the State Capitol. Roberts says it takes a bold man to stay in the building alone all night, waiting for earthquakes. The suspense becomes harrowing about the wee hours of the morning, and is such a pull upon his nerves that he is a wasted skeleton. His sense of hearing has become abnormally acute (wish he would divide it with us), so that he can hear folks think a long distance off.

**Carson Daily Index**  
**June 12, 1887**

**Shaw's Springs**

Just as the Index was going to press last night we learned from an authoritative source that Col. Shaw had recovered by crosscutting over half of the amount of water yesterday afternoon he had before the earthquake, and that there is every probability of getting the full volume. The news is glorious, and the Colonel is heartily congratulated by the Index.

**The Nevada Tribune**  
**June 3, 1887**

**EARTHQUAKE THIS MORNING**

At 2:47 o'clock, so say the timekeepers, a violent shock occurred, the stroke was from the south-west to north-east, and followed by a short, sharp vibration in the contrary direction. The inhabitants of every house in town were roused from their slumbers, and few sought their beds until morning sun gave evidence that another day was granted to the denizens of Nevada's

Capital.

The watchmen in the Mint report a violent shaking of the walls and falling plaster, but no injuries to machinery. The Stone (or Rosser) building, opposite the Mint, owned by Otto Schultz, was violently cracked, and had another shock occurred the rear part would have been laid level with the ground.

In the store of E.B. Rail the most peculiar state of things occurred. Many lamps were thrown from the shelves and broken and Chinaware was toppled over in almost every conceivable shape.

The wall dividing Muller, Schmitt & Co.'s store from Burlington's was cracked in many places and the chimneys of the Ormsby House are in badly shaken up condition.

In the east wall of the Bullion & Exchange Bank Building a very perceptible crack is visible from the foundation to the top story, and when the office room was opened this morning a ton or more of plaster was found on the floor.

Joe Raycraft, of the Occidental Stable, relates that in all his experiences with horses he never heard equines yell and stamp as they did this morning. It was perfect pandemonium and he thought his time had come.

The building occupied by Mr. Schnieder, the baker and Walter Chedic, grocer, and owned by Geo. W. Kitzmeyer, has a crack in the walls that one can run his hand through.

The Rinckel building, opposite the Post office, is badly damaged, nearly all the plaster in the second story rooms being shaken down, while the rear wall has separated at least an inch from the main building.

A gentleman who came in from Wellington's Station this morning states that he saw several large fissures in the road.

James Raycraft happened to be going for the Doctor when the shock occurred and was thrown violently to the ground.

U.S. Marshal Kelly, who came down from Virginia this morning, informs the Tribune that no damage was done on the Comstock, but that the miners in the lower levels all report having been shaken up pretty lively and badly scared. The shock was evidently not as violent as in Carson.

News comes from Cradlebaugh's bridge that the shock was very violent there, shaking down the lamps, pictures, etc., in the building, and badly cracking the ground for three or four rods.

State Printer Harlow, who was out to Shaw's Springs shortly after 7 o'clock this morning, says the water in the main spring has decreased at least six inches since the shock.

In the Capitol Building considerable plaster was shaken down in the Governors and other offices, and a slight crack is noticeable in the west wall.

The women about Carson were thoroughly scared, and many sought the street in night coverings, refusing to return under the house until morning.

It is the general opinion that the quake of this morning is the most violent that has ever visited Nevada. The shock lasted about three seconds and was preceded by a rumbling noise. If it had continued a couple of seconds longer considerable damage would have occurred.

### **Jottings**

The earthquake was the topic of conversation.

It has been quite cool and breezy to-day, and some people believe that another earthquake will visit us.

Nearly every brick and stone building in town was more or less effected by the earthquake this morning.

**The Nevada Tribune**  
**June 4, 1887**

### **EARTHQUAKE NOTES.**

The earthquake still continues the topic of conversation, and very few of our people rested comfortably last night, fearing another shock. The news from the surrounding country shows the shock to have been general, and about equally severe as here.

The residence of Senator Williams, Superintendent of the Mexican mill, at Empire, is so badly cracked in the upper story that it will be necessary to take it down. The building was badly cracked by the earthquake of 1868; that of yesterday morning threw bricks out of the wall and about used up the upper story.

The shock appears to have done more damage in Genoa than elsewhere. Nearly all the chimneys in town were wrecked, while glassware, etc., in the stores, and lamps and bric-a-brac in private residences were thrown down and demolished. The brick residence of W. H. Boyd is so badly cracked and separated that it will have to be torn down.

Parties who were out to Cradlebaugh's bridge report a general demoralization of the earth thereabouts, there being several fissures from one to three inches, wide out of which water and dirt were thrown into the air for some time. It is also reported that the toll house has been moved about two inches from its original foundation.

It is reported that a new hot spring broke out near Genoa, another in the southern part of Carson, near the residence of Mr. Gilbert, and the springs at the State Prison and at Steamboat have nearly doubled their flow, while Shaw's suffer a decrease of volume; but it is probable it will return in a few days.

The brick residence of ex-Governor Adams, in the southwest part of Carson, suffered the most damage of any in Carson. Plaster fell down in all the rooms and valuable vases and other fancy articles destroyed. The walls of the building are also badly cracked. It is estimated that \$300 will not cover the damage done.

At Lake Tahoe the shock was very severe. The damage done to articles destroyed in J.M. Short's store is estimated at \$200. Considerable damage was done to Ramsey's store at Rowlandville, while the lake was never seen more turbulent.

Mr. J. S. Shaw, who was in Carson this morning, informs the Tribune that the indications are that the earthquake has entirely ruined his springs. The water has already decreased two-

thirds. This is a great loss to the owner and the community. It is earnestly hoped the water will re-appear, and in an even more copious quantity.

**The Nevada Tribune**  
**June 6, 1887**

### **EARTHQUAKE IN DOUGLAS COUNTY**

The shaking of brick and stone walls in Genoa was apparently much more severe than at the Capital. The County Building is so much cracked in the upper story, that it will have to be attended to at once, for it is certainly dangerous. The stone and brick buildings belonging to Mr. Harris were jammed against each other, and the rear parts of both were cracked very severely. The plaster in Mr. Kinsey's dwelling house was scattered all over every room, and an old stone wall opposite was thrown completely down. A high brick chimney on the Nevada hotel was twisted like a corkscrew, but fortunately did not fall on Thursday night. The frame buildings all escaped, as did the substantially build brick saloon formerly owned by A. Livingston, and now ran by Mr. F. Fetic. In every house round and about Genoa, pictures and glassware were thrown to the ground and during the trembling of mother earth, every man, woman and child was out on the Main street, and the sound of their united prayers is said to have been likely the rumbling of concentrated thunder.

No shake was felt at Walleys' Springs, and the only change noticeable was a great raise in the hot water flow.

Professor J.L. Smith, principal of the Public school departments of the county, drove the Tribune reporter across the bridge to the Boyd property, for the purpose of looking at the effects of the earthquake. The brick residence erected about three years since, is of two stories and not a part of the building is as it was, so violent must have been the strike. There are cracks all through the building and it is entirely unsafe. In the corral, walking across either way, the ground seems as though all was hollow underneath, and by driving a pole down two or three feet, water flows immediately to the surface, and wherever a fissure is seen, black sand several inches deep has been thrown up. Space will not permit a full description of the peculiar action the late earthquake had, but a future visit may cause more extended remarks.

**The Nevada Tribune**  
**June 7, 1887**

The report that the family of Senator Williams had been compelled to leave their Empire home on account of injury done to the building by the earthquake, is untrue, as they are living there in perfect content and the house is as safe as it ever was.

**The Nevada Tribune**  
**June 9, 1887**

### **JOTTINGS.**

Another slight earthquake between 11 and 12 o'clock last night.

**The Nevada Tribune**  
**June 16, 1887**

### **JOTTINGS.**

It is surprising how the flow of water at the south end of town has increased since the earthquake. The hills west of M.C. Gardner's house look as though old man Moses had come to life and struck them with his divining rod.

**Silver State**  
**June 4, 1887**

### **EARTHQUAKE ON THE COMSTOCK.**

VIRGINIA CITY, June 4.-The severest shock of earthquake ever experienced on the Comstock occurred at 2:47 yesterday morning, which lasted fully thirty seconds the vibrations were from east to west.

### **A LIVELY EARTHQUAKE**

#### **Buildings Shaken and Clocks Stopped.**

The western part of the State experienced a lively shaking up about 3 o'clock yesterday morning. The shocks are said to have extended west as far as Blue Canyon and east to Wadsworth. Senator Foley informed a Silver State reported that the first intimation he had of the shocks was given him by his wife, who thought that the hotel at which they stopped was falling.

It was reported that all the clocks at Carson stopped, and the Virginia & Truckee Railroad Agent had to telegraph to Wadsworth to get the time. So far as learned no damage was done by the shakes, though nervous people were badly frightened.

A dispatch from Virginia City says the shook was the heaviest ever experienced in the Comstock.

**Silver State**  
**June 6, 1887**

### **THE EARTHQUAKE IN WESTERN NEVADA.**

#### **Buildings Cracked and the Flow of Water Changed in Hot Springs.**

The earthquake shocks in the western part of the State last Friday morning were heavier

at Carson and Genoa than elsewhere. The papers say the Capital building was badly shaken, and the plastering and the walls cracked. The flow of water was increased at the hot springs at the State Prison and Steamboat, while Shaw's hot springs near Carson were almost dried up.

Private residences at Genoa were badly damaged, nearly all the chimneys having been cracked or thrown down. Fissures opened in the earth near Cradlebaugh's bridge, and new springs have commenced flowing near Genoa.

The residence of ex-Governor Adams at Carson was considerably damaged, as was also that of State Senator Williams, near Empire, on the Carson River.

At Deadman's ranch, near the toll house on the Ophir grade, the ground was raised in places three feet above its old level. The center of disturbance is supposed to have been on the west slope of Mount Davidson.

### **Silver State** **June 7, 1887**

#### **Freaks of the Earthquake.**

The Enterprise of Sunday last says the earthquake is reported to have opened fissures near Cradlebaugh's bridge which for a time spouted hot water and sand. The Piutes say that some years before the whites came such fissures were opened near Pyramid Lake during an earthquake, from which sheets of water were spouted to a height of sixty feet. In 1861 [1860] there was an earthquake there that tumbled boulders down off the mountain.

#### **Ruined by the Earthquake.**

The Carson Appeal says: "It is now pretty generally conceded that Shaw's Hot Springs and also the Steamboat Springs, have been nearly ruined by the earthquake. The destruction of these famous resorts will be a severe loss to the State, and cause universal regret."

The Golconda Hot Springs and Kyle's Hot Springs in this county are all right, and if gouty and rhematic people of the State want to become supple as circus men let them come to Humboldt for a few weeks.

### **Morning Appeal** **June 3, 1887**

- It is reported that the earthquake has resulted in drying up the water at Steamboat Springs to such an extent that threatens to destroy that place as a bathing resort.

**Morning Appeal****June 3, 1887 (this is likely the paper of June 4, given the first sentence)****THE EARTHQUAKE**

The earthquake was the leading topic of conversation on the street yesterday. The Appeal feels certain that it has given Carson a somewhat larger shock than was recently experienced in Reno. It was, however, not so strong a several shocks which have at times in the past been experienced here, and was not sufficiently strong to alarm anyone as to Nevada's future.

The idea in the minds of superstitious people that such things portend the end of the world is only based on ignorance and superstition. Men of science all agree that the earthquake is a sure sign that the world is still alive and undergoing some such affair that we designate as cramps and colic in the human body.

The shake was quite lively in Reno.

**ALL SORTS.**

- The vibrations were felt 1,500 feet below the surface in Virginia City.

**THE SHAKE****AN EARTHQUAKE TREMOR ROLLS OVER NEVADA****Carson Considerably Vibrated.-****The Experiences of Various People.**

Yesterday morning at quarter of three o'clock exactly, a strong shock of earthquake passed through Nevada and was especially pronounced in this city. The line of the shock seemed at the time to those who were awake, to be from North to South although there is considerable evidence to show it was rotary.

Within five minutes after the shock

**THE STREETS WERE FILLED WITH PEOPLE**

Some badly frightened, some considerably amused and all chattering volubly over the occurrence, with each man relating his own personal experience. After the first shock which lasted several seconds, there were two more slight tremors. Many people were so worried over the matter that they declined to go to bed again.

**TILE DAMAGE.**

All of the merchants have more or less damage to report by the falling of fragile wares. Every store in the city lost from \$20 to \$30 on broken crockery and glass ware, and in private families pictures were shaken from the walls and more or less damage done.

Ex Governor Adam's house was very badly wrenched, pictures and plaster fell from the walls and the place considerably littered up. Shultz's stone building was probably the worst damaged in town and the rear wall will probably be taken down. The Rinckle building was cracked in several places.

The Appeal office was cracked in front and pictures and plastering fell in the editorial

room. Dozens of buildings all over the city are slightly cracked. Some estimate the damage at \$1,000 and some as high as \$5,000. It is certain however that no one individual was badly damaged.

The buildings which were more or less damaged, or whose contents were damaged are: E.B. Rail's, Bullion & Exchange Bank, Muller Schmitt's, Ormsby House, Chedie's grocer and Schneider's Bakery. The plaster fell in the U.S. Mint.

#### AT THE HOT SPRINGS.

Shaw's Springs were badly effected by the shock and the water lowered six inches. It was reported yesterday that the springs were ruined, a report which everybody hopes is not true.

Warden McCullough at the State Prison says that the hot springs there raised six inches and the additional flow of water was white with soda and sulphur.

Cagwin's artesian well has increased its flow.

#### INCIDENTS.

Oliver Roberts the night watchman of the State Capitol supposed burglars were trying to break in the doors, rushed around the place flourishing a big six-shooter. Deputy State Controller Holbrook was in bed in the rear of the office and Roberts says that he heard him kicking frantically at the door, begging to be let out.

Daugherty, the gardner, sprang out of bed and rushed about the Capitol grounds in his night clothes. It was some time before he could be persuaded to dress himself.

A good many other people ran out of their houses in their night clothes.

Tim Dempsey relates some very queer experiences.

Judge Edwards says that his horse screamed like a human being.

Numbers of people were shaken out of bed.

In the livery stables the horses were all panic stricken and attempted to get away, neighing and screaming in terror.

Cows bellowed for half an hour afterwards, the chickens kept up incessant squalling, and the dogs bayed dismally.

Kaiser's son, of the Ormsby House on feeling the shock jumped out of bed and dashing into the center of the room grabbed a revolver and leveled it in the direction of the sound. There happened to be a looking glass in front of him and it being moonlight he says his figure reflected. Thinking it was a burglar with the drop on him, he dropped his pistol and threw up his hands.

James Raycraft was on the street rushing for a doctor when the shock threw him face forward to the ground.

#### DIRECTION OF THE SHOCK.

Every man seems to have a different theory as to the direction of the shock.

In the State Capitol all clocks with pendulums swinging East and West stopped at 2:45, while those with pendulums vibrating North and South were not disturbed. In other places, however, the result was exactly the reverse.

#### A PERSONAL EXPERIENCE

At the writer's place pans of milk were shaken in a way that indicated the shock was rotary.

A buggy in the barn was dashed across the floor against the side of the barn and the shafts of a cart on the outside were plowed along the ground in a South-westerly direction.



When the shock came the writer was asleep and as he rose up it seemed as if a number of people had entered the house and were engaged in smashing up everything inside.

A party not far from the writer at the time, alleges that he yelled out, "Hay there! What's the matter with yer?" and danced about the room like an escapee from the Reno Asylum.

#### PARTIES WHO WERE NOT ALARMED.

In the morning there were lots of people who insisted that "it did not frighten them in the least."

This sort of people grew beautifully less by noon, as people began to make more candid admissions of their experiences.

It soon became the general opinion that the man who declined being frightened was a liar or a drunk.

No one who was suddenly awakened by the shock but felt a vague sense of terror as if something terrible had happened or was about to.

#### IN DOUGLAS COUNTY.

Genoa was badly broken up. A new brick building belonging to a Mr. Boyd, just on the eve of completion, will have to be taken down and rebuilt.

The County Clerk stated that his house was so twisted that the water pipes were useless.

A fissure in the ground opened near Cradlebaugh's bridge, some say fifty feet deep, and mud and hot water spouted out for half an hour then abated.

#### THE STATE MONEY SHAKEN UP.

When State Treasurer Tuffy opened the State safe in the morning a terrible sight met his eyes. The stacks of gold had all been thrown down. The twenties had fallen gracefully and evenly. The tens had been thrown further and the fives were dashed up against the safe's walls and scattered in every direction. A pail[?] of \$60,000 fell in a due line toward the Appeal office, but of course did get that far.

#### WELLINGTON STEWART'S STORY.

Wellington Stewart, the attorney was on his ranch in Washoe and was up looking after some stock that had broken into his inclosure. He says the house rocked East and West as he stood and then everything vibrated up and down. Everybody who was awake heard a load rumbling like a heavy train of cars thundering down a grade. The undefinable roar of thunder seemed everywhere, in the ground and in the air and the instant it stopped came the shock.

Another is expected soon, on the ground that the weather is of a pronounced earthquake character.

### **Morning Appeal**

**June 5, 1887**

- Parties still swap earthquake stories, until an earthquake story is an awful bore.
- The upper story of Senator Williams' brick house was so badly rocked by the earthquake that it will have to be taken down. The shake of 1868 was the first to crack it.
- It has been ascertained that the aqueduct at the City of Mexico was cracked in some

places by the earthquake of Sunday, and a curious phenomenon is reported. The water first became heated and afterwards cold. Confirmatory evidence has been received of sulphurous gases being perceptible at various places.

### **Nevada's Hot Springs.**

It is now pretty generally conceded that Shaw's Hot Springs and also the Steamboat Springs, have been nearly ruined by the earthquake. The destruction of these famous resorts will be a severe loss to the State, and cause universal regret. Shaw's, however, although quite low, are still running water, and it is thought that by a pumping apparatus he will soon be able to supply the baths.

### **Stopped in Time.**

"Ye see, I was in bed with my wife when I woke up, and I thought the d----- house was about to fall. Ye see I wasn't scared a bit, for I knew -"

Just then some one hit the lunatic in the nose, and so the two-hour narration of his earthquake experience was rudely nipped in the bud.

### **Morning Appeal**

**June 7, 1887**

- Parties who were awake on Sunday night at midnight claim they felt another shock.

- Shaw was offered \$2,000 for his Hot springs yesterday and refused. He is still willing to gamble on the chances of another quake.

### **Shaw's Hot Springs.**

It is now a settled fact that the famous Hot Springs are dry. These springs have for years been noted all over the Coast as one of the most wonderful medical springs in the world, but the Appeal is inclined to the idea that the people of Carson never appreciated them so much as when they found they were gone.

They were first developed by ex-Sheriff Swift and sold to Mr. Shaw, their present owner, for \$10,000.

A few weeks ago they fell several inches and acted strangely, and their owner spent a good deal of money having them repaired.

On the fatal night of the earthquake they received a shock which gave them a quietus. It is probable that the shock closed up the fissure which extended to the big reservoir several hundred feet below the surface. It is also probable that the springs were first caused by an earthquake, and Shaw says that sometime he expects another shock to come and open them up again.

Mr. Shaw has the sympathy of everybody in his lose, but sympathy don't go far to restore a loss of that description.

**Morning Appeal**  
**June 9, 1887**

**Steamboat Springs.**

The charge made by the Virginia Report that the Chronicle pronounced Steamboat Springs materially affected by the earthquake because the Springs did not advertise, is unfair to the Chronicle.

It was reported here that the Springs were almost dry, and reputable citizens who had visited them so stated.

It is now said that they are flowing as well as ever. We hope such to be the fact, as any loss of any hot springs of Nevada is a loss to the State.

It is too common occurrence for one newspaper to charge another with a bad motive because frequently in chronicling news the toes of a non-advertiser are trodden upon.

...

**Morning Appeal**  
**June 10, 1887**

- Not a morning passes now that somebody does not insist on recording another slight earthquake shock.

- Sheriff Williams of Genoa thinks that his little burg was the center of the earthquake disturbances.

**Hope for the Springs.**

Shaw has a force of men at work on the Springs and they are sinking into the solid rock in search of water. At a depth of 18 inches below the surface they have found hot water that is not reduced by bailing, and the search will be continued. With the machinery Shaw has he can pump 1,800 gallons an hour.

It is though by some that the earthquake opened a new reservoir which, when filled will cause the water to back up and find a vent where it did before.

Swift, who knows the moods of the springs, thinks that in a month or so the flow will be resumed.

There also is considerable talk of sinking an artesian well. Shaw is making a game fight for the water, and if energy will win he will soon be on his feet again.

**Wants the Capitol.**

The Walker lake Bulletin wants the Capitol and all the public buildings moved to Hawthorne on the ground that it is the only place in the State not disturbed by the earthquake. Mr. Campbell feels a good deal as Richeleau did when the king in a crisis remarked: "The ground on which he stands alone escapes the earthquake."

This matter will be fully considered Jack.

### **Increased Flow from Springs.**

Mr. Gardner, foreman of the stock yards, reports the flow of his springs increased five times in volume since the earthquake. Mr. Gilbert's springs in the Southwest portion of the city flowed hot water several hours after the shock and then gradually became cold. An artesian well belonging to the writer increased flow and became considerably colder.

### **Morning Appeal**

**June 11, 1887**

- Professor Friend is at work on a seismometer, an instrument to measure the duration of earthquake shocks. A pan of molasses will give you the direction of the shock about as well as anything.

...

- There is now good foundation for hoping that Shaw's Springs will come out all right. A little more development is all that is needed to place the old resort on its feet again. Everyday that the work goes on brightens the prospects.

### **Genoa Weekly Courier**

**June 10, 1887**

### **GLENBROOK.**

...

But not even Glenbrook can boast of an exception to the earthquake, unless it be that the shaking was exceptionally hard. Ceilings were cracked and the plastering torn off, and lamps and dishes were broken. At Short's store a good many pieces of glassware and crockery could be bought at great discount. Chimney's in some places were torn down to the roof. One remarkable freak of the phenomenon was that the chimney at the Lake House was turned bodily about a quarter of the way around and yet it did not fall, even when it was replaced and secured.

### **THE EARTHQUAKE.**

It is generally conceded that the earthquake of last Friday morning was the heaviest that has ever visited this section. The earth shook violently for a number of seconds, and much damage was done to stone and brick buildings. The Boyd residence, about a mile east of town, is badly wrecked, and will probably have to be taken down. The well filled up with sand and there are a number of small cracks in the earth out of which was thrown mud and water.

At the Rosser ranch, a short distance north of Boyd's, a brick chimney was shaken down.

At Cradlebaugh's bridge the shock was also very severe. The toll-house was moved about two inches from the foundation, the ground cracked open in several places and water and a ton or more of sand was thrown up.

The Court House in Genoa is badly wrecked, and the walls of Harris' store are cracked in a number of places. The residence of S. A. Kinsey is also considerably damaged. A brick chimney on the Nevada Hotel was shattered and twisted, but did not fall. The chimney on the toll house at the foot of Kingbury grade was thrown down and the bricks scattered in every direction.

The shock was very heavy at Sheridan, but as there is no brick buildings there, little damage resulted.

The earth shook considerably at Markleeville, but eighteen miles above that place, at Joe Harvey's ranch the shock was very light.

The flow of water at Walley's Springs was increased by the earthquake and is said to be hotter than previously.

The quake was quite heavy in Washoe and Store counties, but not so severe as in Ormsby and Douglas. Many think this county was the center of the disturbance.

We clip the following noted from our exchanges:

The shock was distinctly felt at the depth of 1500 feet in the Comstock mines.

Every man has a different theory as to the direction of the shock.

In the Capitol all clocks with pendulums swing East and West stopped at 2:45 while those with pendulums vibrating North and South were not disturbed. In other places, however, the result was exactly the reverse.

Shaw's hot springs near Carson were badly effected by the shock and the water lower six inches, while the hot springs at the State Prison raised six inches and the additional flow of water was white with soda and sulphur.

All of the Carson merchants were more or less damaged. The Appeal says every store in the city lost from \$20 to \$30 on broken crockery and glass ware.

Ex-Governor Adam's house was very badly wrenched, pictures and plaster fell from the walls and the place is considerably littered up. Schulz's stone building was probably the worst damaged in town and the rear wall will probably be taken down. The Rinckle building was cracked in several places.

The Appeal office was cracked in front and pictures and plastering fell in the editorial room. Dozens of buildings all over the city are slightly cracked.

James Ravcraft was on the street rushing for a doctor, when the shock threw him face forward to the ground.

The quake exhibited various peculiarities in Carson. According to the *Index* in one place it seemed to oscillate like a pendulum: in another there was a rotary motion like Hark's sausage machine, and then again it seemed to pick up the town site and slam it down as a disgruntled schoolboy discards a rotten apple. In other places the sensation experienced was as if the Creator were giving us the grand bounce and kicking us into the illimatable hence.

A new hot spring broke out in the southern part of Carson near the residence of Mr. Gilbert and the springs at Steamboat have nearly doubled their flow.

At Glenbrook the shock was very severe. A correspondent of the *Union* says at Short's store, which is built on a wharf and rests on piles in the lake, the damage was the greatest. All the glass and crockery ware fell down, also many tins banging overhead. One brick chimney at the end of the store, over the lake, was completely demolished, scarcely a brick left standing.

The clerks and book-keepers sleeping in the store were completely covered with articles of merchandise. They quickly made their escape and fearing a repetition did not return during the remainder of the night. At F. S. Jellerson's saloon, bottles and glasses were thrown from the shelves back of the bar, and a new brick chimney was badly cracked. It is reported that some large boulders were dislodged at Cave Rock and thrown into the lake.

The editor of the Carson *Tribune* spent a couple of days in Genoa taking earthquake notes and it is evident from the account that appeared in the *Tribune* on Monday that the good man was imposed upon. Contrary to that paper's report, the earthquake was very heavy at Walley's Springs. A large crack was made in the cellar floor and the ground cracked open in a couple of places near the buildings. The stonewall on Nixon street, opposite Mr Kinsey's property, fell down several months previous to the earthquake and the Boyd residence was erected nearer twenty years ago than three, as stated by the *Tribune*. We presume the report that "every man, woman, and child" united in prayers on Main street is all right.

I [Issac] Cohn, of Sheridan was damaged about \$50 by the earthquake. There are a couple of large cracks in the rear wall of his store and several pieces of crockery and glassware were broken.

#### **Local Intelligence.**

There was a slight earthquake about midnight Sunday night.

Wm. Zirn has taken a contract to repair the damage done to the Court House by the earthquake.

**Genoa Weekly Courier**  
**June 17, 1887**

#### **Local Intelligence.**

...

Another light shock of earthquake was felt here last Saturday morning about 9 o'clock.

#### **Earthquakes.**

The second class of volcanic phenomena are earthquakes. These consist of vibrations or tremblings of the earth's crust, and are caused by movements in the fluid interior; but how these movements are produced, is as yet unknown. It is estimated that since the Creation earthquakes have destroyed thirteen million human beings. ...

[rest of discussion generalized discussion of earthquakes, but notes that 1868 was a remarkable year for the number and severity of earthquakes.]

**Genoa Weekly Courier**  
**June 24, 1887**

We are still having earthquakes. The last occurred yesterday morning about 3 o'clock. It was quite a lively shake and was felt throughout the valley, but the shock was not nearly so severe as the one on the 3d instant.

**Mountain Democrat**  
**June 18, 1887**

The Virginia Enterprise says that during the recent earthquake Lake Tahoe "boiled like a pot." Our contemporary is evidently in error there. A. W. Ramsey, who keeps the store at Rowlands, was seriously shaken up by the shock, and in his store at least \$100 worth of goods were destroyed. Mr. Ramsey's store and dwelling are built upon piles extending out into the lake. He was awakened by the earthquake, and at once looked out upon the lake to see its effect there, and was surprised to see the water perfectly calm and smooth - and this too while his house was trembling from the shock. Here is a peculiar phenomenon for someone to explain. Our authority for the above statement is the Lake Valley mail carrier, to whom Mr. Ramsey told these facts.

**LOCAL JOURNAL ACCOUNTS**

From **Journals of Alfred Doten**, Reporter for the Virginia Daily Union, Territorial Enterprise, and Gold Hill Evening News

Friday, June 3, 1887 (Virginia City)

...At 10 minutes to 3 this morning was very summarily awakened by a smart shock of earthquake - Lasted 3 or 4 seconds, & the vibrations seemed to be from west to east - Shook down a little plastering in this & a few other buildings, rang the Corporation House bell 3 taps - Many were of opinion that the vibrations were from SW to NE - Any how most of the pendulum clocks, which were the only ones stopped, swung north & south - The clocks in the 2 banks, Nev and Cal on C Street, opposite sides of the street stopped simultaneously at 12 minutes to 3 - anyhow beyond a little ceiling plaster falling, there was little or no damage, from it throughout the city - Many people who got out of the International and other sleeping places did not go to bed again - No(?) harm was done in the grocery stores, throwing down shelf goods & destroying the same as in Dec. 26, 1869 - the last big earthquake here - Pickles, sweet oil, whisky, olives, pepper sauce and other shelf goods piled up in a genuine "smash" or "cocktail" on the floor - Two firewalls of brick buildings on B St fell then - This shock, like the other was felt principally in the upper levels of the mines, and not noticeable at much depth - This shock was felt very generally throughout the Pacific Coast, stronger in Carson, Dayton, Reno, etc, than here, but doing little

harm anywhere - Threw goods off the shelves in Silver City and Dayton, - also in Carson - On this occasion, I got out of bed, pretty lively, same as did the lodgers in the International, Fredrick House and other big bricks - dressed and went down town - Noticed Gillig's thermometer stood at 49 degrees - Found lots of people on the streets to chat with about the earthquake - Didn't go to bed again - till about noon - when lay down in my clothes, on the bed, & slept 3 hours ...



**1887 Earthquake Intensity Summaries**  
(modified from Toppozada and others (1981))

Earthquake: Date: 1887, June 3  
Time: 10:50 GMT; 02:50 PST  
Location: 39.2 N?, 119.8W? Carson Valley

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**Nevada**

Carson City

Carson City (Carson) Int. = VI-VII  
Brick walls cracked, some badly; chimneys on a building badly shaken up. *Reno Evening Gazette*, 4 June 1887, p. 1.

Empire Int. = VII  
Second story of house badly damaged. *Territorial Enterprise*, 4 June 1887.

State Prison Int. = VI+  
Hot springs increased flow. *Marysville Daily Appeal*, 4 June 1887, p. 3.

Douglas County

Cradlebaugh's Bridge Int. = VII-VIII  
Toll house shifted off its foundation by 5 cm (2 in) and extensive liquefaction fissures and water spouts. *Carson Daily Index*, 4 June 1887; *The Nevada Tribune* (Carson City), 4 June 1887.

Genoa Int. = VIII  
Bottles and dishes shaken from shelves; bricks thrown from chimneys; plastering fell from ceilings and walls; houses shifted on their foundations. *Oakland Daily Evening Tribune*, 3 June 1887, p. 3.

Glenbrook Int. = VII  
Extensive nonstructural damage; chimneys fell. *Genoa Weekly Courier*, 10 June 1887.

Sheridan Int. = VI-VII  
shock very heavy; broken crockery and glassware; large cracks in rear wall of store. *Genoa Weekly Courier*, 10 June 1887.

Eureka County

Eureka Int. = not felt  
Not felt. *Eureka Sentinel*, 11 June 1887, p. 1.

## Humboldt County

Winnemucca                      Int. = severe  
 Very severe. *Virginia Evening Chronicle*, 7 June 1887, p. 3.

## Lander County

Austin                              Int. = IV  
 Windows rattled; door opened. *Reese river Reveille* (Austin) 4 June 1887, p. 1.

## Lyon County

Dayton                              Int. = V-VI  
 Some crockery and brittle ware broken. *Daily Territorial Enterprise* (Virginia City), 4 June 1887, p. 3.

Mason Valley                      Int. = severe  
 Severest ever experienced. *Virginia Evening Chronicle*, 9 June 1887, p. 3.

## Mineral County

Hawthorne                      Int. = felt  
 Not felt. *Morning Appeal* (Carson City), 5 June 1887  
 Slight rumbling heard. *Virginia Evening Chronicle*, 9 June 1887, p. 3.

## Storey County

Silver City                              Int. = V-VI  
 Some crockery and brittle ware broken. *Daily Territorial Enterprise* (Virginia City), 4 June 1887, p. 3.

Virginia City                      Int. = VII  
 Articles thrown from shelves. *Daily Territorial Enterprise* (Virginia City), 4 June 1887, p. 3.  
 Plaster knocked from ceilings; brick walls cracked. *Virginia Evening Chronicle*, 3 June 1887, p. 3.  
 Two fire walls fell. Doten's Diary (unpublished)

## Washoe County

Lawton's Hot Springs              Int. = VI+  
 Flow somewhat diminished. *Daily Territorial Enterprise* (Virginia City), 4 June 1887, p. 3.

Pyramid Lake                      Int. = severe  
 Very severe. *Morning Appeal* (Carson City), 5 June 1887, p. 3.

Reno                                  Int. = VI  
 Ornaments toppled over; clocks stopped; plastering cracked and loosened in

places. *Reno Evening Gazette*, 3 June 1887, p. 3.

Steamboat Springs                      Int. = VI+  
Springs increased flow. *Reno Evening Gazette*, 3 June 1887, p. 3.

Wadsworth                      Int. = severe  
Most severe ever experienced in Nevada. *The Daily Bee* (Sacramento), 3 June 1887, p. 3.

Washoe Valley (eastern foothills)                      Int. = V+  
Ground raised more than three feet above natural level. *Virginia Evening Chronicle*, 4 June 1887.

## California

### Alpine County

Markleeville      Int. = severe  
Severe. *Daily Alta California* (San Francisco), 5 June 1887, p. 5.

### Amador County

Amador                      Int. = IV  
Windows rattled. *Virginia Evening Chronicle*, 7 June 1887, p. 3.

Ione                      Int. = IV-V  
Heavy; "the people were much excited". *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

Jackson                      Int. = heavy  
Quite heavy. *The Amador Dispatch* (Jackson), 4 June 1887, p. 3.

Oleta                      Int. = V-VI  
Shook dishes off shelves in some houses. *The Amador Dispatch* (Jackson), 4 June 1887, p. 3.

Plymouth                      Int. = IV  
Glassware jingled. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

### Butte County

Cherokee                      Int. = felt  
Felt. *San Francisco Chronicle*, 4 June 1887, p. 8.

Chico                      Int. = IV  
Most severe ever felt; no clocks stopped. *Weekly Butte Record* (Chico), 11 June 1887, p. 1.

Rattled windows. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

Oroville Int. = V

Quite severe. *Weekly Butte Record* (Chico), 11 June 1887, p. 1.

Awoke a good many sleepers; not felt by many. *The Morning Call* (San Francisco), 4 June 1887, p. 8.

#### Calaveras County

Milton Int. = V

Aroused people from their sleep. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

Mokelumne Hill Int. = VI+

Awoke people; started a spring. *The Calaveras Chronicle* (Mokelumne Hill), 4 June 1887, p. 3.

Murphy's Int. = heavy

Heavy. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

#### Colusa County

Arbuckle Int. = V

Woke up most everybody. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

Colusa Int. = IV

Shook up China closets, chandeliers, etc. *The Weekly Colusa Sun*, 4 June 1887, p. 3.

Grimes Landing Int. = IV

Doors, windows, etc. rattled. *Oakland Daily Evening Tribune*, 3 June 1887, p. 3.

#### Contra Costa County

Antioch Int. = severe

Severe. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

#### El Dorado County

Coloma Int. = VI

In some cases, plastering loosened from the walls. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

Georgetown Int. = VI

Many people awakened; plaster ceilings cracked; a few items on shelves in the stores tipped over; a few bricks knocked from a chimney. *Georgetown Gazette*. 4

June 1887, p. 2.

Placerville Int. = VI

People awakened; windows and crockery rattled; clocks stopped; plastering knocked from brick buildings. *The Mountain Democrat* (Placerville), 4 June 1887, p. 3.

#### Glenn County

Germantown (Artois) Int. = heavy

Quite heavy. *The Daily Bee* (Sacramento), 3 June 1887, p. 3.

Orland Int. = V

Stopped a number of clocks. *The Daily Examiner* (San Francisco), 4 June 1887, p. 3.

#### Lassen County

Long Valley Int. = felt

Quite a shock. *Lassen Advocate* (Susanville), 9 June 1887, p. 3.

Susanville Int. = severe

Severe. *Lassen Advocate* (Susanville), 9 June 1887, p. 3.

#### Mariposa County

Yosemite Valley Int. = V

Felt severely. *Oakland Daily Evening Tribune*, 3 June 1887, p. 3.

Awoke most people. *Sacramento Daily Record-Union*, 4 June 1887, p. 8.

#### Merced County

Snelling Int. = severe

Quite severe. *The Merced Star*, 9 June 1887, p. 3.

#### Mono County

Mono County Int. = heavy

Very heavy. *Foothill Weekly Tidings* (Grass Valley), 10 June 1887, P. 1.

#### Napa County

Calistoga Int. = felt

Felt. *Virginia Evening Chronicle*, 7 June 1887, p. 3.

#### Nevada County

Grass Valley Int. = V-VI

Some Crockery thrown from shelves in a store; some clocks stopped. *Foothill Weekly Tidings* (Grass Valley), 10 June 1887, p. 1.

Indian Springs                      Int. = not felt

Not felt. *The Daily Transcript* (Nevada City), 4 June 1887, p. 3.

Meadow Lake                      Int. = severe

Violent. *Sacramento Daily Record-Union*, 3 June 1887, p. 3.

Nevada City                      Int. = V

Awoke people; rattled windows. *The Daily Transcript* (Nevada City), 4 June 1887, p. 3.

North San Juan                      Int. = heavy

Heaviest known. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

Penn Valley                      Int. = severe

As severe as Grass Valley. *Grass Valley Daily Union*, 4 June 1887, p. 3.

Pleasant Valley                      Int. = VI?

Frame work of a barn being built shaken down. *The Daily Transcript* (Nevada City), 5 June 1887, p. 3.

Soda Springs                      Int. = VI+

Springs increased flow. *Sacramento Daily Record-Union*, 3 June 1887, p. 3.

Truckee                      Int. = VI

A few brick buildings cracked; most clocks stopped. *Marysville Daily Appeal*, 4 June 1887, p. 3.

Washington                      Int. = felt

About the same as Nevada City. *The Daily Transcript* (Nevada City), 4 June 1887, p. 3.

You Bet                      Int. = V

Awoke all the hands at the mill. *The Daily Transcript* (Nevada City), 4 June 1887, p. 3.

#### Placer County

Auburn                      Int. = V

Awoke many people. *The Placer Argus* (Auburn), 4 June 1887, p. 3.

Blue Canyon                      Int. = VII

Threw down a chimney. *The Reno Evening Gazette*, 4 June 1887, p. 2.

Colfax            Int. = heavy  
Heavy. *Virginia Evening Chronicle*, 7 June 1887, p. 3.

Dutch Flat      Int. = VI?  
People awakened. *The Placer Herald* (Auburn), 11 June 1887, p. 2.  
Some damage; frightened everyone. *The Morning Call* (San Francisco), 4 June 1887, p. 8.

Forest Hill            Int. = IV-V  
Shook the house considerably. *The Placer Herald* (Auburn), 18 June 1887, p. 5.  
Heavy. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

Iowa Hill            Int. = IV-V  
Created quite a sensation. *The Placer Herald* (Auburn), 11 June 1887, p. 5.

Lincoln            Int. = IV-V  
Windows and crockery shaken. *The Daily Bee* (Sacramento), 3 June 1887, p. 3.

Michigan Bluff      Int. = IV-V  
Caused some commotion. *The Placer Argus* (Auburn), 4 June 1887, p. 3.

Summit            Int. = heavy  
Very heavy. *Sacramento Daily Record-Union*, 4 June 1887, p. 5.

#### Plumas County

Greenville      Int. = V  
Roused many sleepers. *Greenville Bulletin*, 8 June 1887, p. 3.

Quincy            Int. = V  
“Quite a lively shock of earthquake ... shook up our citizens ...” *Plumas National* (Quincy), 4 June 1887, p. 3.

#### Sacramento County

Clay Station            Int. = felt  
Sharp. *The Daily Bee* (Sacramento), 3 June 1887, p. 3.

Galt            Int. = V  
Stopped clocks. *The Weekly Galt Gazette*, 4 June 1887, p. 3.

Sacramento      Int. = V  
Awoke all but a few. *The Daily Bee* (Sacramento), 3 June 1887, p. 3.

#### San Francisco County

San Francisco                      Int. = light

Light. *Foothill Weekly Tidings* (Grass Valley), 10 June 1887, p. 1.

Not felt. *Grass Valley Daily Union*, 5 June 1887, p. 3.

San Joaquin County

Stockton                      Int. = V

Awoke most sleepers. *The mail* (Stockton), 3 June 1887, p. 3.

Sierra County

Downieville                      Int. = felt

Not much of a shake. *The Mountain Messenger* (Downieville), 4 June 1887, p. 3.

Sierra City                      Int. = VI

Awoke everybody; rang the town bell. *San Francisco Chronicle*, 4 June 1887, p. 8.

Solano County

Dixon                      Int. = V

“... disturbed the slumbers of Dixonites ...” *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

Sonoma County

Santa Rosa                      Int. = not felt

Not felt. *Daily Republican* (Santa Rosa), 4 June 1887, p. 3.

Stanislaus County

Modesto                      Int. = IV-V

Awoke several people. *Daily Evening News* (Modesto), 3 June 1887, p. 1.

Sutter County

Nicolaus                      Int. = IV

Rattled windows. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

Yuba City                      Int. = V

Awoke quite a number of people; bedsteads on rollers moved a little. *The Sutter County Farmer* (Yuba City), 10 June 1887, p. 2.

Tehama County

Red Bluff                      Int. = severe

Severe. *Weekly People's Cause* (Red Bluff), 11 June 1887, p. 5.



## Tuolumne County

## Columbia

Int. = felt

Sharp. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

## Sonora

Int. = V

Awoke people. *The Tuolumne Independent* (Sonora), 4 June 1887, p. 5.

## Yolo County

## Davisville

Int. = V

Stopped a clock. *The Daily Bee* (Sacramento), 3 June 1887, p. 3.Awoke almost everyone. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

## Woodland

Int. = V

Doors and windows rattled; light furniture moved. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

## Yuba County

## Camptonville

Int. = felt

Felt. *Marysville Daily Appeal*, 4 June 1887, p. 3.

## Marysville

Int. = V

Awoke many people; windows rattled; clocks stopped. *Marysville Daily Appeal*, 4 June 1887, p. 3.

## Smartsville

Int. = V

Awoke people. *The Daily Examiner* (San Francisco), 4 June 1887, p. 2.

## Wheatland

Int. = V

Woke everybody. *Daily Evening Bulletin* (San Francisco), 3 June 1887, p. 3.

## County Unknown

## Alabama

Int. = felt

Felt. *The Weekly Galt Gazette*, 14 June 1887, p. 2.

# 1888, January 30 Carson Valley Earthquake

## EARTHQUAKE SUMMARY

There were several earthquakes in western Nevada during January, February, April, and May of 1888, and again during the early summer of 1889. These may have been aftershocks of the 1887 earthquake. The severest shaking for the February 3, 1888 event appears to have been within Carson Valley, similar to the 1887 event (Genoa Weekly Courier, 2/3/1888). None of these events had very high intensity values (max. MMI V). The main effects of these earthquakes beyond being felt was shaking of houses, rattling of doors, and causing dogs to bark all over Carson City (Morning Appeal, 1/31/1888).

## EARTHQUAKE CATALOG ACCOUNTS

### Holden's 1898 Earthquake Catalog

#### 1888. January 29; 10:35 p.m.

Carson, Nevada, a slight shock (IV to V)[RF]. Grass Valley, Cal.: the same shock (II)[RF]. - *Grass Valley Tidings*, Feb. 3. Carson 10:45 p.m., S.W. to N.E. (III)[RF]. -C.W.F.

#### 1888. May 27; 1:50 a.m.

Carson (Nev.), S.N.; light, followed by quite a heavy shock 20 sec. later. - C.W.F.

### Slemmons and others (1965)

#### 1888-1-30; 06:35 a.m.;

39°N Lat., 120.0 W. Long;

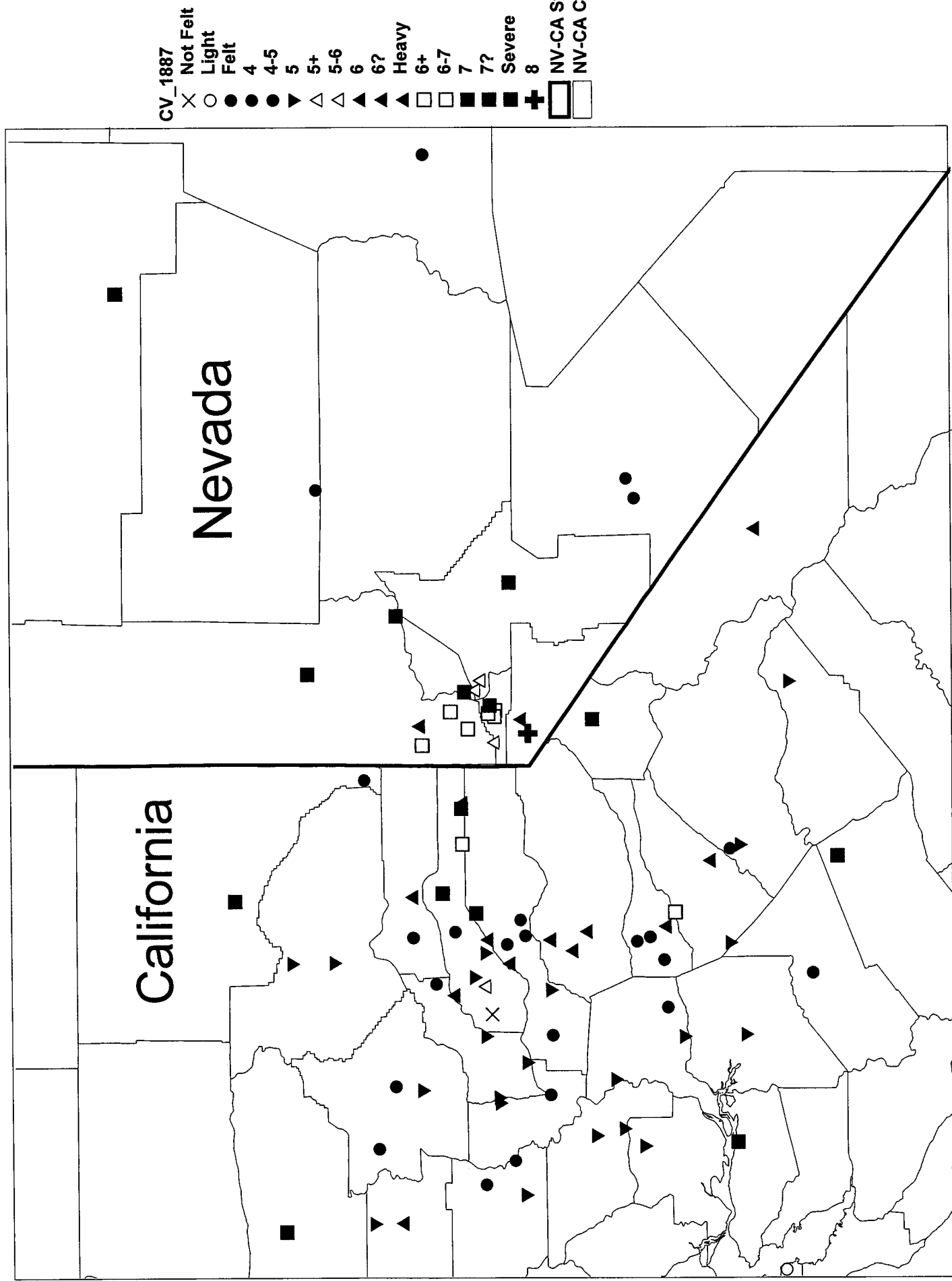
**magnitude 4.5, max. Intensity, MMI V**

T-A. IV to V at Carson City, II at Grass Valley. Felt area is more than 4,000 sq. mi. may be Calif. Epicenter. WB reports at Carson City; slight, lasting but a fraction of a sec. Single vibration. From the SW.

#### 1888-05-28 09:50 [GMT], 39.0 N. Lat., 119.8 W. Long., Intensity MMI V

T-A. S to N (light) with quite heavy shock 20 sec later of 5 sec duration.

# Carson Valley Earthquake - 1887



**NEWSPAPER ARTICLES:****Morning Appeal  
January 31, 1888****Another Earthquake.**

On Sunday night, at 25 minutes to 11, there was a slight earthquake shock. It rattled doors, shook houses, and caused dogs to barks all over this city. Oliver Roberts, the Meteorological Director, describes the direction as rotary. No damage.

**Genoa Weekly Couirer  
February 3, 1888****Another Earthquake.**

On Sunday night, at 25 minutes to 11, there was a slight earthquake shock. There was only one shock, and about half of our residents did not know anything about it until the next morning. Out at Boyd's place, as was the case last June, the quaking of the earth was more severe. Members of the family sleeping in the upper story felt the shock very distinctly, and got up and went down stairs. At Cradlebaugh's bridge the quake was also quite heavy.

# 1894, November 18 and December 18 Virginia City Earthquakes

## EARTHQUAKE SUMMARY

The earthquakes of November and December 1894 make up a remarkably energetic and localized earthquake sequence, over about a months time. This sequence was being felt at Virginia City, commonly felt at Carson City and Dayton, but apparently was not notably felt in Reno. Also noteworthy is that many of these events were strongly felt in underground mines; this was true for most of the larger events, except the December 18<sup>th</sup> earthquake, where the earthquake was felt underground, but not as severely as at the surface.

There were five earthquakes in this sequence that caused Modified Mercalli Intensity VI, where people were alarmed and emptying the buildings into the streets, goods and crockery were being knocked off the shelf, plaster fell off ceilings and walls, and some windows were cracked and broken. One gets the feeling that many of these buildings were at their damage limits, but that they performed adequately during these events. The two largest events of the sequence appear to have been on November 18 and December 18. Both of these appear to have caused nonstructural damage in Virginia City. The *Territorial Enterprise* and *Lyon County Times* both declare the December 18 earthquake to have been the most severe of the sequence.

As a note, it was reported by some people that the earth trembled for minutes before the December 18 earthquake and that some people were expecting a large event when it came; apparently there was an immediate series of foreshocks preceding this earthquake, potentially giving people an unusually long period of time to prepare for the main shaking.

## EARTHQUAKE SEQUENCE (PST)

Accounts are from Virginia (City) unless otherwise noted.

<u>Date</u>	<u>Time (PST)</u>	<u>Comments</u>
November 10, 1894 (Sat.)	6:55 PM	light earthquake
November 14, 1894 (Wed.)	2:20 PM	severe earthquake
	2:45 PM	severe earthquake
	6:55 PM	most severe event on day (MMI-V)
November 15, 1894 (Thur.)	11:07 PM	severe shock (MMI-VI)
	11:20 PM	slight shock
November 16, 1894 (Fri.)	12:15 AM	slight shock
	?	2 <sup>nd</sup> shock this day?
November 17, 1894 (Sat.)	10:45 AM	severe shock (MMI-V)
	11:05 AM	2 <sup>nd</sup> shock
November 18, 1894 (Sun.)	2-3 AM	Comstock shaken incessantly; 27 violent earthquakes felt in Virginia this morning. At least one event (2:40?) caused MMI-VI.
	2:38 AM	tremor recorded in CC
	2:40 AM	tremor recorded in CC (largest event on day)
	2:49 AM	shock recorded in CC
	5:15 AM	small shock recorded in CC
	5:23 AM	small shock recorded in CC
	7:22 AM	small shock recorded in CC
November 21, 1894 (Wed.)	2:15 AM	small shock
November 22, 1894 (Thur.)	1:00 AM	severe shock in Carson
November 16-22, 1894		>100 eqs. felt in Virginia this week
November 23, 1894 (Fri.)	?	two shocks felt in Dayton
November 24, 1894 (Sat.)	10:02 PM	severe shock (MMI-VI)
	10:25 PM	severe shock (MMI-VI)
December 2, 1894 (Sun.)	?	several slight shocks
December 4, 1894 (Tue.)	9:39 PM	small shock
December 16, 1894 (Sun.)	1:24 PM	earthquake shock
December 18, 1894 (Mon.)	9:08 AM	largest event of sequence? (MMI-VI)
December 19, 1894 (Tue.)	morning	two little shocks
December 21, 1894 (Thur.)	2:20 AM	small shock
December 23 & 24, 1894	?	five earthquakes; two of considerable severity

aftershocks continued occasionally until at least Jan. 25, 1895 (see Holden, 1898).

## EARTHQUAKE CATALOG ACCOUNTS

### Holden (1898) Earthquake Catalog

#### 1894. November 18; Carson Nev.

Earthquake shocks continue to be felt. Between 3 and 7 o'clock this morning six distinct shocks were felt, the first being very heavy. Thus far no damage has been done except to cause acute nausea (VII) and prevent sleep. The direction of the vibrations varies considerably, and the shocks are usually preceded by a roaring sound.- *S.F. Chronicle*. [2:38 a.m.; 2:40 a.m.; 2:49 a.m.; III, sharp; 5:15 a.m.; 5:33 a.m.; 7:22 a.m.; all "tremors" except 2:49 a.m. - C.W.F.] Austin, Nev.: 10 a.m., II; Carson 2:38 a.m., I; 2:40 a.m., I; 2:49 a.m., III; 5:15 a.m., I; 6.22 a.m., I. Gold Hill, Nev.: four tremors of intensity II. (No time given) Lewers Ranch, Nevada: (no time given) (I.) Virginia, Nev.: 2:28 a.m. (II); 2:30 a.m. (I); 2:40 a.m. (IV) (this shock cracked plastering; in some places walls were damaged; in many instances window glass was broken (VI? VII?)); 5 a.m. (II); 5:24 a.m. (I); 6:18 a.m. (II).-Report of Nevada State Weather Service, 1894.

#### 1894. December 18; Carson, Nev. 9:09 p.m. (II)

(C.W.F.)-Report of Nevada State Weather Service, 1894

## NEWSPAPER ACCOUNTS

### Territorial Enterprise

November 15, 1894

#### THREE EARTHQUAKE SHOCKS.

##### The Comstock Rocked by Seismic Disturbances.

The people of the Comstock were startled by three distinct shocks of earthquake yesterday afternoon. The shocks were all of considerable severity, shaking doors and windows and causing some of the buildings in town to crack and groan in a most terrifying manner.

The first shock occurred about 2:20, the next at 2:45, and the last, which was the most severe, at 6:55. The first one was quite severe, however, and created considerable consternation underground and seems to have been more severe in Gold Hill than in Virginia. Two men were at work in the Overman mine. The shock is described by them as being something terrific in that mine. They both ran for the cage and after the surface was reached, supposing that some great cave-in had taken place returned and made a thorough exploration of the mine.

The second shock was a slight one, being perceptible only to those who were in shaky buildings or under ground. The third one at five minutes to seven was the most severe of all and caused many people to run into the street. The vibrations were from east to west and lasted for over ten seconds.

So far as can be learned no damage was done. The seismic disturbances set old-timers to talking of the time in '69 when the Comstock was incessantly rocked a lone night by the disturbances of mother earth.

**Territorial Enterprise**  
**November 16, 1894**

### **MORE EARTHQUAKE SHOCKS**

#### **The Comstock Was Sharply Rocked at 11:07 O'clock Last Night**

The town was thoroughly startled last night at seven minutes past eleven by an earthquake shock of much greater severity than those experienced on Wednesday. The Comstock rocked as in a cradle for the space of a few seconds, doors and windows rattled sharply, brick walls cracked and groaned, and in many buildings the plaster was dislodged from the ceiling and fell, but so far as could be learned up to the time of going to press no damage was reported.

Underground the seismic disturbance was felt more than on the surface, the miners in many places supposing that an accident of some sort, either the explosion of a quantity of powder or a cave-in had taken place, were considerably startled and in some cases came to the surface to be told what had happened. The vibrations of mother earth apparently were from the east to west and lasted about six seconds.

Sheriff Quirk, who was asleep in his apartments at the Court-house, was awakened with the impression that some one had hold of the foot of his bed and was dragging it around the room. The jail birds set up a hullabaloo and Mr. Quirk came down town to see what was up.

At 11:20 there was another slight shock and at 12:15 still another.

**Territorial Enterprise**  
**November 18, 1894**

### **TWO MORE EARTHQUAKES**

#### **The Comstock Visited by Two More Seismic Disturbances.**

About a quarter of eleven o'clock yesterday forenoon the Comstock was visited by another earthquake, and about twenty minutes later the earth trembled again.

The first of these shocks was much the more severe of the two, and is reported to have been felt underground. One the 975 level of the Gould & Carry a car of ore was moved on the track by the shaking of the ground. If these shocks keep up in the way they have been going on for the past few days, the time will soon come when there will be no plaster on the walls of Comstock houses. People, while they do not generally admit that they are frightened at the unstableness recently shown by Mother Earth, are all glad when the ground gets through shaking.

**Territorial Enterprise**  
**November 20, 1894**

### **THE COMSTOCK WAS BATTLED.**

#### **People Were Thoroughly Terrorized Last Sunday Morning.**

The Comstock was shaking incessantly between the hours of 2 and 5 o'clock last Sunday morning by a seismic disturbance, and timid people were thoroughly frightened. The tremors started shortly after 2 o'clock and were almost incessantly felt until twenty minutes to 3, when the seismic disturbance wound up for a time with a positive shock, lasting several seconds at this



time.

People got out of bed, lights shone from windows and the community was thoroughly startled. No damage of importance was reported. In several buildings the plaster was loosened and came rattling down on the heads of the occupants. Windows and doors were shaken and the vibrations of the earth were clearly felt. At 5 o'clock or thereabouts there was still another shock followed by a series of tremors. There were also two slight tremors Sunday night. Although these shocks were quite apparent to all, and particularly noticeable to the occupants of the settled and dilapidated buildings, of which there are many on the Comstock, they cannot be called severe when compared with those prevalent in some countries, or even those frequently felt on the coast.

Down in the mines the shocks were felt plainly. The center of the disturbances is apparently Mt. Davison, and it is of narrow scope. All of the shocks felt here have apparently been felt at Carson, but no further away from the Comstock.

A gentleman scientifically describes the tremors and shocks felt at the Capital city Sunday morning as follows: Tremor, 2:38 A.M.; tremor, 2:40 A.M.; shock, 2:49 A.M.. Motion east and west. Microseismic shocks at 5:15, 5:23, 7:22 A.M..

### **Territorial Enterprise**

**November 21, 1894**

#### **Another Shock**

About the time of going to press this morning, 2:15 o'clock, a shock of earthquake was felt. The shock was not so heavy as some that have perturbed the Comstock the past few days, but it was clearly perceptible. The vibrations were from east to west and last several seconds.

### **Territorial Enterprise**

**November 23, 1894**

[under "MISCELLANEOUS JOTTINGS"]

Carson was visited by another earthquake shock about 1 o'clock yesterday morning. The vibrations were from east to west and were quite severe.

### **Territorial Enterprise**

**November 25, 1894**

#### **Another Shake.**

#### **A Shock and a Tremble Felt Last Evening.**

The Comstock was shaken very perceptibly last evening at 10:02 by a shock of earthquake, followed by another at 10:25. The disturbances were similar to those felt here so frequently last week. The shocks rattled doors and windows, and gave many people a sensation of nausea. Although Virginia City has been kept shaking pretty regularly of late, and frightening people generally, none of the seismic shocks can be said to have been very severe, comparatively speaking, as little damage has been done, save the shaking down of plaster.

### **JUPITER AND THE EARTHQUAKE.**

The accuracy with which science predicts seismic disturbances is particularly noticeable in the present visitation of earthquakes. Seven months ago the *Illustrated American* published an article concerning the influence which the planets in conjunction exert over the earth; and, among other predictions the astrologer called attention to the fact that unusual seismic disturbances might be expected from November 12<sup>th</sup> to the 19<sup>th</sup>, 1894. The punctuality with which they have reached this locality indicates one of two things. That the man who made the prediction was born under a lucky star or else he knew something of what he was talking about. In either case he would do well to turn his talent into some more useful channel.

Old Comstockers are familiar with the “earthquake sky,” which invariably precedes such phenomena here, and its peculiar flushings were very marked last evening, so it will be likely that we will have a few more shivers before “Jupiter in conjunction” gets through with us.

### **Territorial Enterprise** **November 27, 1894**

#### **Nevada Earthquakes.**

#### **Not of Recent Origin and Not Special to Mount Davidson.**

#### **A Few comprehensive Illustrations-Traditions and Pertinent Remarks on the Subject.**

A correspondent of the San Francisco *Examiner* advances the theory that the numerous small seismic disturbances which have interestingly varied the monotony of Comstock Nevada life during the past month are attributable to chronic troubles in the bowels of old Mount Davidson. He says: “It may be that Mount Davidson, on the side of which this town is built, may have been in ages past a volcano, active at times, and yet retains a portion of its former vitality. The cone of this mountain shows undoubted evidence of volcanic action formerly, and scoria is found on portions of its western slope.”

This would argue in favor of plenty of lively earthquakes “in ages past” yet a new or renewed specialty for the present, But he goes on to say:

“Theories without number have been put forward, giving reasons why such disturbances should occur in Nevada, which has been almost free of earthquakes since the advent of the white man. There are no Indian traditions in reference to former earthquakes in this vicinity, nor in any portion of Nevada as far as can be ascertained from ‘the most intelligent of the Indian residents here.’”

It is a matter of Nevada history and frequent newspaper mention “since the advent of the white man” that earthquakes similar to those prevailing at present have been of frequent occurrence. The most noted of the modern ones was that of December 26, 1869, which did so much damage to this city, throwing down fire walls, chimneys and plastering, cracking brick buildings and destroying shelf-goods in the stores. It was strongly felt throughout this section, and also in California several milder shocks occurred at that time. About a dozen years ago an earthquake extending through Carson Valley tacked the fundamental sources of Shaw’s Springs, just north of Carson City, letting out all of the water of the baths. In the course of a few weeks or months the water gradually returned and the springs became as good as ever. Steamboat Springs, a few miles northward, showed unusual activity on that occasion, spouting ten or fifteen feet into the air.

As to "Indian traditions" or records in this matter, the Piutes are not only better than other Indians, but they express no surprise or fear and say these shakes are nothing new. John[?][?] Sides, one of the "most intelligent of the Indian residents," says they are as familiar as the eclipses of the sun and moon, and tells of a tradition among the old people of his tribe about a time a great many years ago when the ground got "heapa sick" some of their campoodies tumbled down, and the whole side of a big mountain the other side of Washoe Valley slid off, filling the creek below. "Slide Mountain" is a prominent familiar object today in corroboration of this tradition.

Twenty-five years ago Mount Butler, adjoining Mount Davidson on the south - with Bullion ravine between - was one day discovered to be in a state of eruption, a nice column of smoke arising from its summit. Quite a little excitement was created at the novel sight, the newspapers spoke of it as "the Gold Hill volcano." and many people went up there to see about it. A sort of natural tunnel or deep crevasse in the rocky crest had been used for thousands of years as a refuge or rendezvous for mountain sheep, birds, etc., grass, weeds, sagebrush and all that sort of thing had blown in there, accumulating several feet in depth of debris. By some means this took fire at the east entrance and kept burning for nearly two weeks before it burned out. It looked, fine in the night, but no earthquakes shocks accompanied or resulted from that amusing eruption.

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[under "MISCELLANEOUS JOTTINGS"]

Most of the seismic disturbances lately have ranged from west to east, but the *Dayton Times* says that two more earthquake shocks were felt there Friday morning bound for the Comstock.

**Territorial Enterprise**  
**December 4, 1894**

[under "MISCELLANEOUS JOTTINGS"]

Several slight shocks of earthquake were felt here Sunday.

**Territorial Enterprise**  
**December 16, 1894**

**"BUMMER" HAS WENT**

### **Earthquakes Prove Too Much for the Mascot of the International.**

The recent earthquake disturbances have tendered to decrease the population of the Comstock, strange as it may seem. "Bummer," the one-eyed pointer and mongrel dog that lived at the International, will be remembered by all. On that memorable night when Virginia was shaken violently twenty-seven times, "Bummer" departed for Reno, where he has taken up residence at the Riverside Hotel. He went via the grade and those who say him say that he lost no time in doing so.

Bummer has many friends among the traveling public. Railroad men, drummers and attorneys alike bring us the news that "Bummer" is leading a prosperous life in the Riverside town.

It was just after the 3:20 shock on that night that "Bummer's" yelping aroused the occupants of the International not already awaked by the unstableness of mother earth. He left then for Reno and it is the hope of his many friends that like the hero of the fairy story "Bummer" may live a good and happy life forever.

### **Territorial Enterprise December 18, 1894**

[under "MISCELLANEOUS JOTTINGS"]

An earthquake shock perturbed the Comstock at 1:24 o'clock P.M. last Sunday.

### **Territorial Enterprise December 19, 1894**

#### **THE CLIMAX WAS REACHED.**

#### **The Comstock Experiences the Worst Earthquake of the Series.**

At eight minutes and forty seconds past nine o'clock yesterday morning the Comstock was shaken by the worst of the long series of seismic disturbances which this locality has experienced during the past three weeks. Yesterday's earthquake thoroughly startled everybody, and some were badly frightened. It is maintained by a number of people that the earth had been trembling for some minutes before the final climax was reached. Some people even go as far to say they were expecting the shock when it came. It was violent enough when it did come to satisfy the expectations of the most exacting.

Doors were swung on their hinges, windows were rattled, plaster came tumbling down and lamps and other articles not securely placed were shaken from tables and shelves. A number of persons were coming up Union street from the depot. They said that while they were not conscious of the earth moving under them, that they heard the rumbling distinctly and that looking up the buildings appeared to sway to and fro like ships on waves.

A deep rumbling sound, which seemed to come from the very bowels of the earth, accompanied the shock. The noise was heard by some before the earth began to quiver, and after the trembling had ceased was heard to die away as if in the distance. The actual damage done by the earthquake was slight. Dr. Packers office was somewhat damaged by the plaster being

dislodged from the ceiling, but the chief inconvenience of the phenomenon was the fright which it occasioned.

At the Fourth Ward school the shock was severely felt and almost a panic ensued. Some of the pupils rushed from their seats and there was great confusion for a time. The inmates of the International felt the earthquake sharply, many of them running into the street. In fact this was the rule all along C street, and that avenue which just before the shock was comparatively quiet all at once assumed the appearance of a metropolitan thoroughfare.

Below ground the earthquake was felt but from accounts not so severely as it was on the surface. There did not seem to be as much horizontal motion to the seismic disturbance yesterday as there has been to the previous ones, but what there was, was from north to south. The motion seemed to be principally an up and down one. At Silver City, Gold Hill, and Sutro the shock was experienced with the same severity with which it was felt here.

The following is from the Carson *Tribune* of last evening: Another earthquake was felt this morning at eight minutes and forty seconds past nine. The vibrations were northeast and southwest.

Numerous theories regarding earthquakes are being constantly advanced, but none seem to be as satisfactory as the old one, that is to the effect that they are caused by big volcanic disturbances toward the center of the earth. Those countries which are of volcanic formation, and those where active volcanoes exist, are frequently shaken by seismic disturbances, which is the strongest substantiation of this theory. Volcanic eruptions are always accompanied by earthquakes and by the rumbling noises which are of late becoming so familiar on the Comstock.

It is thought that Mount Davidson, which seems to be the center of the difficulty mother earth is having with her inner workings, was an active volcano at a comparatively recent era. Mount Rainer, in Washington, is again active after centuries of somnolence, and it is among the possibilities of nature that Mount Davidson may again open its crater and belch forth pumice stone, lava and fire.

**Territorial Enterprise**  
**December 20, 1894**

[under "MISCELLANEOUS JOTTINGS"]

There were two little shocks of earthquakes after we went to press yesterday morning.

**Territorial Enterprise**  
**December 25, 1894**

[under "MISCELLANEOUS JOTTINGS"]

Five more earthquakes, two of which were of considerable severity, have shaken the Comstock during the past two days.

**Carson Morning News**

**November 17, 1894**

Two light earthquake shocks were felt in Virginia yesterday. The “shakes” of Thursday night were rather severe in the “City of Sin.”

**Carson Morning Appeal  
November 20, 1894**

**The Earthquake**

Carson has been shaken again by earthquakes, but we have not experienced severe shocks as those to which the Comstockers have been treated.

A strange feature of this disturbance is their narrowness of scope. They have not been felt in Reno, and they seem to be confined to the Comstock and Carson.

**Carson Morning Appeal  
December 19, 1894**

Carson was visited by a heavy earthquake shock yesterday at 9 hours, 8 minutes and 40 seconds A.M.. The shake was so lively that many people rushed into the street. No damage was done.

**The Daily Nevada Tribune  
December 18, 1894**

**Another Shock.**

Another earthquake was felt in Carson this morning at eight minutes and forty seconds past nine. The vibrations were Northeast and Southwest.

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**Earthquake on the Comstock.**

Wm Mooney, of Virginia, is in town. He says the shock this morning on the Comstock was very severe, peeling off the plaster in all brick buildings, causing much alarm. Dr Pickets office was completely ruined.

**Lyon County Times  
November 24, 1894**

- Another light earthquake passed through Dayton yesterday morning about 6 o'clock, bound for the Comstock.

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-Two more earthquake shocks were felt here last Monday night. Virginia City has had many shocks in the last week, Carson a few and Reno none.

**Lyon County Times  
December 22, 1894**

**A Shaker.**

Last Sunday two earthquake shocks were felt here, one of which was quite heavy, but Tuesday forenoon, about 9:10, the boss rattler of the season came along and shook things up mightily. This shake lasted for about ten seconds, and was so severe it shook crockery off the pantry shelves in several houses. The wave was from north to south. People in brick buildings rushed out of their houses, and County Clerk Huntoon says Tom Mack nearly broke his neck getting out of the Court House. Tom swears that Mount Davidson was in a state of eruption and that he saw smoke and fire belching from its summit. There is one thing certain, if the creator of these festive quakes increases the speed much more there is liable to be only a crack in the earth to mark where Dayton once stood.

**LOCAL CORRESPONDENCE**

**Letters from Sister Baptista of the St. Mary's School in Virginia City to Sister Mary Williams Vinet? [My very dear Mother]**

**November 18, 1894**

Such perilous times as we are having , dear Mother, a series of earthquake shakes; commenced last Wednesday ??? and have continued steadily up to this. We really dread the coming of the night, for tis coming the night time they are more marked and frightful, and we have been up during the greater part of the two past nights. The shocks are vertical, sometimes introduced by a loud noise as of a heavy body falling after which the shaking or trembling; again the noise, like the roar of distant cannon, is simultaneous with the shock. No damage has been done up to the present, but the frequency and continuance is truly alarming; fills us with dread of what may come. On Wednesday, the 14<sup>th</sup> ??with? two heavy shocks occurred between two o'clock and six??? during the night they were so frequent that we lost count, and so it continued until about three this morning when three heavy shocks came in rapid succession banishing sleep; we all rose and dressed and went to the chapel, the children joined us about an hour later, glad of the permission to use and come to the chapel. We counted ten shocks this morning, the last occurring between ten and eleven, but the trembling seems to continue right along.

We are truly alarmed; of course no cause can be assigned for the disturbance and no one is able to say how it will end. You know something of the surface of the country, highly indicative of volcanic origin. Last night I made up my mind to write you should one ???

till then. All are in good dispositions; should our Lord refuse our lives we hope in His mercy and are resigned; though I for one would prefer a different death as I told our Lord last night. The weather continues surprisingly beautiful. I think we would gladly have back frost and snow, they being more natural to this climate and season. ...

## LOCAL JOURNAL ACCOUNTS

From **Journals of Alfred Doten**, Reporter for the Virginia Daily Union, Territorial Enterprise, and Gold Hill Evening News

(Virginia City)

Wednesday, November 14, 1894: ...Two or three light earthquake shocks this PM & evening.

Friday, November 16, 1894: ...Quite a strong shock of earthquake, the strongest for years a few minutes after 11 last evening - I did not feel it but lots did - No damage whatever - 11:20 and 12:15 other light shocks - Felt down to lowest working levels in the mines - no damage -

Saturday, November 17, 1894: ...About 11:40 AM quite a strong jolt of earthquake, no damage - I felt it in my room - Bed 12 - Several earthquake shocks during the evening and night.

Sunday, November 18, 1894: ...During last night at least a dozen earthquake shocks took place - one at 2:50 this morning another at 4:30 and another at 4:45 aroused me from sound sleep - None of them strong enough to do damage...

Monday, November 19, 1894: ...No more earthquakes...

Wednesday, November 21, 1894: ...a medium earthquake about 2 AM waked up lots of people but not I...

Saturday, November 24, 1894: ...Evening at 10 quite a sharp earthquake shock...

Sunday, November 25, 1894: ...Evening I wrote a 4 page article on Nevada Earthquakes for the Enterprise on which I take Norris' place tomorrow as he goes to Carson with the Oriole Minstrels tomorrow where they give a benefit performance tomorrow evening...

Sunday, December 2, 1894: ...Two shocks of earthquake, one quite heavy, between 2 & 6 o'clock this morning - I did not feel them, only heard of them -

Tuesday, December 4, 1894: ...tolerably smart earthquake at 9:30 & one lighter later on -

Saturday, December 8, 1894: ...About 2 PM a smart shock of earthquake - did no damage - most everybody felt it...



Tuesday, December 18, 1894: ...At 9:10 AM, sitting at my desk writing heaviest shock of this very earthquakey season came - Did no damage anywhere but was keenly recognized by most everybody - It was preceded by a low rumbling sound...

Friday, December 21, 1894: ...Quite a smart little earthquake jolt at 5:30 PM -

Saturday, December 22, 1894: ...A couple of light earthquake jolts this morning...

## **RESEARCH NOTES**

To hazard a guess, the main event on December 18 may have been a normal earthquake based on people in the Virginia City area feeling mostly up-and-down motion, in contrast to earlier events that had more side-to-side motion; this may have helped avoid damage from the December event.

# 1896, January 27 Carson City Earthquake

## EARTHQUAKE SUMMARY

This small earthquake sequence appears to have occurred near Carson City. Nine earthquakes were reported, three on January 25th and six on January 27th, although it was commented that in Carson City on January 27th the earth was almost in constant tremor (VEC, 2/28/1896). The largest event occurred at 1:01 p.m. PST on the 27th. In Carson City this earthquake created a large crack in the side of the government building, shook some plaster down from the ceiling of the county building, cracked the ceiling of the Post Office some, and broke a pane of glass in a door at the newspaper office (Holden, 1898; TE, 2/29/1896; Doten, 2/27/1896).

## EARTHQUAKE SEQUENCE (PST)

January 25, 1896 (Sat.)	4:45	small shock, largest of day
	4:46	light shock
	5:02	light shock
January 27, 1896 (Mon.)	7:59	small shock
	8:34	heavy shock (MMI V)
	11:04	sharp shock
	11:19	small shock
	1:01	<b>main shock</b> (MMI VI)
	6:32	small shock

## EARTHQUAKE CATALOG ACCOUNTS

### Holden (1898)

#### 1896. January 25; Carson, Nevada.

Professor C.W. Friend reports: "We have had quite a number of earthquake shocks on January 25 and 27, 1896; they were rather peculiar. On the 25<sup>th</sup> the first noticeable one occurred at 4:45 a.m., and was the heaviest that day. I also noticed one at 4:46 a.m. and 5:02 a.m., both light. The motion W. to E. was hardly perceptible.

We had quite a number of shocks on the 27<sup>th</sup>:

- 7:59 a.m. S. to N (II)[RF],
- 8:34 a.m. W. to E. (III)[RF],
- 11:04 a.m. SW. To NE (III)[RF],
- 11:19 a.m. SW to NE (I)[RF],

1:01 p.m. SW to NE (IV)[RF],

6:32 p.m. SW to NE (II)[RF],

and quite a number of very light tremors between, which I noticed, being quiet in the building. The seismographs did not record a spot larger than one-tenth inch on the plate for all these, although some of the shocks were quite severe, so much so that it scared a great many people. On the 25<sup>th</sup> I hung up a one-ounce plumb bob on a fine thread three feet long in a glass case fastened to a stone wall, and it was all I could do to determine the motion by it; all the shocks, including those of the 25<sup>th</sup>, were vertical and produced a very strange feeling.”

### **1896. January 27; Carson, Nevada**

The first heavy shock was about 8:30 o'clock in the morning, and it was quick and lively. It rattled the glass and china in everybody's cupboard, made the windows shake and got several lazy people out of bed (V?)[RF]. The next was about 11 o'clock and was also quite sharp. At 1 o'clock came the heaviest of them all, and it shook every building in the city. The capitol building was particularly well shaken and inside of a minute there was a rush to the basement of the building to see the record of the seismograph. It had been deflected about an eighth of an inch by each shock and had also recorded small shocks all through the day.

The signal service records showed a very unsettled barometer. Rapid changes occurred and their suddenness was unequaled by anything recorded since last July. These shocks were all graded as No. III, Rossi-Forel scale. There were two others during the day that graded I and II respectively. The first was north and south, the second east and west and the last three southwest to northeast. They were principally vertical.

The jar at 1 o'clock made a large crack in the side of the government building and shook some of the plaster from the ceiling of the county building (VIII)[RF].-S.F. Call.

### **NEWSPAPER ACCOUNTS:**

#### **Virginia Evening Chronicle January 27, 1896**

#### **An Earthquake.**

Virginia was visited by an earthquake today. The shock occurred at four minutes past 1 o'clock p.m. and it was felt very distinctly by a good many people. It was not particularly strong and was hardly or not at all noticed out of doors. Consequently, it was not felt by the generality of people and therefore did not cause much comment. It was felt in buildings that are inclined to rock more than elsewhere and it swayed some of them very perceptibly. It seemed to move from east to west and was brief in passing. It is some time since the last earthquake period, and it is hoped for the sake of timid people that the next is a long way off. It is said that there were some lighter shocks earlier in the day.

**Virginia Evening Chronicle**  
**January 28, 1896**

**Earthquakes in Carson.**

The *News* says: The earth was almost in a constant tremor yesterday, with six distinct shocks that could be recorded. They were so slight that the register moved scarcely a thirty-second of an inch. The heaviest occurred at about 1 o'clock and shook a quantity of plaster down upstairs in the county building.

**Daily Territorial Enterprise**  
**January 28, 1896**

**Seismic Disturbances Yesterday.**

At six minutes past 1 o'clock yesterday morning an earthquake shook the Comstock very perceptibly. The shock was not very severe, but sufficed to alarm some of the more timid susceptibility. The Carson News says that the Capitol City was kept in a state of tremor throughout the day. No less than six distinct shocks were felt there and a number of minor[?] seismic disturbances were noticed.

**Daily Territorial Enterprise**  
**January 29, 1896**  
 [under "PEN AND SCISSORS"]

Another earthquake shock occurred yesterday at 1 o'clock.

The earthquake shock at 1 o'clock broke a pane of glass in one of the Carson News' doors.

**Daily Territorial Enterprise**  
**January 30, 1896**

Carson people with hair spring nerves imagine they felt three or four earthquakes since Tuesday, but the seismograph in the basement of the Capitol denies that any such proceedings have taken place.

**Daily Territorial Enterprise**  
**January 31, 1896**

The creek in Antelope Valley disappeared after the recent earthquake and there is no water for the cattle to drink.

**The Morning Appeal**  
**January 28, 1896**

**EARTHQUAKE SHOCKS.!**

**Several Agitate This City Yesterday.**

There was considerable of a shake up in this city yesterday by reason of several well defined earthquake shocks and several minor tremblors. The first heavy shock was about 8:30 in the morning and it was quick and lively. It rattled up the glass and china in everybody's cupboard, made the windows rattle and got several lazy people out of bed. The next was about 11 o'clock and was also quite sharp.

About 1 o'clock was the heaviest of all and it shook every building in this city. The capitol building was particularly agitated and inside of a minute there was a rush to the basement to see the record of the seismograph. It had been deflected about an eighth of an inch by each shock. It also recorded small shocks all through the day and more or less anxiety was manifested by everybody.

The signal service records showed a very unsettled barometer. It showed rapid deflections, and then sudden changes were unequaled by anything recorded since last July.

The following is a complete record of shocks as reported by Friend:

7:59 A.M. II Motion N & S  
 8:34 A.M. III Motion E & W  
 11:01 A.M. III Motion SW & NE  
 11:19 A.M. I[?] Motion SW & NE  
 1:01 P.M. II Motion SW & NE

The shocks were principally vertical, very little horizontal motion. The 1:01 P.M. shock was the heaviest.

The following is the Rossi-Forel scale which explains the numbers after each shock:

- I. Microseismic shock, recorded by a single seismograph, or by seismographs of the same model, but not putting seismographs of different patterns in motion. Reported by experienced observers only.
- II. Shocks reported by several seismographs of different patterns. Reported by a small number of persons who are at rest.
- III. Shocks reported by persons at rest. Duration or direction noted.
- IV. Shocks reported by persons in motion. Shaking of moveable objects, doors and windows, cracking of ceilings.
- V. Shock generally felt by every one; furniture shaken, some bells rung.
- VI. General awakening of sleepers; general ringing of bells; swinging of chandeliers; stopping of clocks; visible swaying of trees: some persons run out of buildings.
- VII. Overturning of loose objects: fall of plaster; striking of church bells; general fright; without damage of buildings.
- VIII. Fall of Chimneys; cracks in walls of buildings.
- IX. Partial or total destruction of some buildings.
- X. Great disasters; overturning of rocks; fissures in the surface of the earth: mountain slides.

**Carson Morning News**  
**January 27, 1896**

**Earthquakes.**

The earth has been in almost a constant tremor today, with six distinct shocks that could be recorded. They were so slight that the register moved scarcely a thirty-second of an inch. The heaviest occurred at about 1 o'clock and shook a quantity of plaster down upstairs in the county building.

**Carson Morning News**  
**January 28, 1896**

The earthquake shock at 1 o'clock yesterday broke a pane of glass in on of the doors of the News office.

**Reno Evening Gazette**  
**January 27, 1896**

[under "BREVITIES, Local and General Intelligence"]

Three shocks of earthquake were felt at Carson Saturday morning at about 4:30, but none, so far as known, in Reno.

**LOCAL JOURNAL ACCOUNTS**

From **Journals of Alfred Doten**, Reporter for the Virginia Daily Union, Territorial Enterprise, and Gold Hill Evening News

Monday, January 27, 1896 (Carson City)

...Earthquake day - light shock at 7:59 - heavy one at 8:34 - still heavier at 11:04 - light one at 11:19 - heaviest one at 1:01, and a light one about 6 PM - six shocks in all - The Va Chronicle only mentions one noticeable shock - No damage done here except shaking down a little plastering in the county building and cracking the Post office ceiling some -

# 1897, May 15 Southern Virginia Range Earthquake

## EARTHQUAKE SUMMARY

At least seven small earthquakes shook Virginia City and Carson City between May 14 and May 21, with aftershocks continuing until at least July. The most severe of these earthquakes occurred at 11:02 a.m. PST on May 15. This event was strong enough to bring down several square yards of plaster in Carson City (MA, 5/16/1897), and to bring quite a piece of a brick wall of a building and plastering in Virginia City (DTE, 5/16/1897; Doten, 1897). In Virginia City it was commented that “Buildings rattled and groaned as though they were standing all the trouble of that kind of which they were capable.” (TE, 5/22/1869). There also apparently was earthquake activity being felt in Reno at this time that may have been different events (e.g., twenty earthquakes felt in Reno beginning on May 16, MA, 5/19/1897).

## EARTHQUAKE SEQUENCE (PST)

May 14, 1897 (Fri.)	6:30 p.m.	small shock
	9:15 p.m.	small shock
May 15, 1897 (Sat.)	6-6:30 a.m.	small shock
	11:02 a.m.	severe shock (MMI VI+)
	12:30 a.m.	two earthquakes
May 16, 1897 (Sun.)	?	three-day earthquake sequence in Reno?
May 21, 1897 (Fri.)	1:51[?] p.m.	small shock
June 4, 1897 (Fri.)	11:03 a.m.	slight shock
June 20, 1897 (Sun.)	12:15 p.m.	small earthquake (MMI V)
July 5, 1897 (Mon.)	6:52 p.m.	tremor
July 11, 1897 (Sun)	12:15 p.m.	tremor

## EARTHQUAKE CATALOG ACCOUNTS

### Slemmons and others (1965)

**1897, 5-15 19:04 [GMT] 39.3 N. Lat., 119.7 W Long.**

T-A. Severe 3 sec shock in Carson City, NE to SW motion. Plaster broken in many buildings.

## NEWSPAPER ACCOUNTS

**Daily Territorial Enterprise**  
**May 15, 1897**

**AN EARTHQUAKE AT RENO**

RENO, Nev., May 14 - A severe earthquake was felt here this evening, which lasted several seconds. The vibration was north to south.

**Daily Territorial Enterprise**  
**May 16, 1897**

**Another Attack.**

**The Comstock Suffering From its Old Disorder.**

The Comstock is again attacked by one of the fits of argue to which it is subject. Yesterday it had two or three spells of shaking, which very much resembled a symptom of the disease so prevalent in the malaria districts of Arkansas. When mother earth get the malady scientists call it a seismic affection. There were three well defined earthquake shocks yesterday - one at about 6 o'clock in the morning, another at 11 o'clock and another at 12. The one at 11 was the most severe of the trio, and rattled things in a lively manner and did some damage to at least one building in town,, where quite a piece of the brick wall was shaken down. This disturbance is very reminiscent of a season last spring or early summer, about the time the old Comstock load seemed very unstable, earthquakes occurring every day for nearly three weeks. A similar spell occurred during the preceding November, when there were 28 shakes in one night. A scientist in New York predicted both of these earthquake periods, basing his prediction on a theory that planets when in conjunction exert a peculiar influence upon the molten interior of the earth, not unlike the influence which the moon exerts on the waters of the ocean. The present lot of earthquakes seems to embrace a larger territory than those former years, for the ones of yesterday were felt in both Reno and Carson.

**Daily Territorial Enterprise**  
**May 18, 1897**

Another quite severe shock of earthquake was felt in this city at five minutes of 11 Sunday night. [May 16]

**Daily Territorial Enterprise**  
**May 22, 1897**

**EARTHQUAKE**

Signs Portend Unusual Seismic Activity at Present.

There was an earthquake yesterday. It occurred about five minutes to 2. Very few Comstockers need to be told of it, for a person's senses must have been dull, indeed, that did not feel the bumping commotion that was going on inside Mother Earth. Buildings rattled and



groaned as though they were standing all the trouble of that kind of which they were capable. So far as could be learned no damage was done beyond a shock administered to timid nerves. We may have an unusually lively Spring in this regard.

Some of our exchanges claim that there is a larger amount of oil from the submarine flowing oil well off Santa Barbara than has been noted from many years. This phenomenon, it is said, always precedes seismic activity.

**Daily Territorial Enterprise**  
**May 23, 1897**

Reno is getting a bigger dose of the present earthquake epidemic than is Virginia. Shocks shake the Riverside town pretty regularly these days. Renoites should remember the fate of Sodom and Gomorrhah and turn from their evil ways while there is yet time.

**Virginia Evening Chronicle**  
**May 15, 1897**

**EARTHQUAKES AGAIN.**

Another series of Earthquakes Disturbs the Comstock - Heavy Shock this Morning.

Another series of earthquake shocks has disturbed that Comstock. Two shocks took place last night and two today. The second shock today, which occurred at two minutes past 11 o'clock, was very severe. It began mildly and then developed into a decided agitation, shaking and swaying some buildings very violently. The first shock last night was felt at about half-past six and second at a quarter past 9; the first one this morning took place between 6 and half past 6. None of these shocks were heavy, but all were distinctly felt by a number of people.

It would be satisfying to know exactly what causes earthquakes. One phenomenon which is frequently described as attendant upon them is cloudy, sultry weather. Just this sort of weather prevailed here for three or four days previous to today. How an atmospheric or weather condition should succeed in causing the ground to shake is difficult to guess. It may be that this sort of weather is, indeed, an effect instead of a cause in earthquake phenomena.

Another heavy earthquake followed by a lighter one took place at about half past 12 today.

Carson, May 15 - A severe earthquake shock was experienced here this morning at 11:04, lasting two seconds. The seismograph registered the dip of the vibration as northeast and southwest. Plaster broke in many buildings.

**Virginia Evening Chronicle**  
**May 21, 1897**

**A Heavy Earthquake.**

The earthquake disturbances seemed to have resumed today. About the heaviest shock yet experienced was felt at 1:51 [?] p.m. today. It swayed buildings and rattled loose objects in a most disquieting fashion. A lighter shock preceded it earlier in the day. The hot sultry weather

today was identical to that on the days when the last preceding shocks occurred.

**The Morning Appeal**  
**May 16, 1897**

**Earthquake Shock**

At a few minutes past 11 o'clock yesterday there was an earthquake vibration on the Comstock and all over the eastern part of the State.

It lasted two seconds and the seismograph registered the course of the vibration north east and south west. Several square yards of plaster fell in this city.

**The Morning Appeal**  
**May 19, 1897**

**More Earthquakes**

At 10:35 Sunday night, Reno was visited by another sharp earthquake shock and yesterday morning near the 10 o'clock hour there was a slight tremor. For the past three days there have occurred somewhere in the neighborhood of twenty shocks and they have ceased to be a novelty. Whether a second edition will be issued or not, the Journal has not been informed, but the public will be notified of coming events. - Journal.

**LOCAL JOURNAL ACCOUNTS**

From **Journals of Alfred Doten**, Reporter for the Virginia Daily Union, Territorial Enterprise, and Gold Hill Evening News

Saturday, May 15, 1897 (Carson City)

... At 11:05 while I was sitting reporting in the U.S. Dist Court quite a strong shock of earthquake attracted attention of all - The three big chandeliers of the court room swing vibrantly two or three inches east and west - Another reported an hour later - Two or three at Va last night & this was felt there today, same as here ...

Sunday, May 16, 1897

... Know of no more earthquakes today - Enterprise this morning, told of a little damage, shaking down of some brick work, and plastering - not much - by the shaking of yesterday ...

Friday, May 21, 1897

... Smart shock of earthquake at Va about 2 PM today - no harm done ...

**Developing a Magnitude and Epicentral Location Analysis Procedure**

In this study we began to develop an analysis for the potential magnitudes and the location of the epicentral regions of the larger pre-1900 earthquakes (as well as early 20<sup>th</sup> century earthquakes) following Bakun and Wentworth (1997). We entered and analyzed 27 earthquakes from Nevada and eastern California (Table 2) to explore whether coefficients are distinctly different from those used by Bakun and Wentworth (1997) for central California. Our analysis has attempted to use moment magnitudes for the calibration earthquakes whenever possible, but had to resort to reported magnitudes for several older events. Intensities were compiled from the sources indicated in Table 2. We entered 3,617 intensity reports or estimates from 1,090 sites for the 27 calibration earthquakes. Figures 1 through 27 are intensity versus distance graphs for each of the calibration earthquakes; the figures are organized chronologically. The triangles are the median values of the distance range for each intensity after the removal of outlying values. A linear regression is shown as a line on Figures 1 through 27 and the coefficients are summarized in Table 2 (organized by increasing magnitude). The linear regression between Modified Mercalli Intensity (**MMI**) and the distance (**Dist.**) is,

$$\mathbf{MMI} = \mathbf{C1} \times \mathbf{Dist.} + \mathbf{C2} \quad (1)$$

Figures 28 and 29 are plots of the two coefficients (**C1** & **C2**) for the calibration data plotted against magnitude to look for expected dependencies with magnitude. Figure 28 shows that a constant value can be used to describe **C1** (the slope). Although the slopes do tend to be shallower with larger magnitudes, a linear regression of these slopes showed a weak to nonexistent correlation. Because we are assuming the first earthquakes we are going to analyze were in the magnitude 6 range, we used the average of the magnitude 6 and greater calibration earthquakes, or -0.0166. Figure 29 shows a positive correlation of **C2** (the intercept) with magnitude (**Mag.**), as might be expected intuitively, and as confirmed by Bakun and Wentworth (1997). A linear regression through these values gives the relationship of,

$$\mathbf{C2} = \mathbf{1.328} \times \mathbf{Mag.} - \mathbf{1.009}. \quad (2)$$

Equations (1) and (2) are combined and -0.0166 is adopted for **C1** to give,

$$\mathbf{MMI} = \mathbf{-0.0166} \times \mathbf{Dist.} + \mathbf{1.328} \times \mathbf{Mag.} - \mathbf{1.009}. \quad (3)$$

This can be rewritten in terms of magnitude as,

$$\mathbf{Mag.} = (\mathbf{MMI} + \mathbf{1.009} + \mathbf{0.0166} \times \mathbf{Dist.})/\mathbf{1.328}. \quad (4)$$

For each trial epicenter, magnitude estimates are made using each of the intensity measurements (**M<sub>i</sub>**), and the final magnitude (**M<sub>f</sub>**) assigned to the trial epicenter is the average of the intensity magnitude estimates.

Bakun and Wentworth (1997) resolved the epicentral region by minimizing the root-mean-squared misfits in the magnitude calculation, and weighting the local intensity reports higher.

The calculation of **RMS** [**M<sub>I</sub>**] for this initial run is the same as proposed by Bakun and Wentworth (1997). That is,

$$\mathbf{RMS} [\mathbf{M}_I] = \mathbf{RMS} [\mathbf{M}_I - \mathbf{M}_i] - \mathbf{RMS}_o [\mathbf{M}_I - \mathbf{M}_i],$$

where,

$$\mathbf{RMS} [\mathbf{M}_I - \mathbf{M}_i] = \left\{ \sum_i [W_i \times (\mathbf{M}_I - \mathbf{M}_i)]^2 / \sum_i W_i^2 \right\}^{1/2},$$

and,

**RMS<sub>o</sub>** [**M<sub>I</sub>** - **M<sub>i</sub>**] is the minimum **RMS** [**M<sub>I</sub>** - **M<sub>i</sub>**] calculated for the trial epicenters. A weighting factor **W<sub>i</sub>** is introduced to make the calculation consistent with the strong effect of the location of the epicenter on local intensities. The weighting function uses a cosine (in radians) of the distance out to 150 km, and weights all values beyond 150 km at 0.1. The weighting function is,

$$W_i = \begin{cases} 0.1 + \cos [(\text{Dist.}/150) \times \pi/2], & \text{for Dist.} < 150 \text{ km} \\ 0.1, & \text{for Dist.} > 150 \text{ km} \end{cases}$$

Four Maps (figs 30 thru 33) give in-progress results of these calculations for the 1868, 1869a, 1869b, and 1887 earthquakes. Calculations were done in MATLAB. Several aspects need to be improved in the procedure and input data before the results can be used. Site conditions in the form of local geology, topographic position, tectonic (lithospheric?) province will likely improve the results. Additional earthquakes with intensity values exist that can be incorporated into the calibration. The weighting function should be reviewed to possibly be tailored to treat regional versus local intensity sites. For example, a cut-off that includes or doesn't include as appropriate the sites in the Sierra Nevada should be considered, as well as what bias the Sierra Nevada sites might introduce into the results.

This part of the study is included to demonstrate our progress and ability to apply the Bakun and Wentworth (1997) methodology to western Nevada. Results are in-progress and may change (will hopefully improve!). Perhaps one result that was a bit surprising and may remain with us in future calculations is the possibility that the epicentral region of the 1887 earthquake was in the Lake Tahoe region (fig. 33), as opposed to Carson Valley, as more traditionally thought.

**Table 2**  
**Calibration Earthquakes for Intensity-Based Location and Magnitude Analysis**  
 (events from Nevada and eastern California)

<b>Date/Time (GMT)</b>			<b><u>Magnitude</u></b>	<b>Location</b>	<b><u>Reference</u></b>
<b><u>year</u></b>	<b><u>mo/day</u></b>	<b><u>time</u></b>		<b><u>N. Lat./W. Long.</u></b>	
1915	10/3	06:53	7.3	40.5 /117.5	d&d; Jones (1915)
1932	12/21	06:10	7.1	38.73 /117.82	US Dept. Comm. (1936)
1933	6/25	20:45	6.0	39.08 /119.33	Neumann (1935)
1934	1/30	20:16	6.3	38.28 /118.37	US Dept. Comm.(1936);d&d
1948	12/29	12:53	6.0	39.55 /120.08	Murphy and Ulrich (1951)
1950	12/14	13:24	5.6	40.1 /120.2	Murphy and Ulrich (1952)
1953	9/26	03:34	5.5	39.10 /119.13	Murphy and Cloud (1955)
1954	7/6	11:13	6.6	39.29 /118.36	Doser (1986)
1954	8/24	05:51	6.8	39.35 /118.34	Doser (1986)
1954	12/16	11:07	7.2	39.2 /118.0	Doser (1986)
1956	12/31	17:39	5.1	38.28 /118.97	Brazee and Cloud (1958)
1959	3/22	23:10	6.3	39.60/118.02	Eppley and Cloud (1961)
1959	4/1	10:18	5.8	39.72/120.20	Eppley and Cloud (1961)
1959	6/23	14:35	6.1	39.08 /118.82	Eppley and Cloud (1961)
1959	8/4	07:36	5.2	37.35 /118.55	Bolt and Miller (1975)
1961	7/3	04:56	5.4	40.9 /118.4	Lander and Cloud (1963)
1966	8/16	18:02	6.0	37.4 /114.2	Von Hake and Cloud (1968)
1966	9/12	16:41	6.0	39.4 /120.1	Von Hake and Cloud (1968)
1979	2/22	15:57	5.1	40.00 /120.09	Stover and von Hake (1981)
1980	4/8	00:13	4.7	39.50 /119.18	Stover and von Hake (1982)
1980	5/25	16:33	6.1	37.59 /118.85	Stover and von Hake (1982)
1980	5/27	14:50	6.0	37.49 /118.83	Stover and von Hake (1982)
1980	8/1	16:38	5.0	37.55 /118.89	Stover and von Hake (1982)
1981	9/30	11:53	5.8	37.62 /118.88	Stover (1984)
1984	12/23	18:08	5.8	37.46/118.61	Stover (1988)
1986	7/21	14:42	6.3	37.537/118.450	Stover and Brewer (1994)
1992	6/29	10:14	5.6	36.71 /116.29	Gross and Jaume' (1995)

**Table 3      Coefficients for the Calibration Earthquakes**

<u>Date</u>	<u>Magnitude</u>	<u>C1 (slope)</u>	<u>C2 (intercept)</u>	<u># of points</u>
1915 10/3	7.3	-0.012	7.945	35
1954 12/16	7.2	-0.0126	8.53	276
1932 12/21	7.1	-0.018	9.6	258
1954 8/24	6.8	-0.016	8.338	205
1954 7/6	6.6	-0.0165	8.412	192
1986 7/21	6.3	-0.013	6.256	189
1934 1/30	6.3	-0.0163	6.946	106
1959 3/22	6.3	-0.0126	6.694	53
1959 6/23	6.1	-0.0187	6.7	104
1980 5/25	6.1	-0.0163	7.339	336
1966 8/16	6.0	-0.018	6.404	13
1980 5/27	6.0	-0.0184	7.516	257
1966 9/12	6.0	-0.017	7.074	310
1933 6/25	6.0	-0.0189	6.977	215
1948 12/29	6.0	-0.0251	7.437	118
1981 9/30	5.8	-0.0131	6.204	187
1984 12/23	5.8	-0.015	6.584	189
1959 4/1	5.8	-0.0278	6.995	165
1950 12/14	5.6	-0.0263	7.02	64
1992 6/29	5.6	-0.0236	6.539	17
1953 9/26	5.5	-0.0276	6.374	52
1961 7/3	5.4	-0.0155	5.401	10
1959 8/4	5.2	-0.0212	6.433	82
1956 12/31	5.1	-0.0196	5.788	19
1979 2/22	5.1	-0.0258	6.18	76
1980 8/1	5	-0.0169	5.296	74
1980 4/8	4.7	-0.0258	5.226	14

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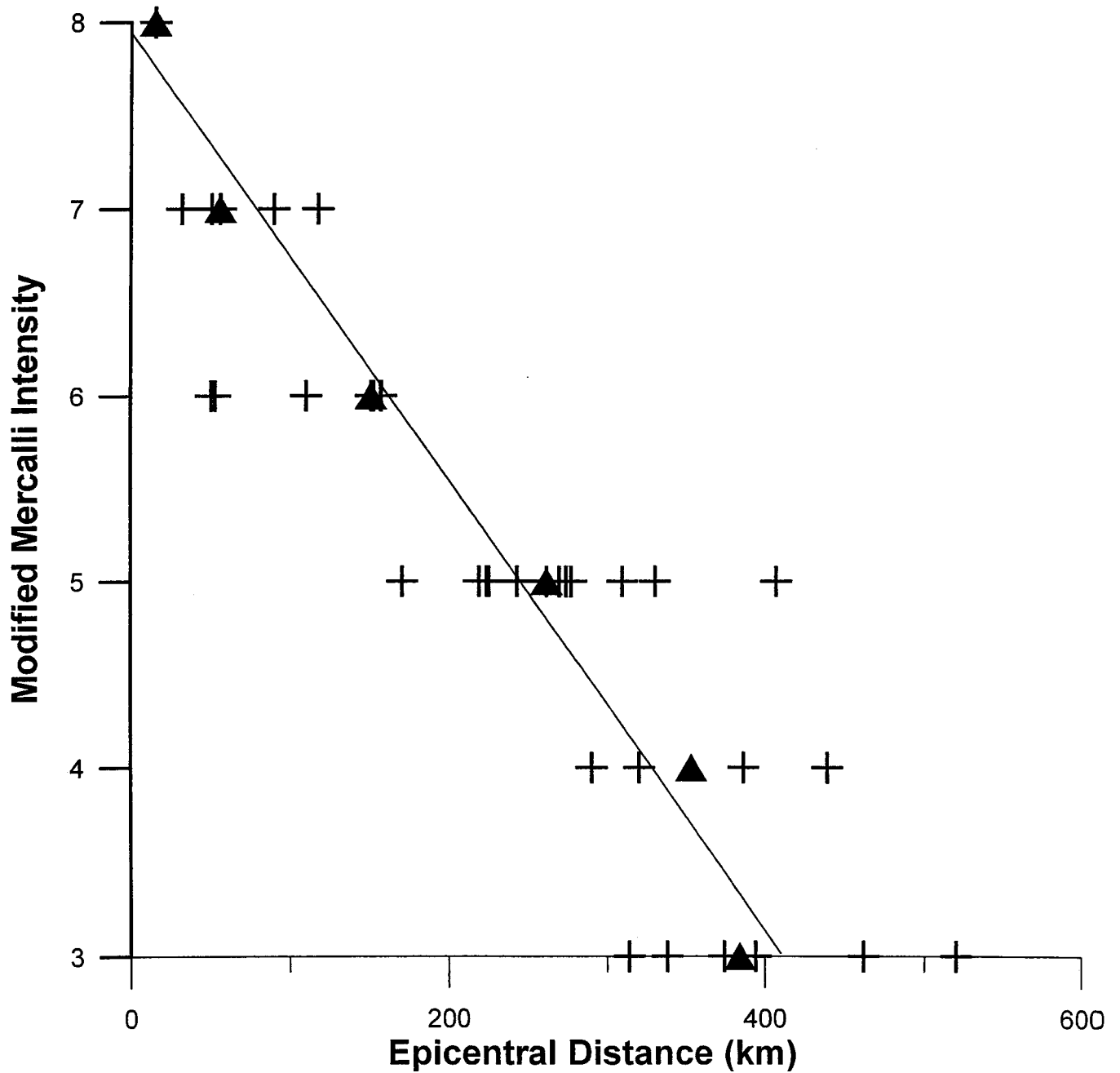
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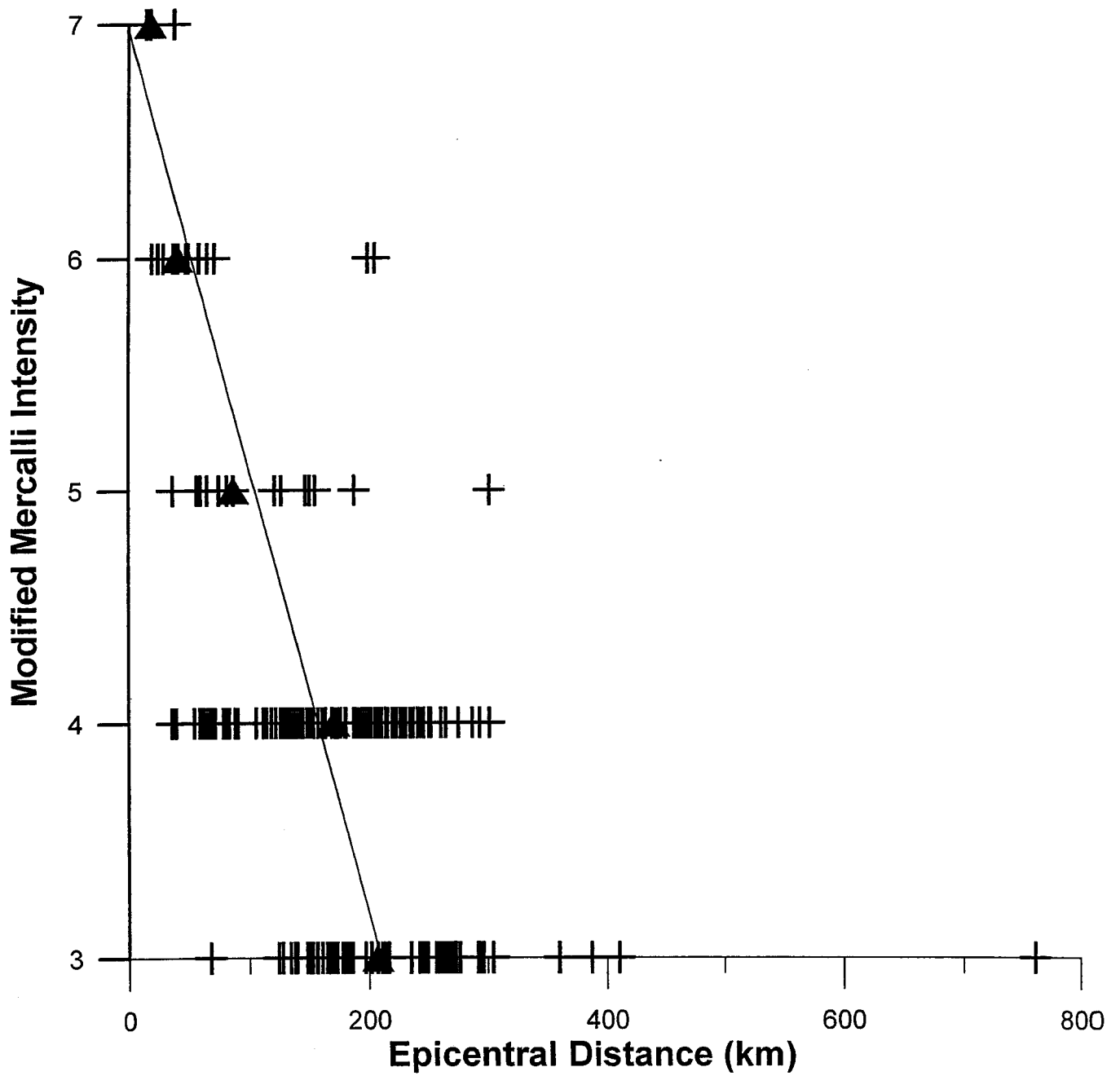
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## 1915 Pleasant Valley Eq., M7.3

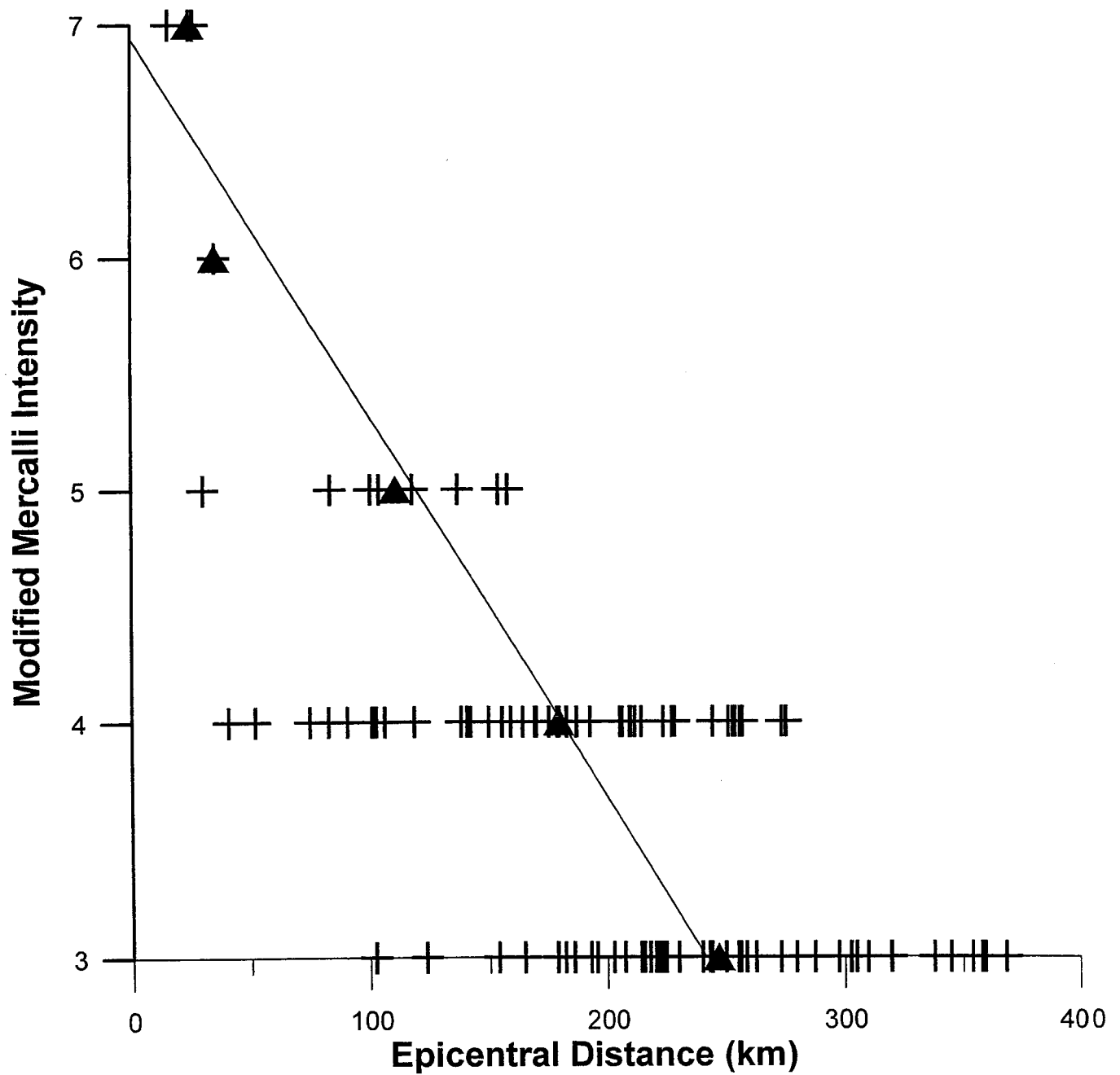




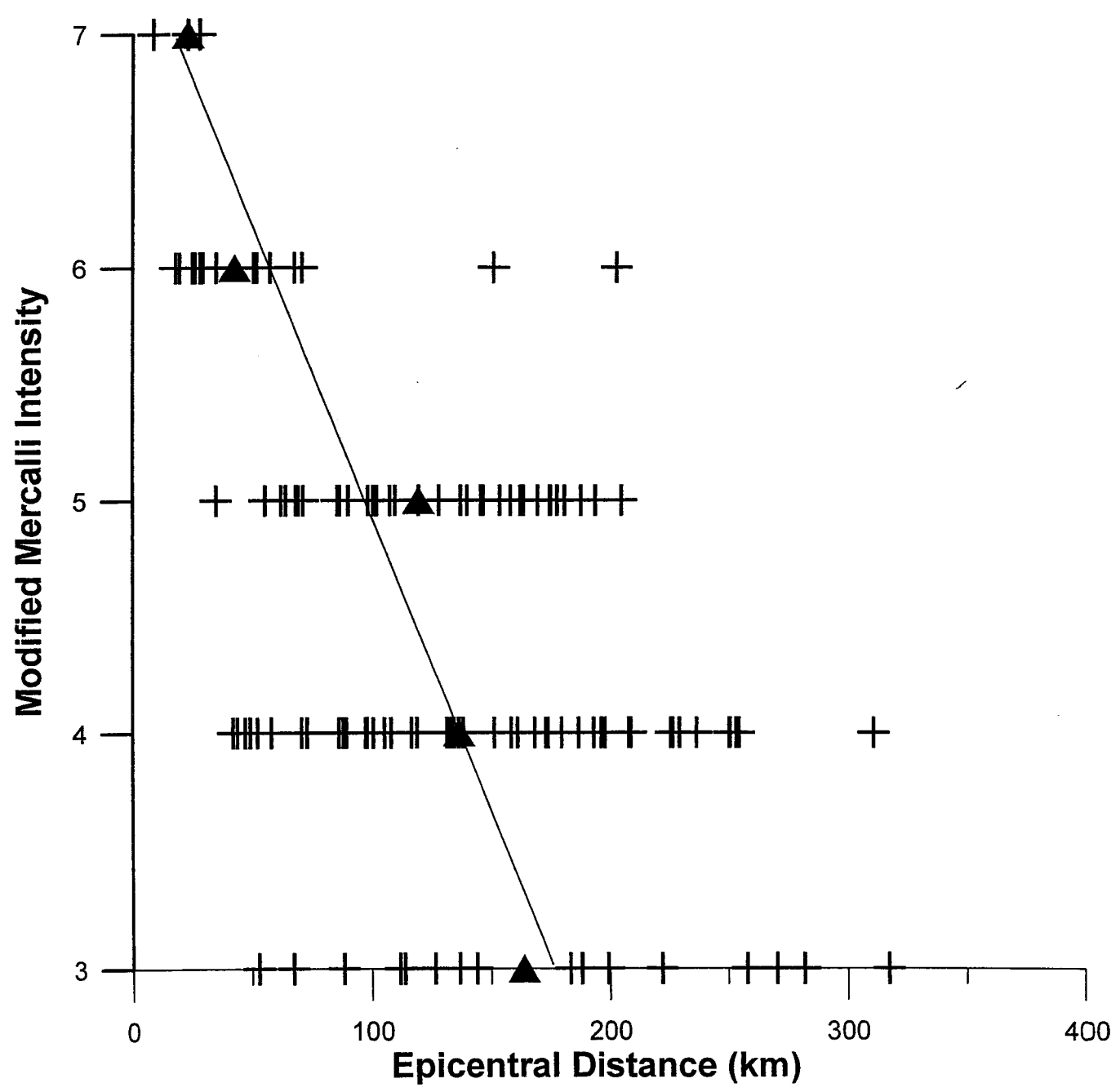
## 1933 Wabuska Eq., M6



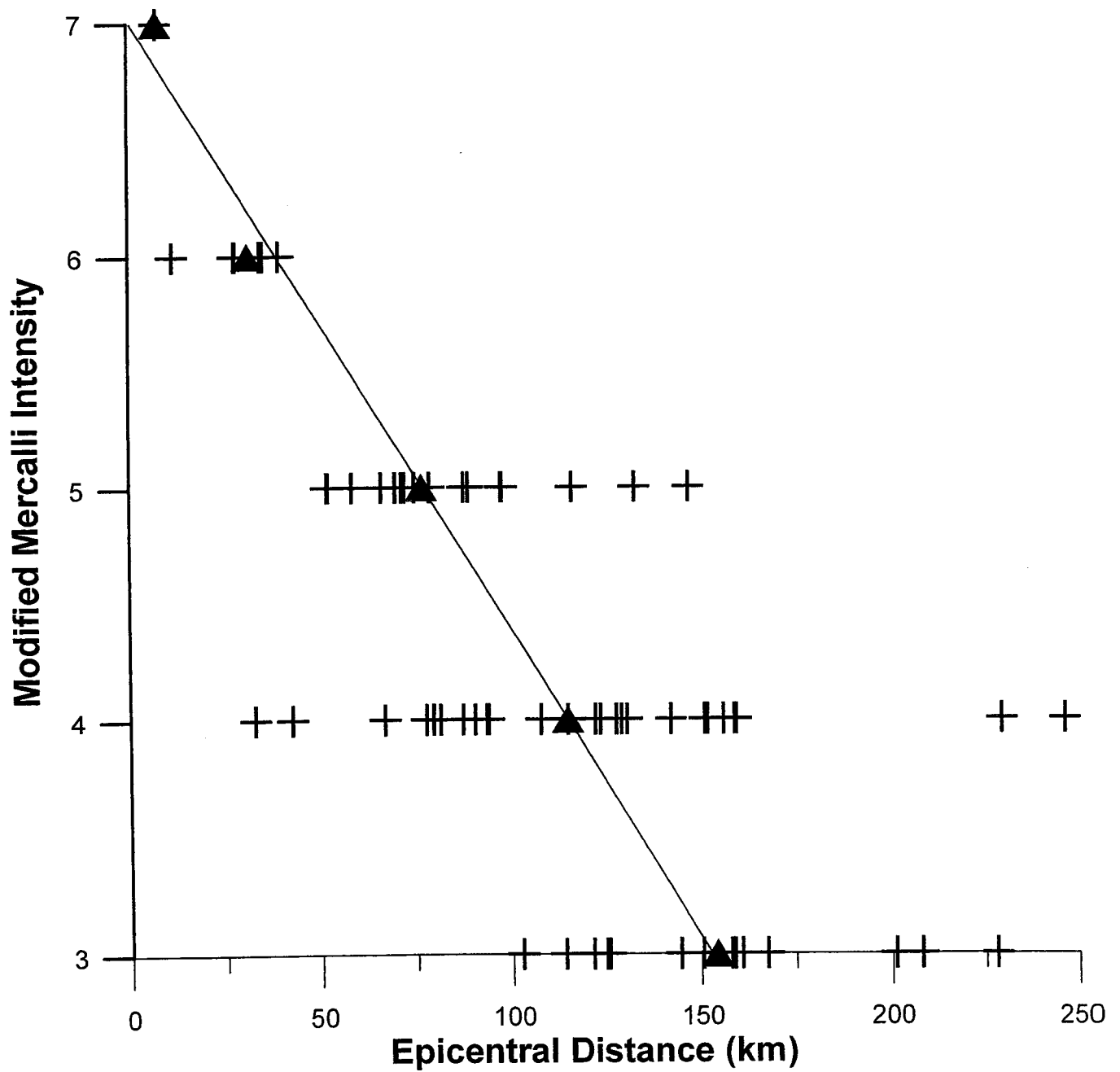
## 1934 Excelsior Mtn. Eq., M6.3



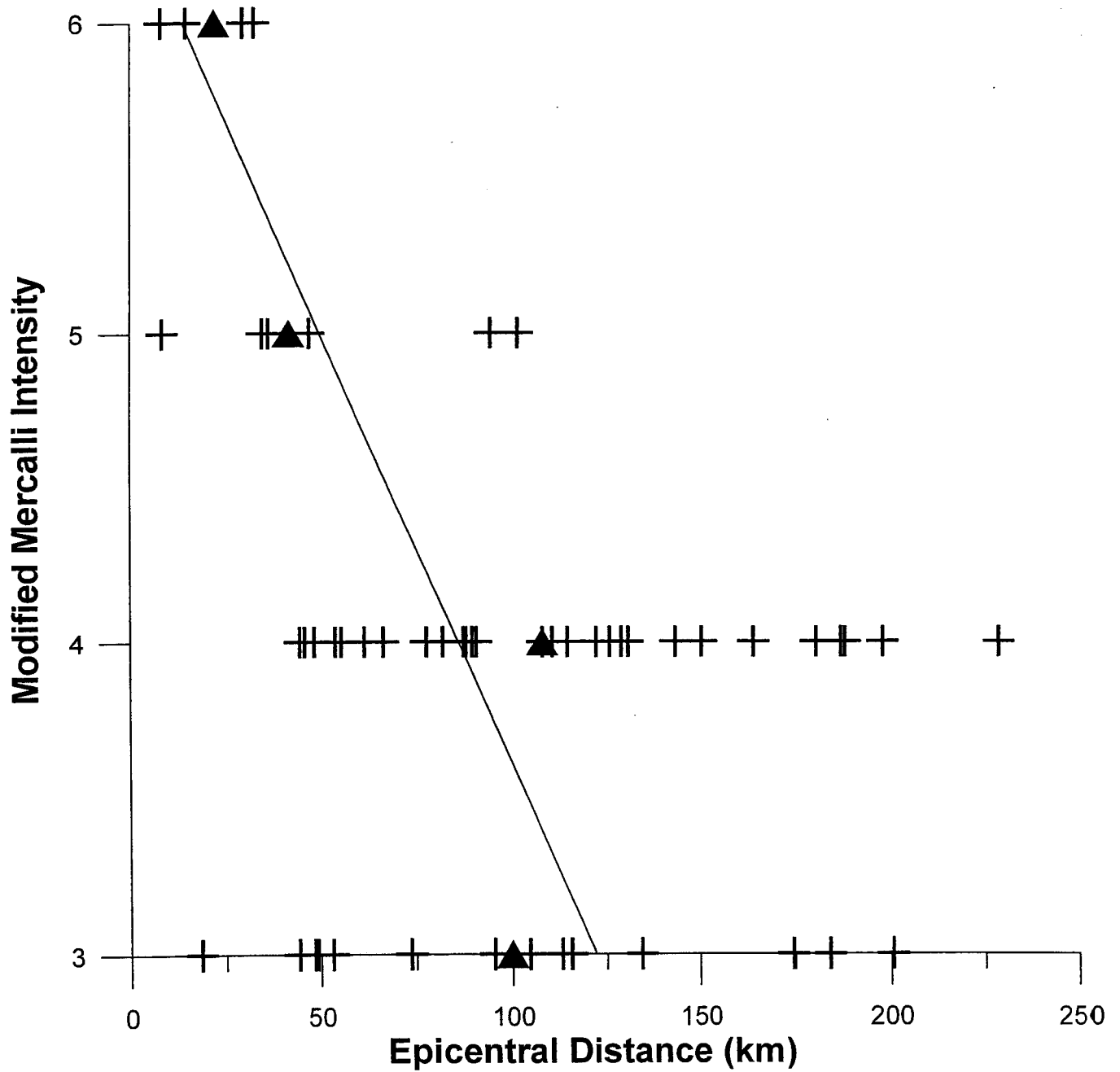
# 1948 Verdi Eq., M6



## 1950 Fort Sage Mtns. Eq., M5.6

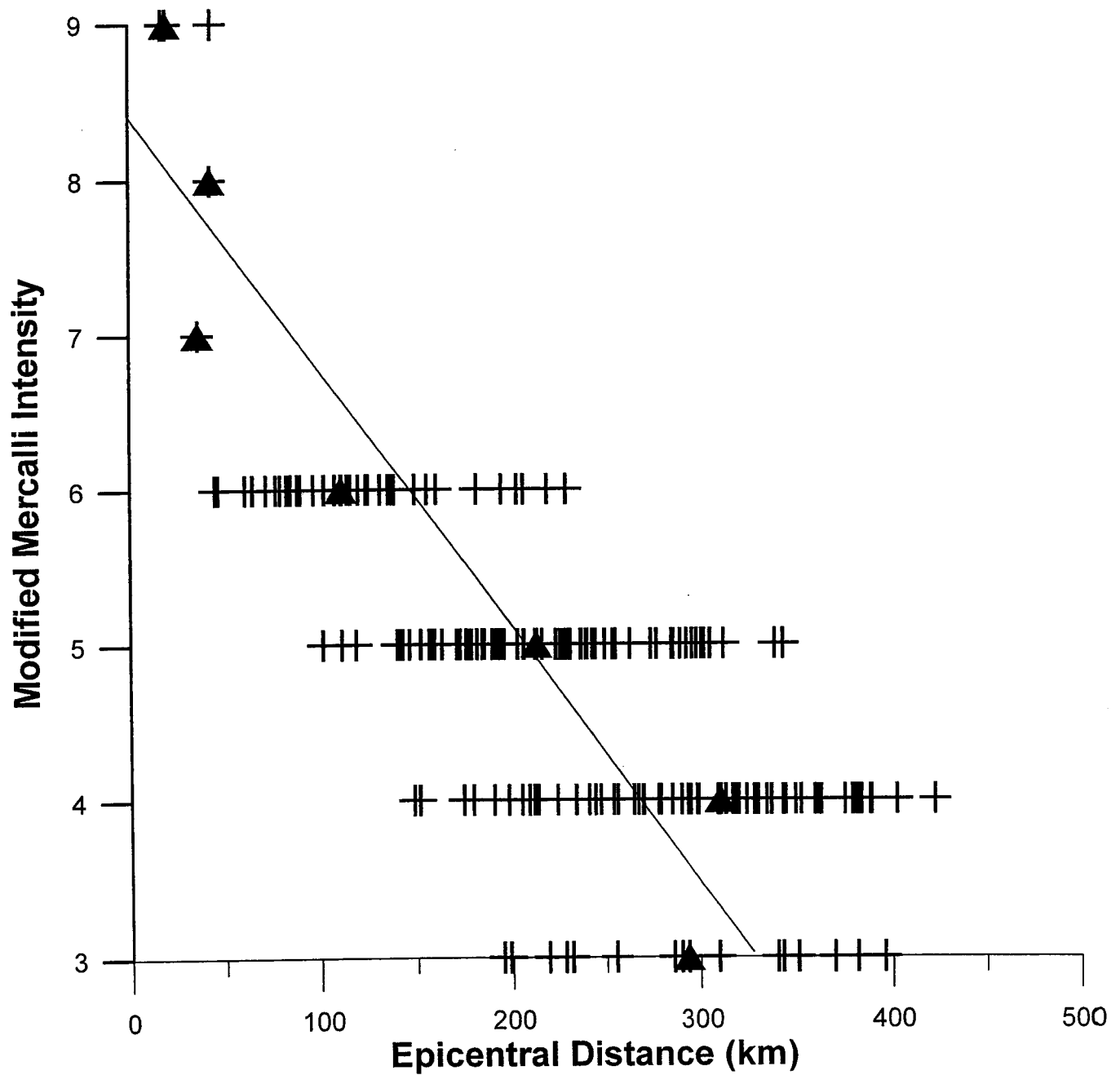


## 1953 Verdi Eq., M5.5

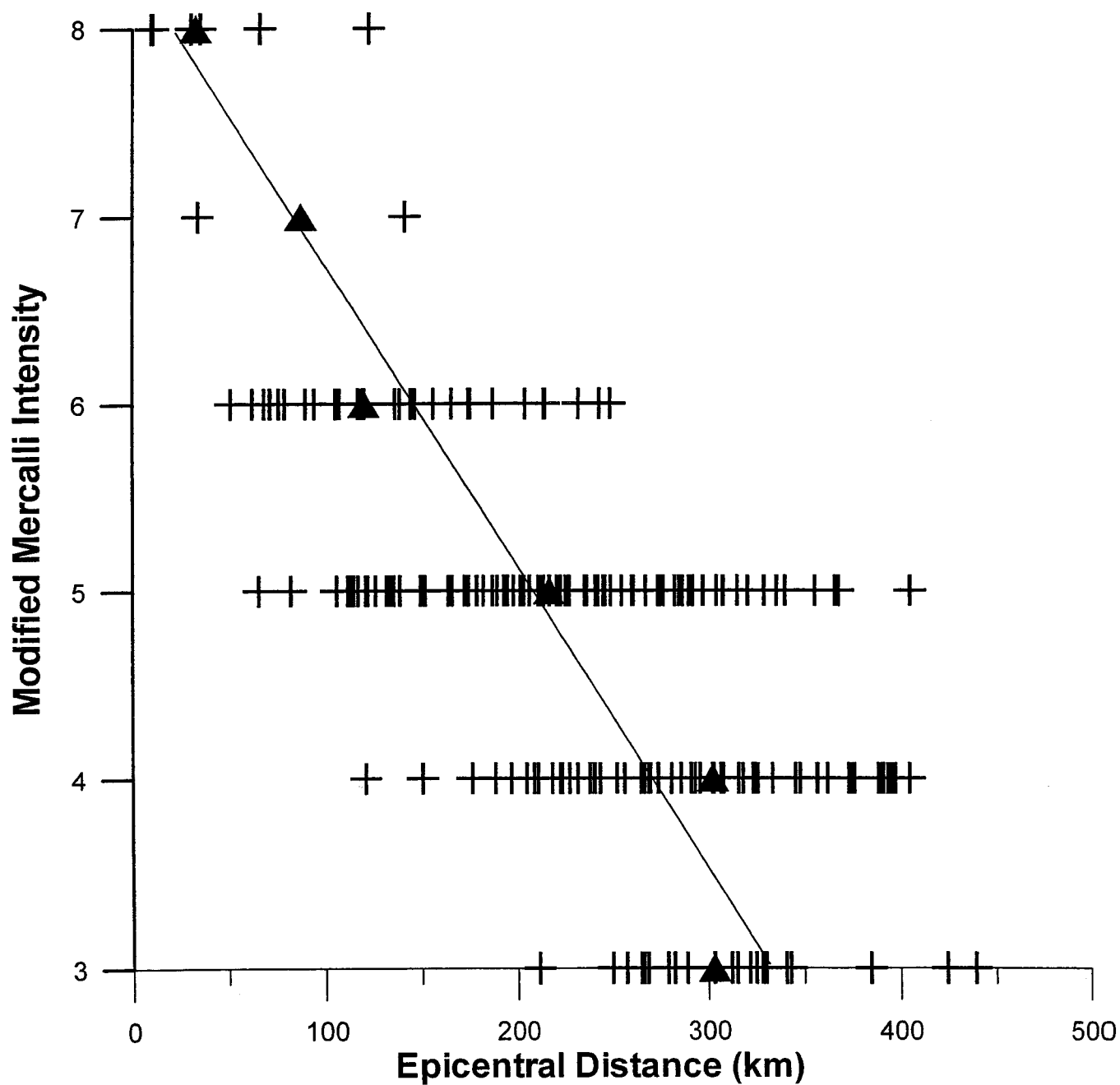




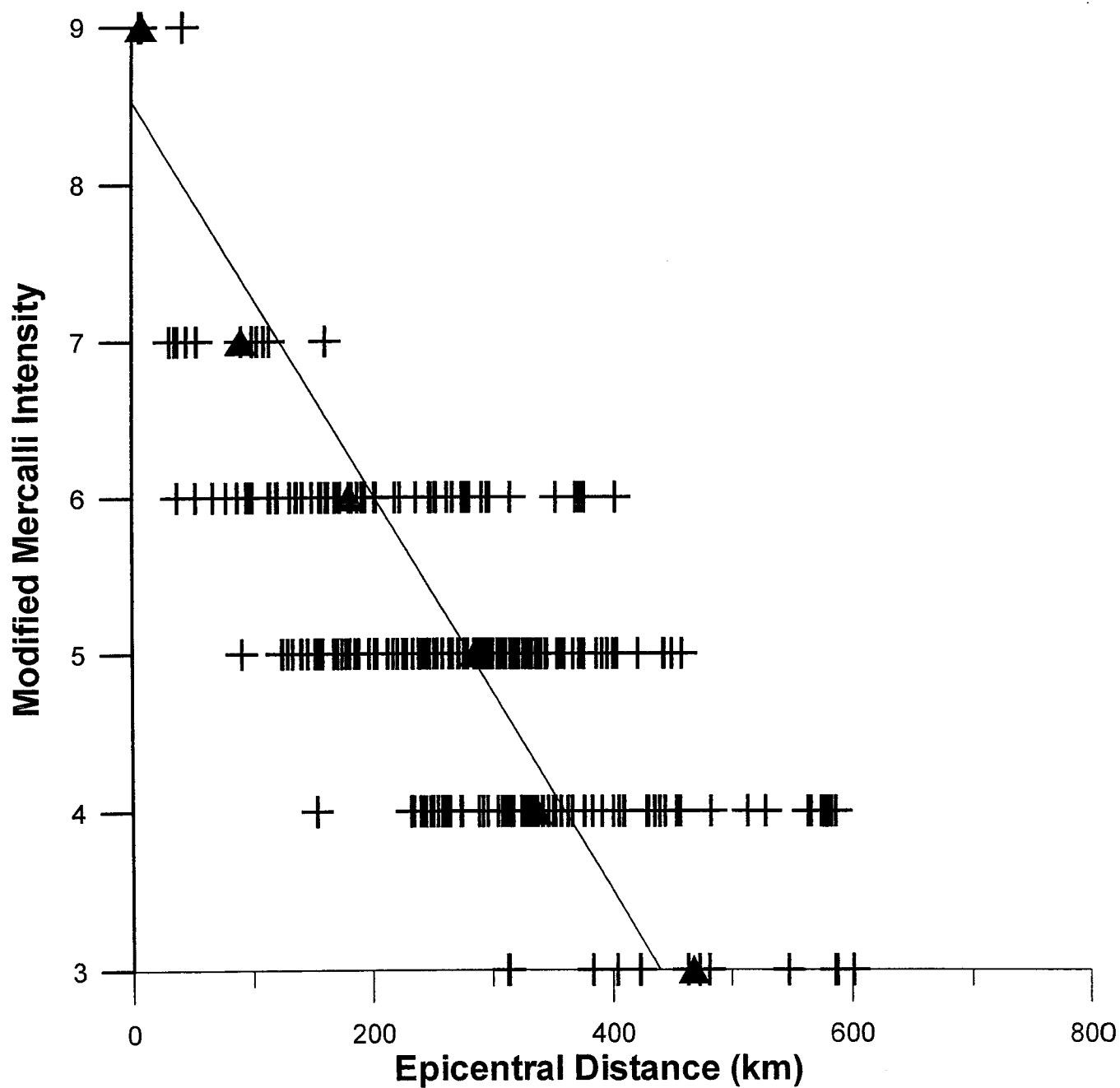
## 1954 Rainbow Mtn. Eq., M6.6



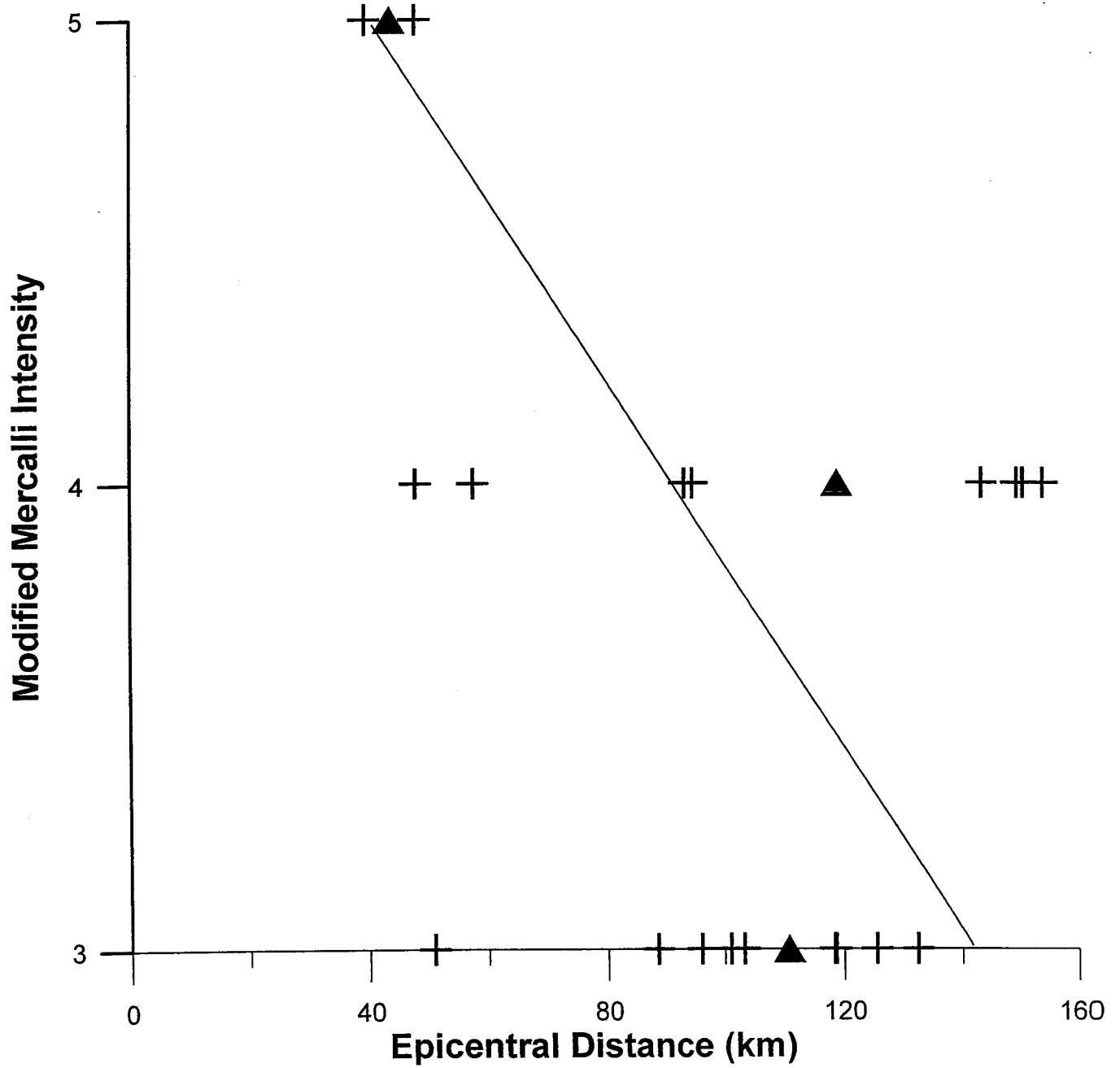
## 1954 Stillwater Eq., M6.8



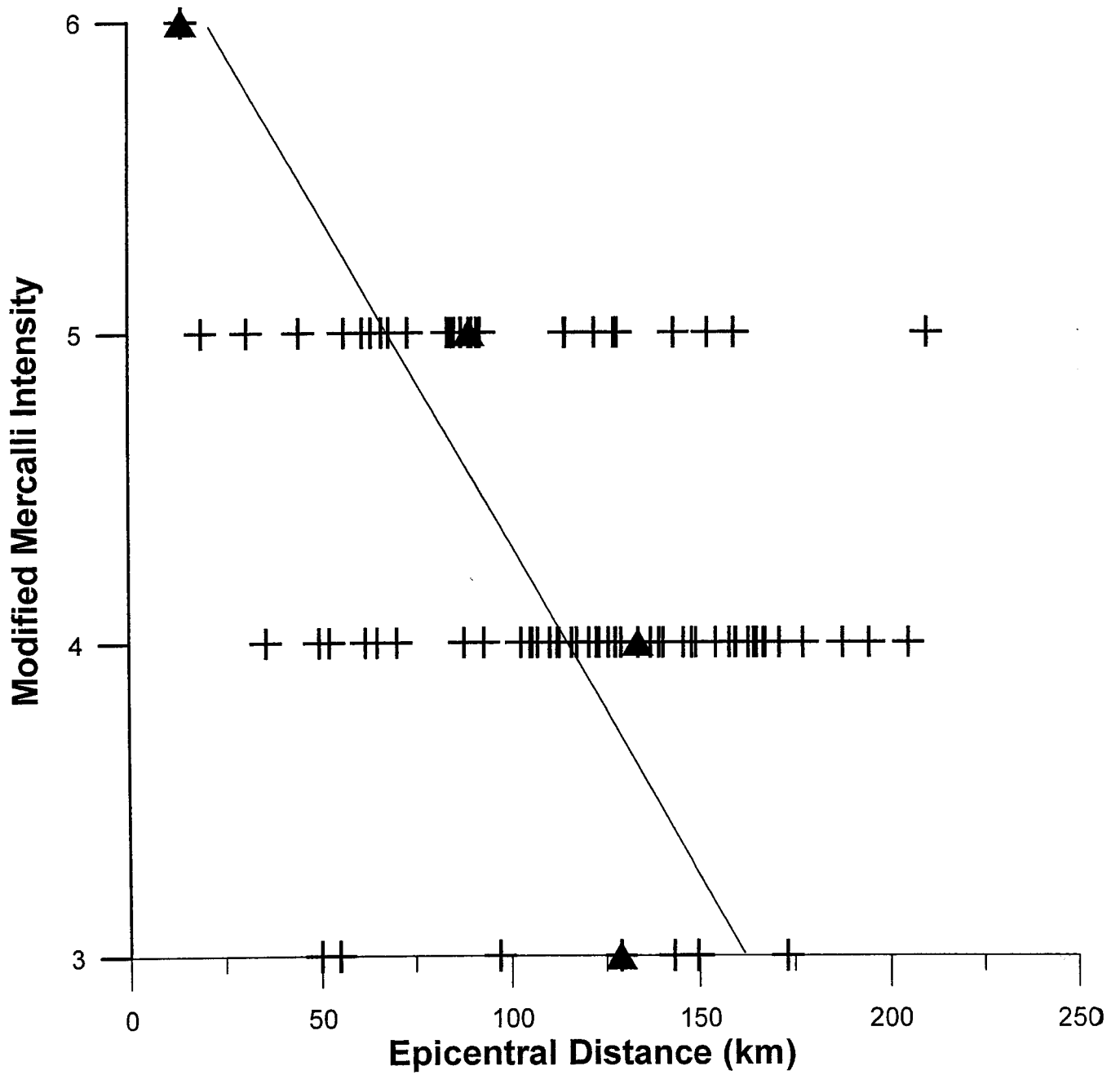
## 1954 Fairview Pk. - Dixie Valley Eqs., M7.2



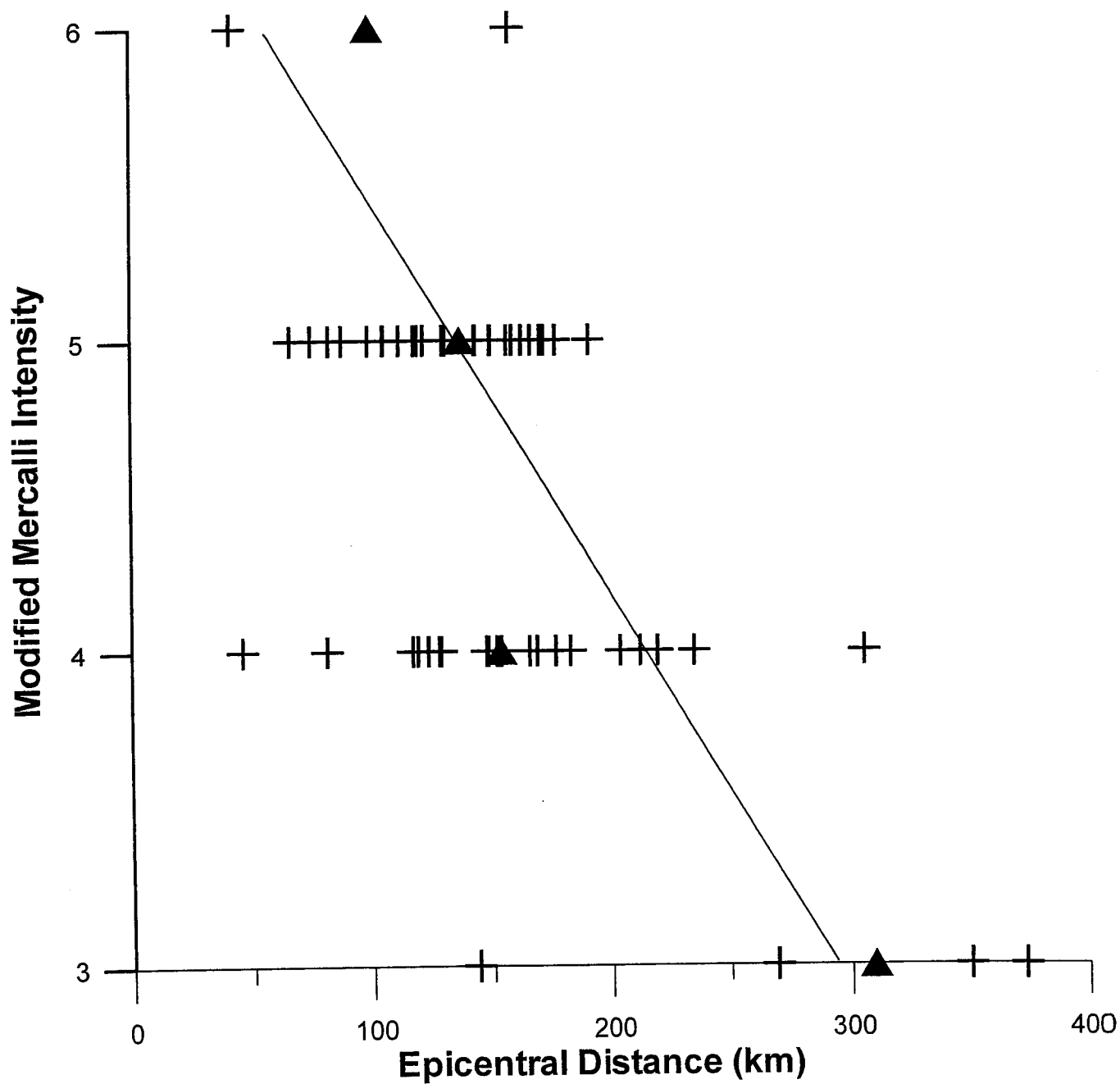
## 1956 Hawthorne Eq., M5.1



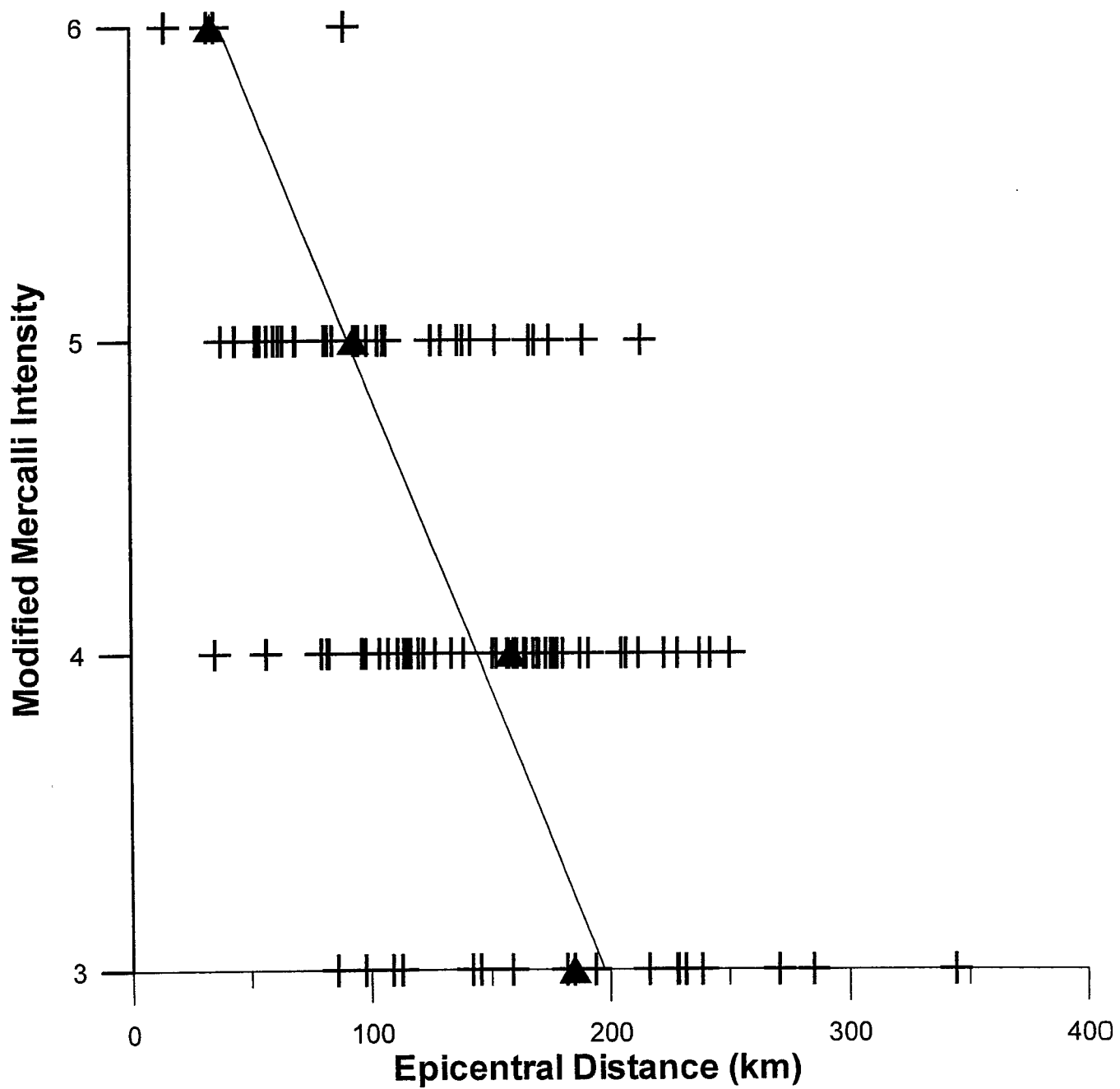
## 1959 W. Bishop Eq., M5.2



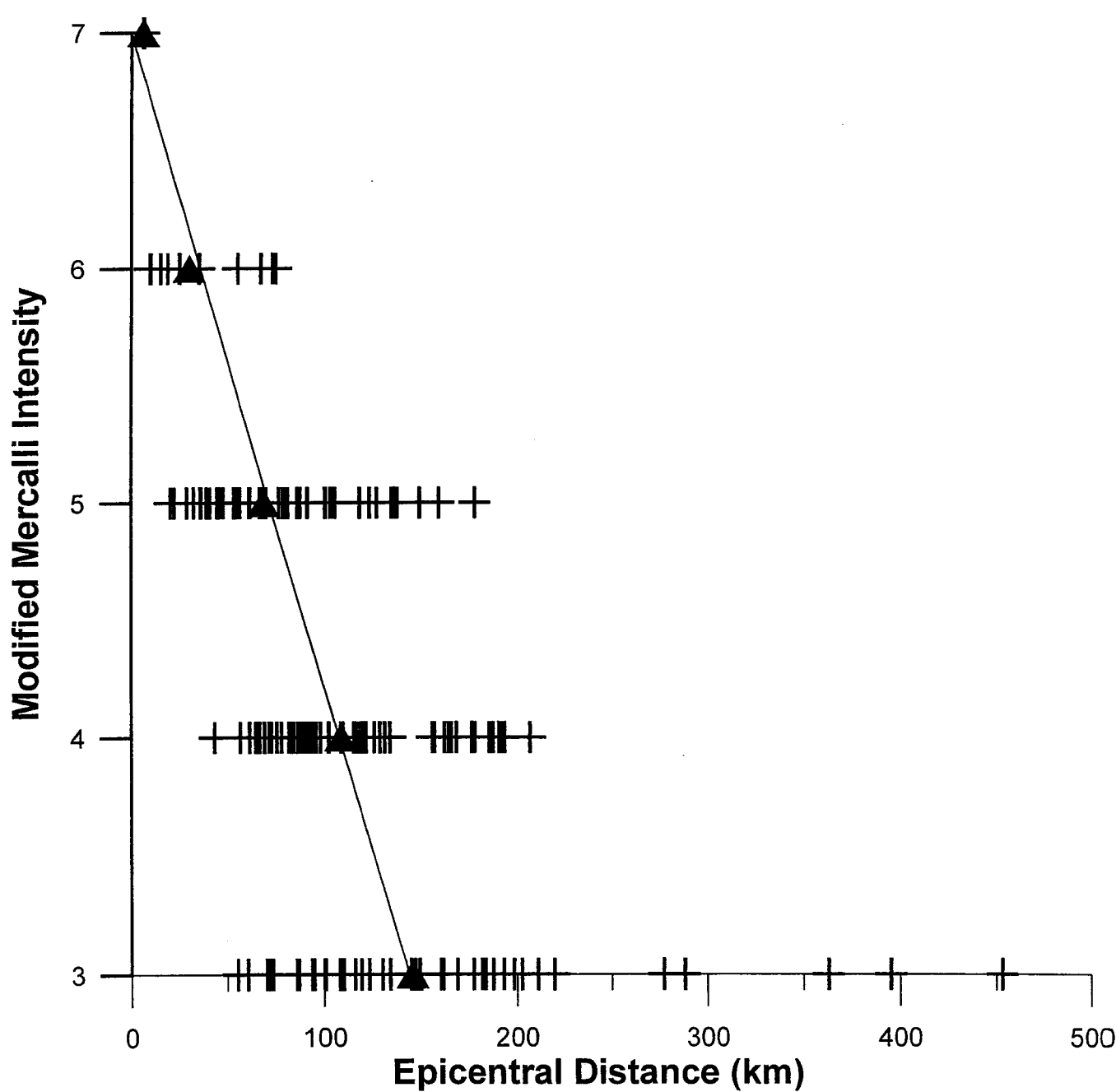
## 1959 Dixie Valley Eq., M6.3



## 1959 Schurz Eq., M6.1

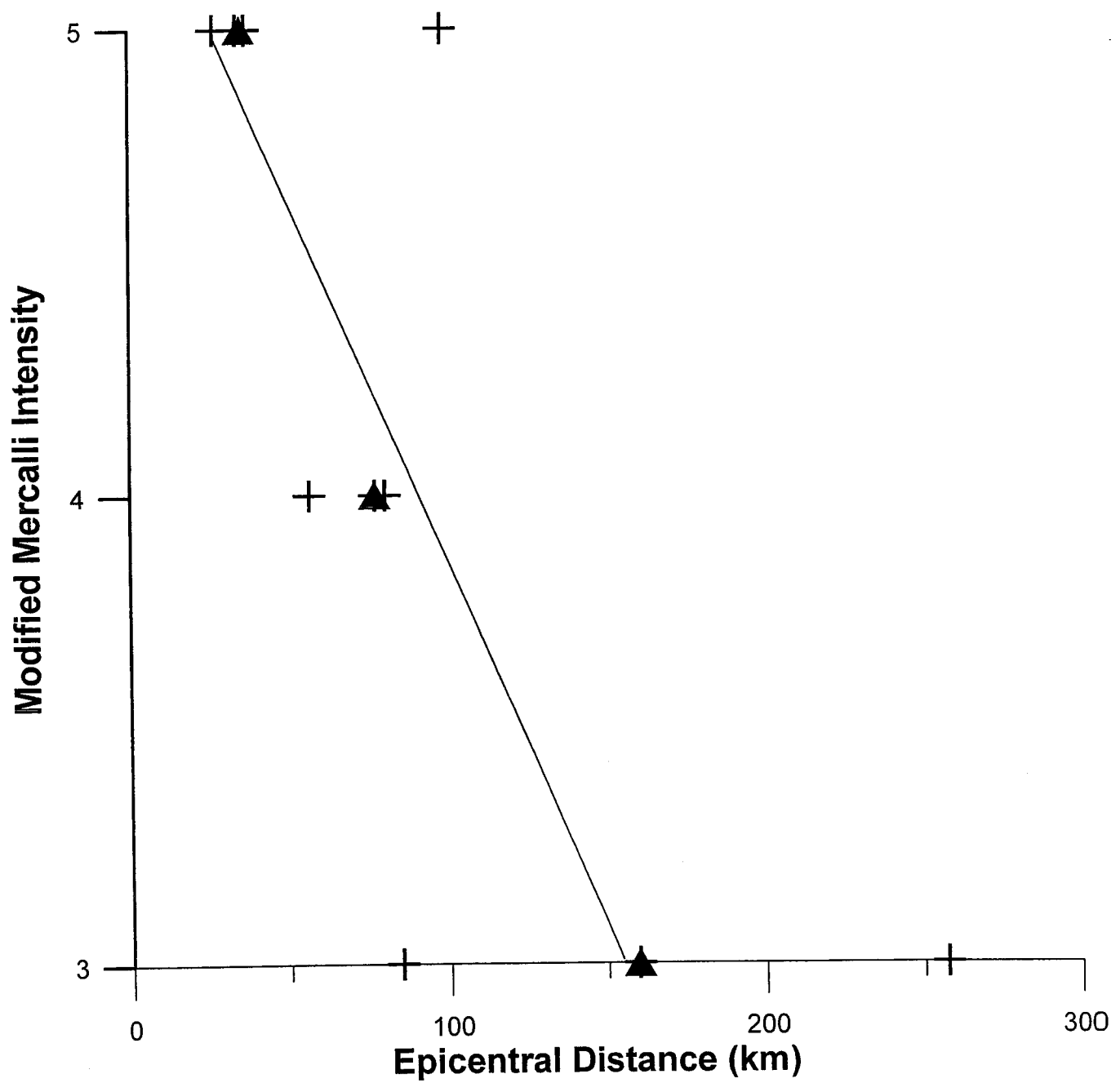


# April 1959 E. California Eq., M5.8

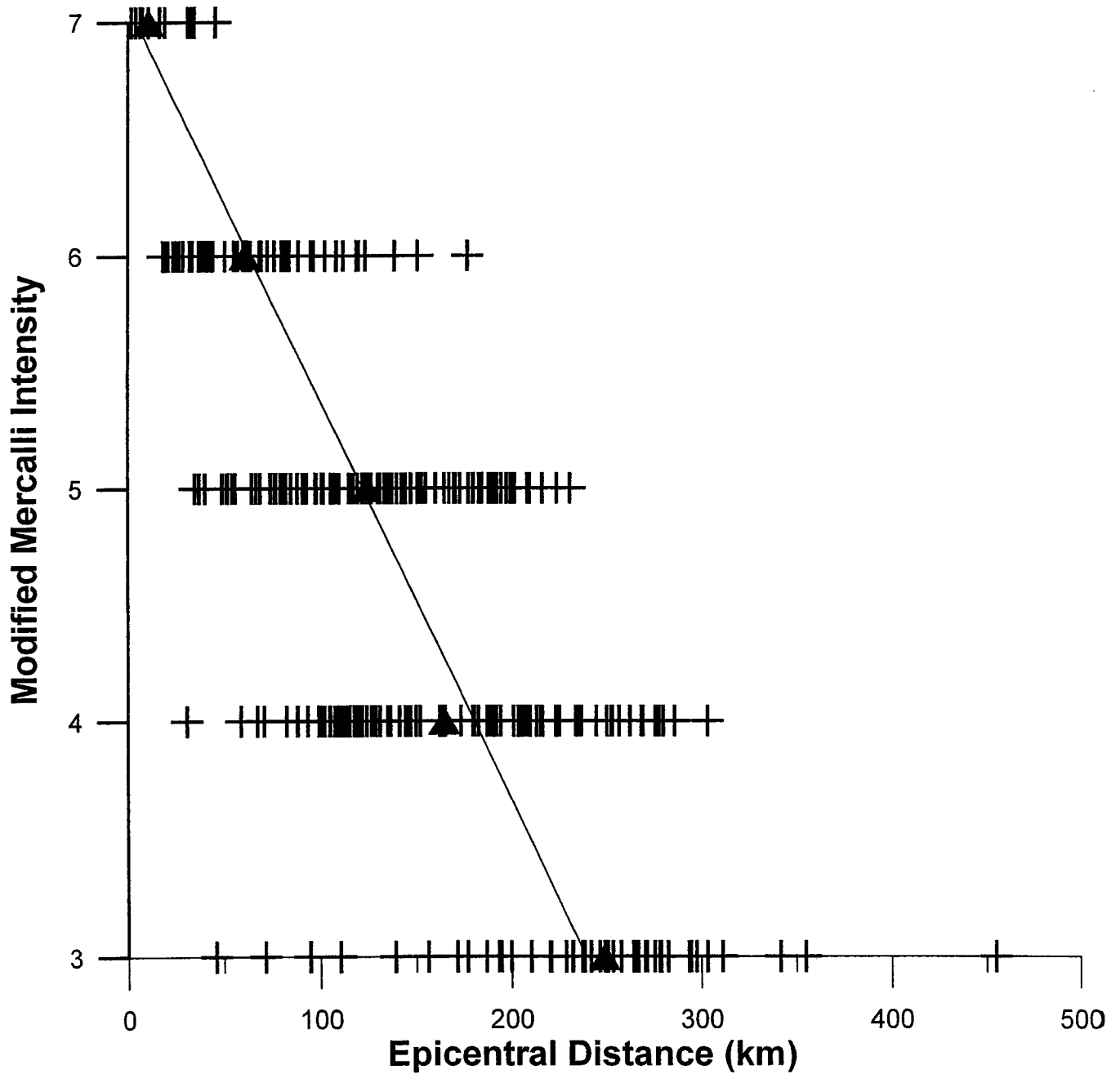




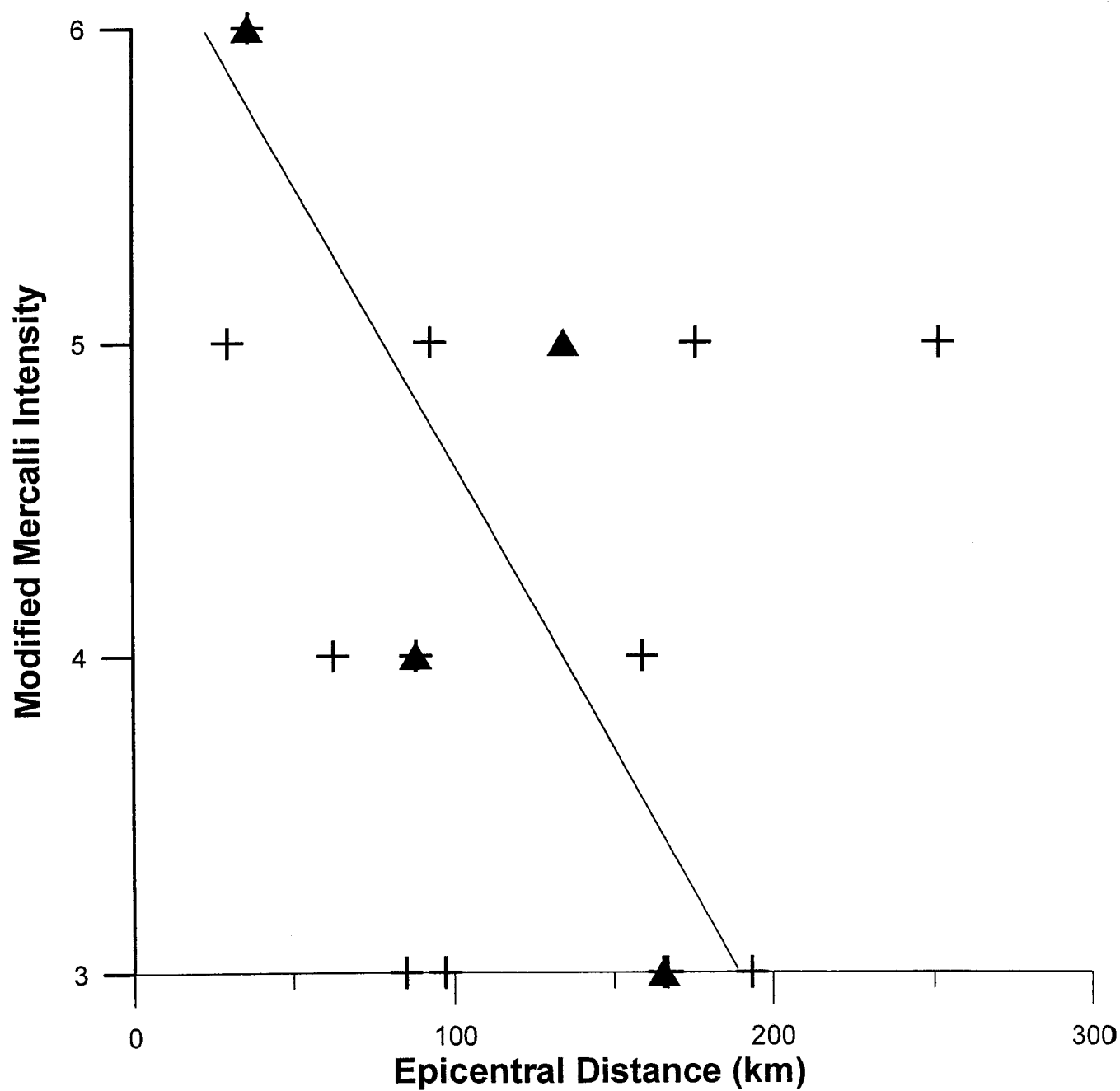
# 1961 Winnemucca Eq., 5.4



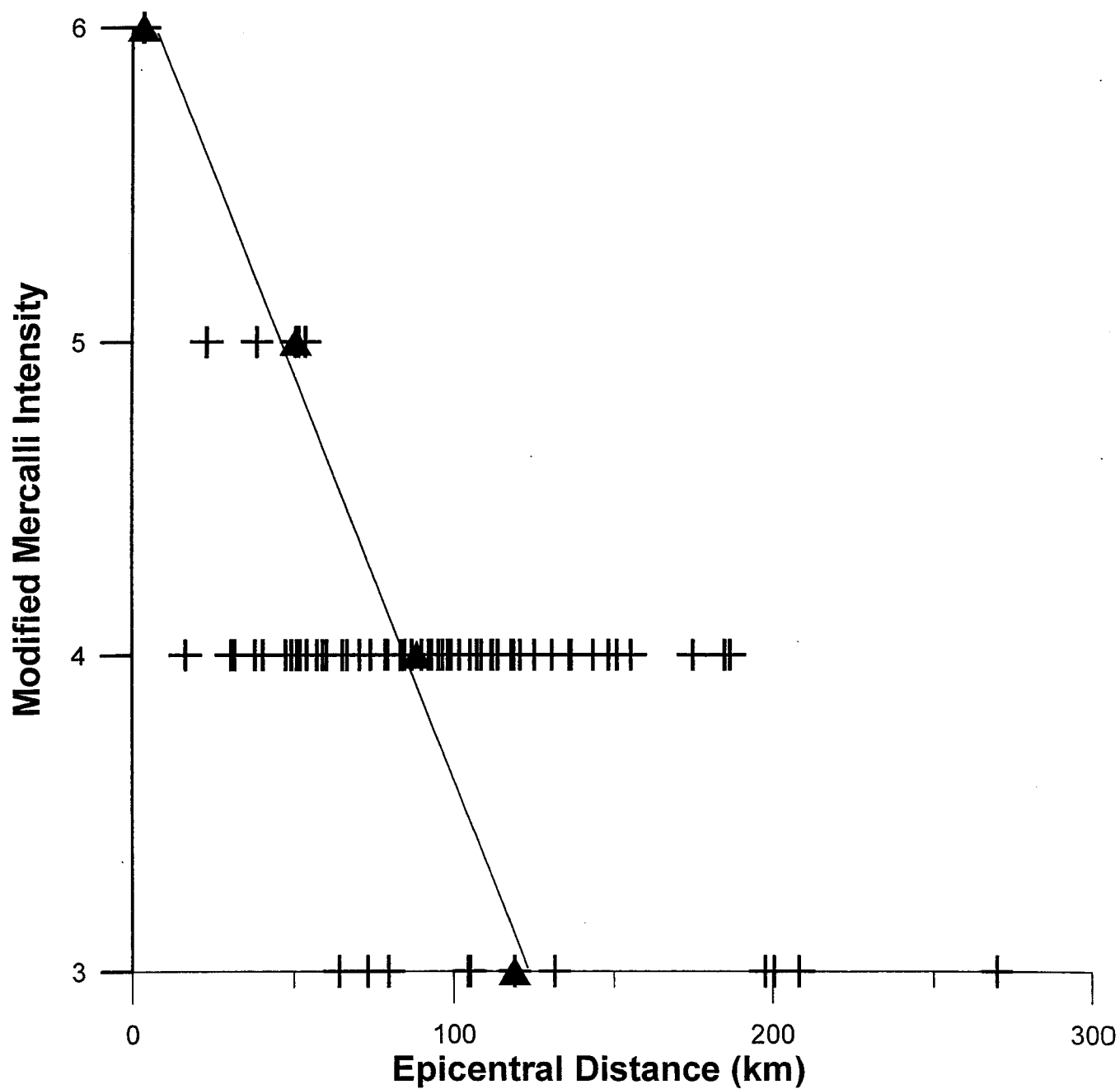
## 1966 Boca Valley Eq., M6



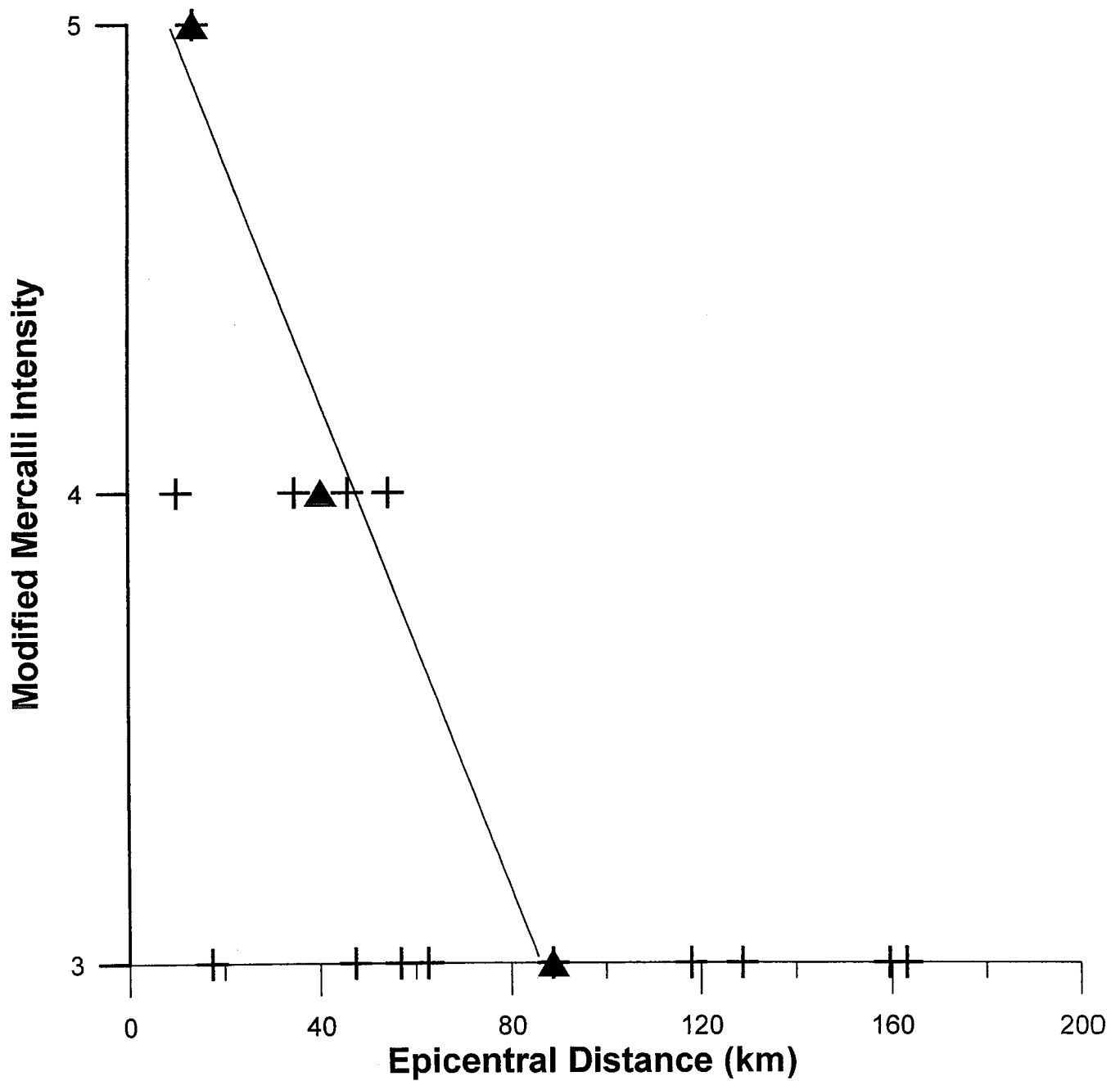
## 1966 Caliente Eq., M6



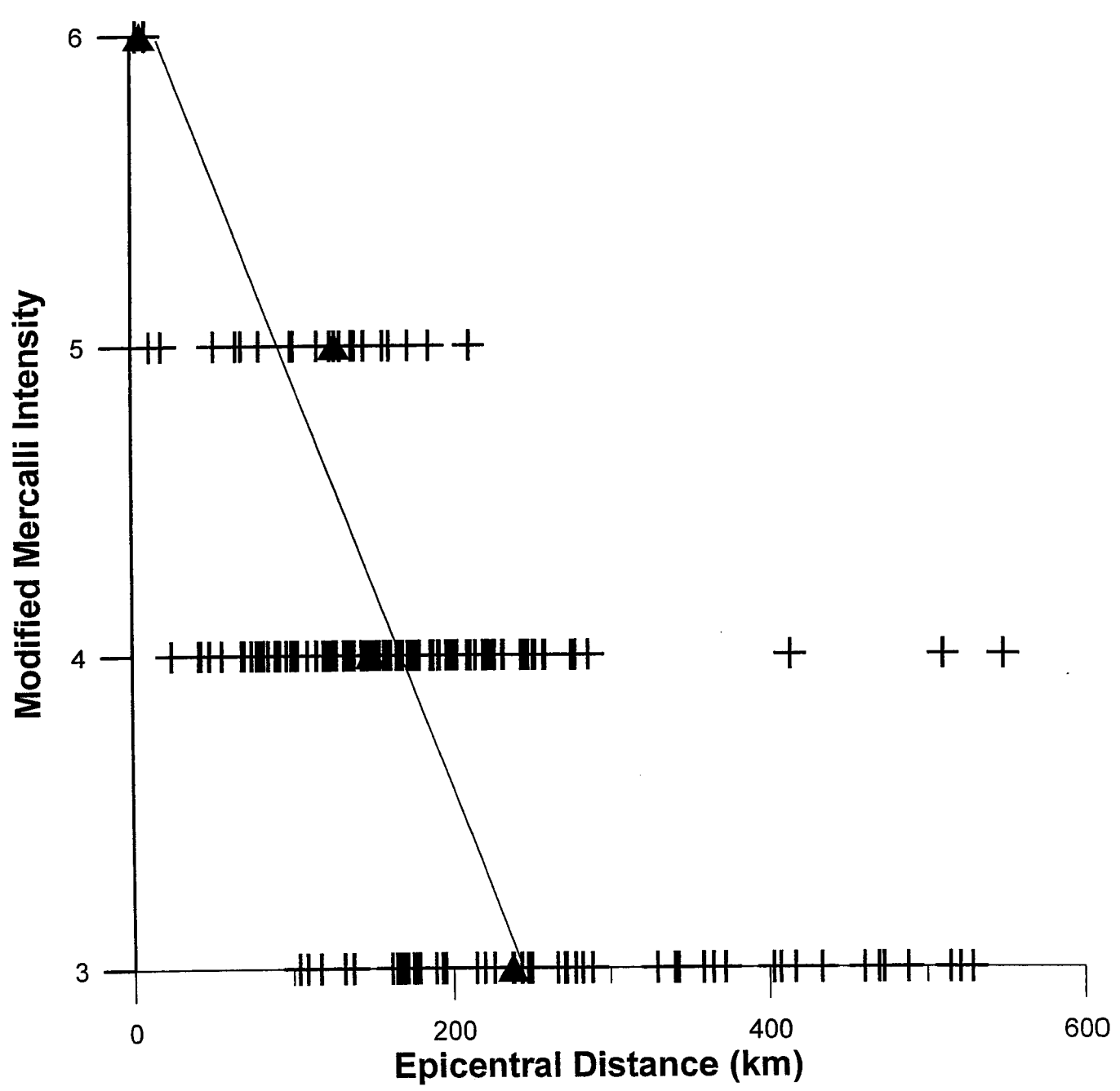
## 1979 Diamond Mtns., CA, M5.1



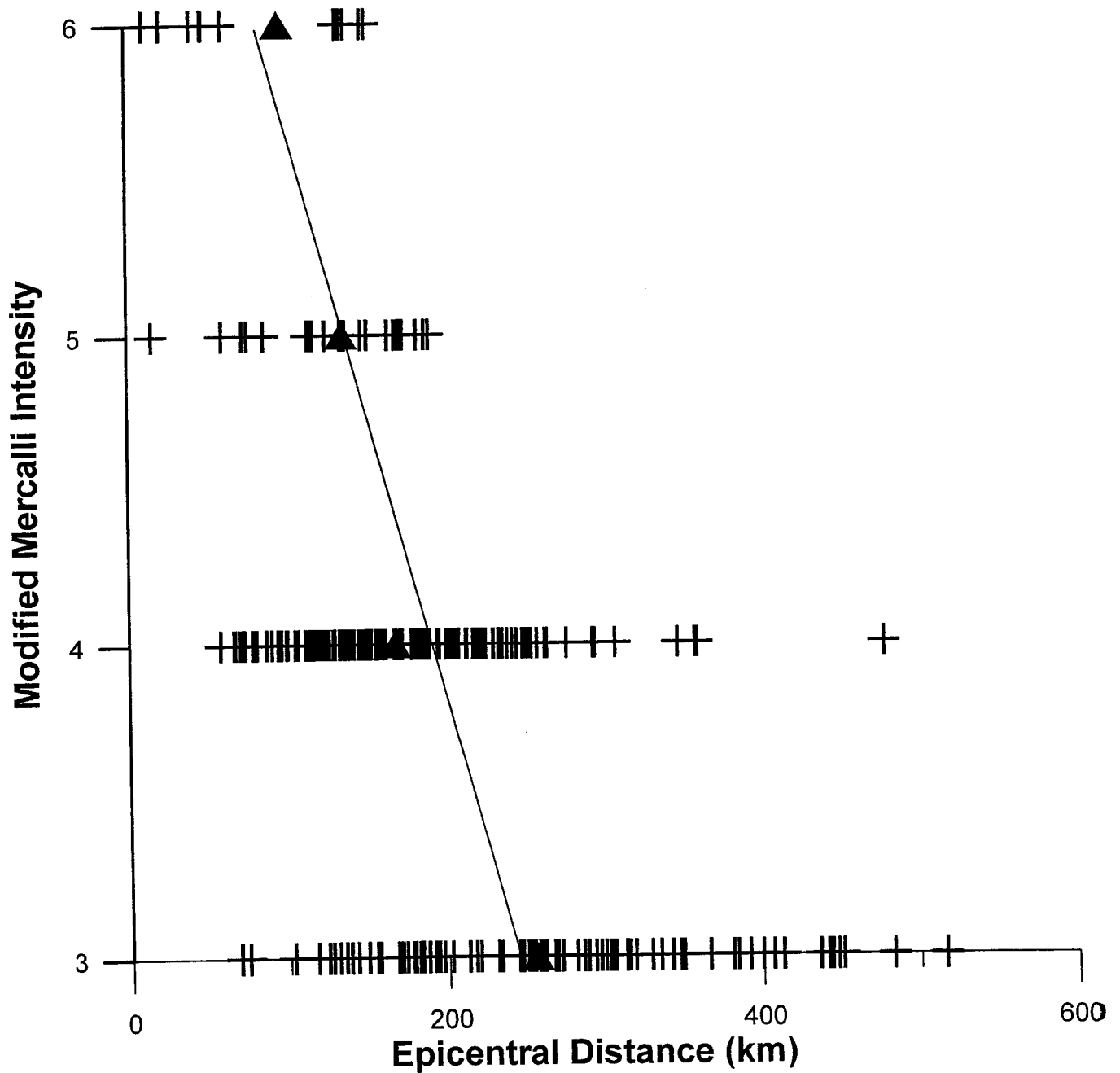
## 1980 Fernley Eq., M4.7



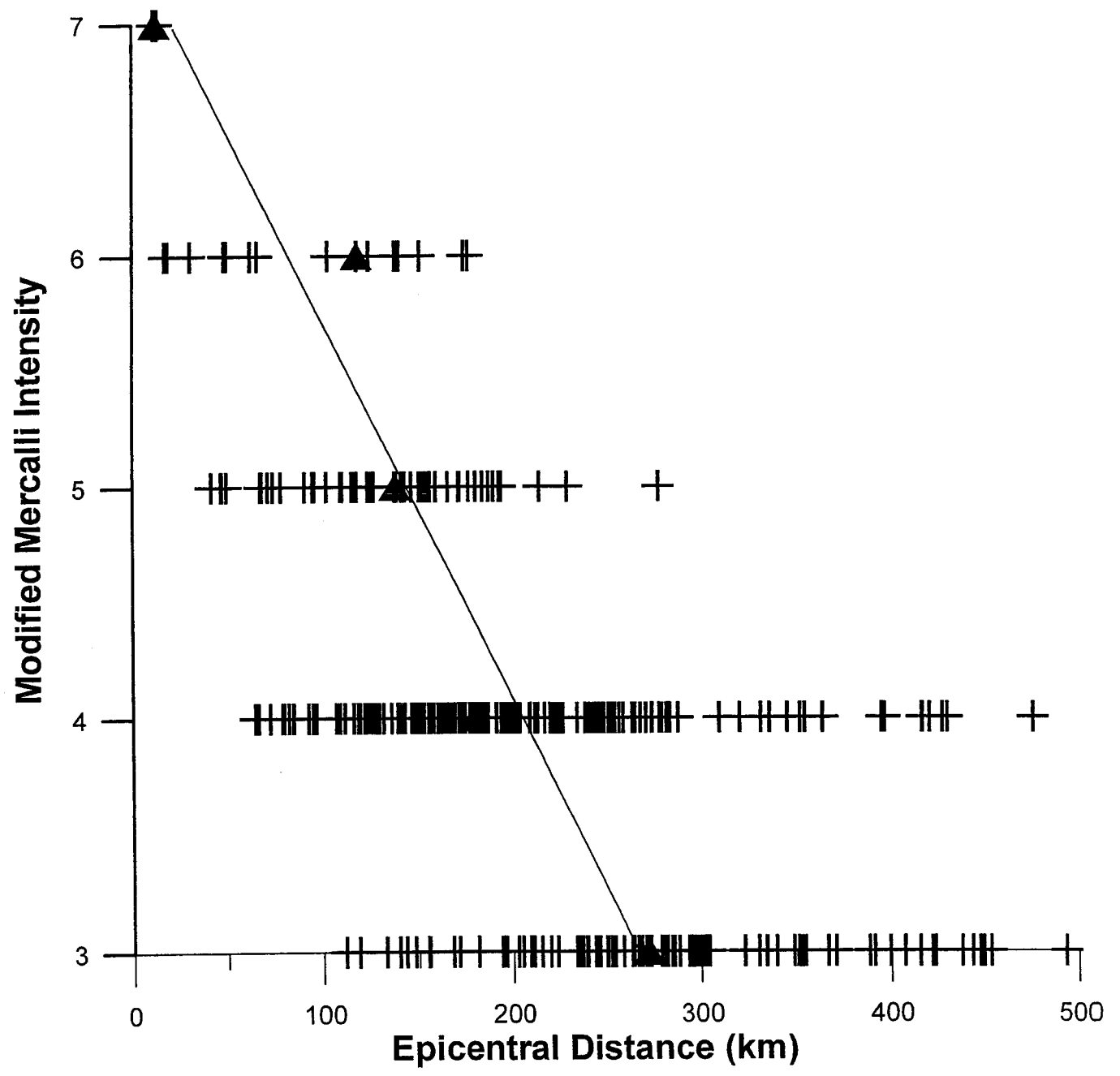
## Sept. 1981 Owens V. Eq., M5.8



# May 27, 1980 Mammoth Lks. Eq., M6

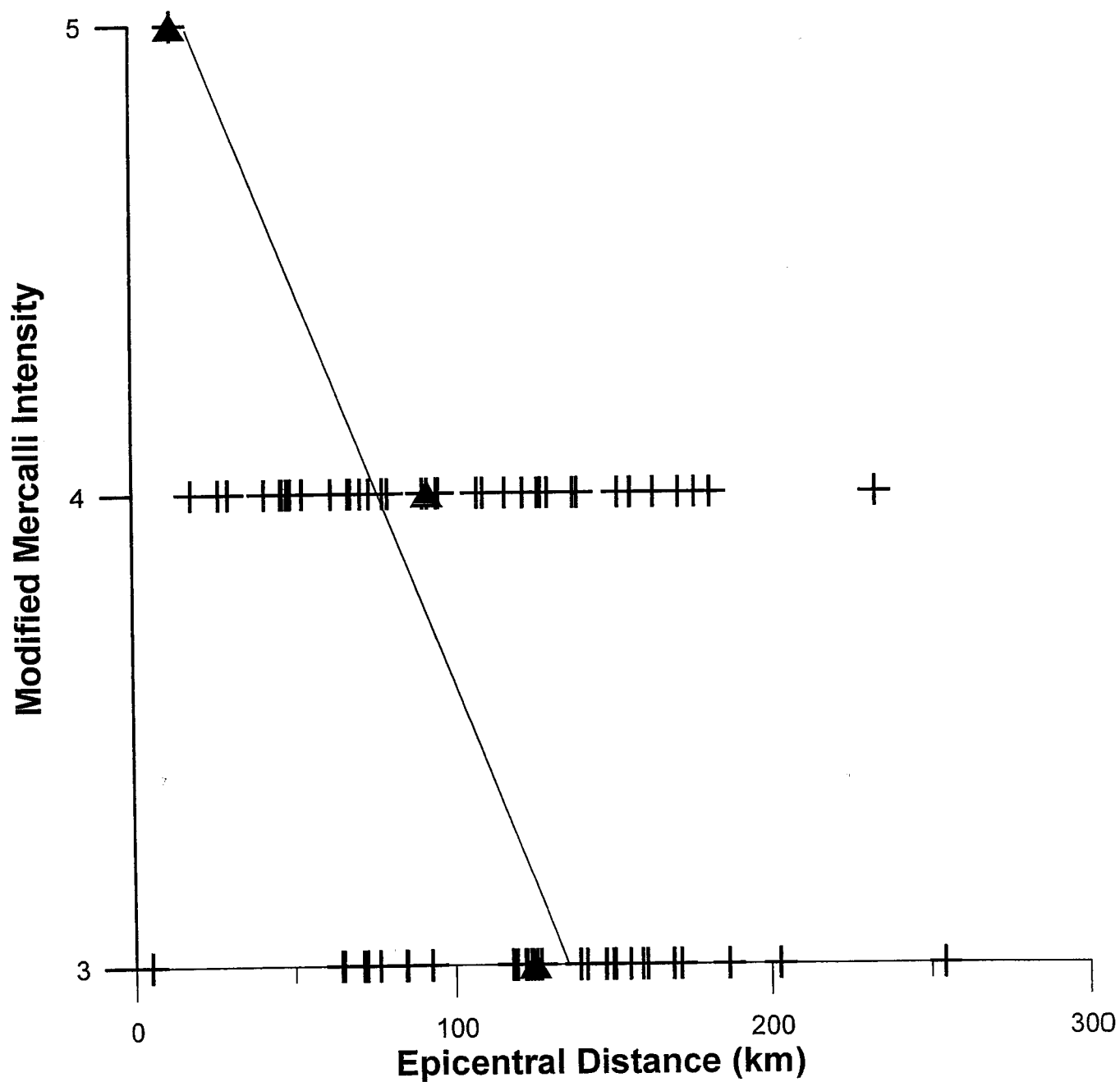


# May 25, 1980 Mammoth Lakes Eq., M6.1

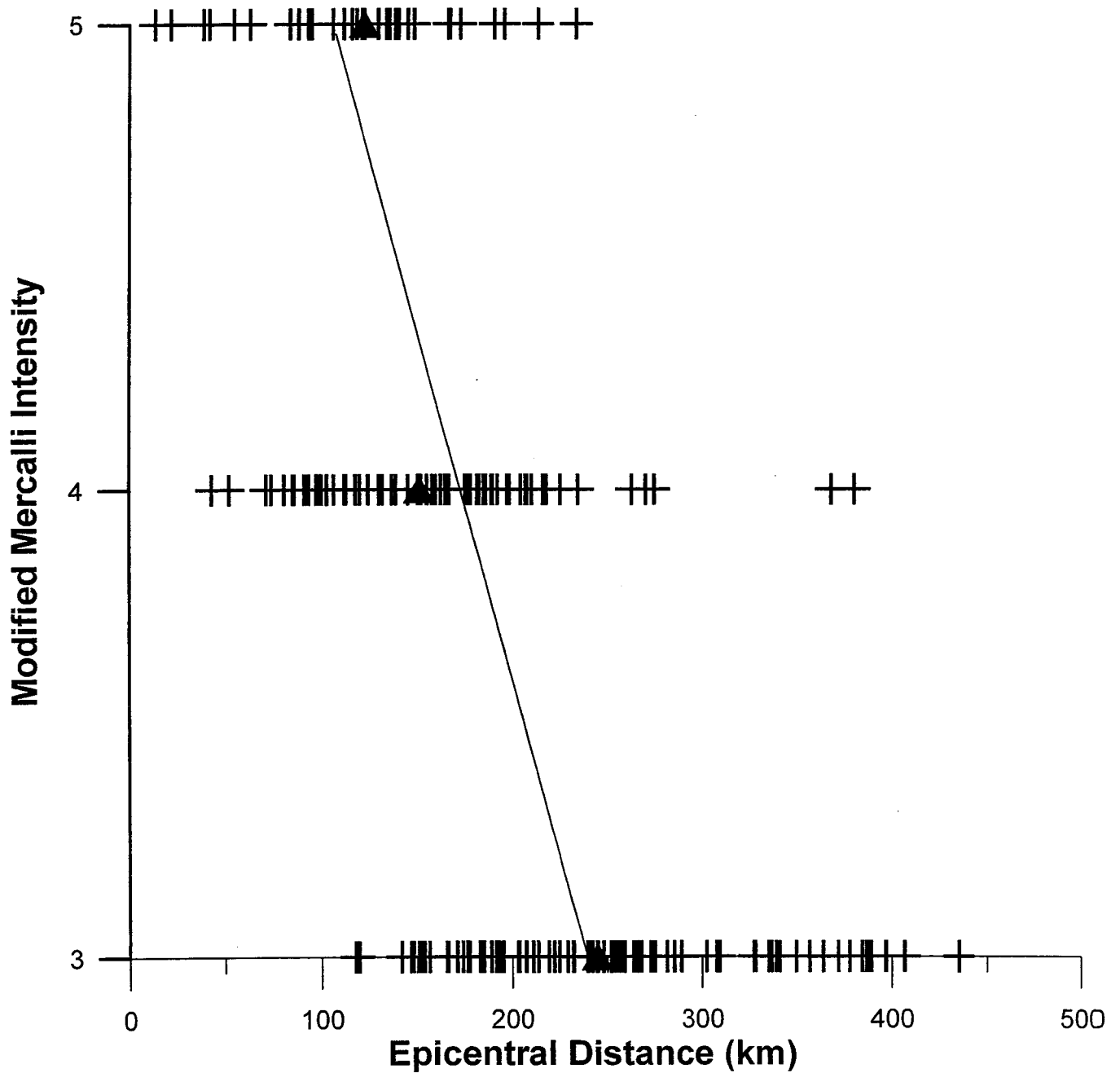




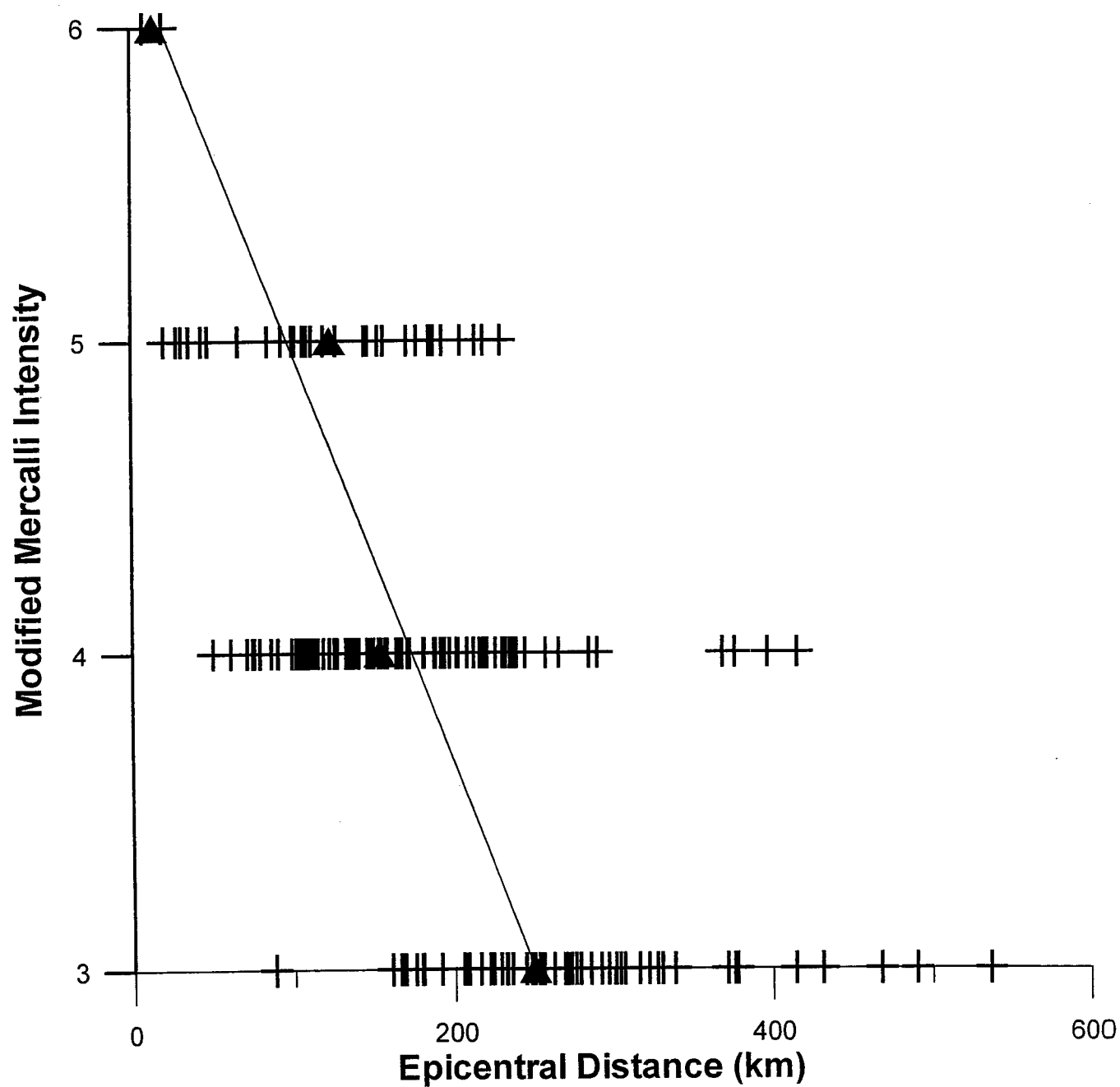
## Aug. 1980 Owens V. Eq., M5



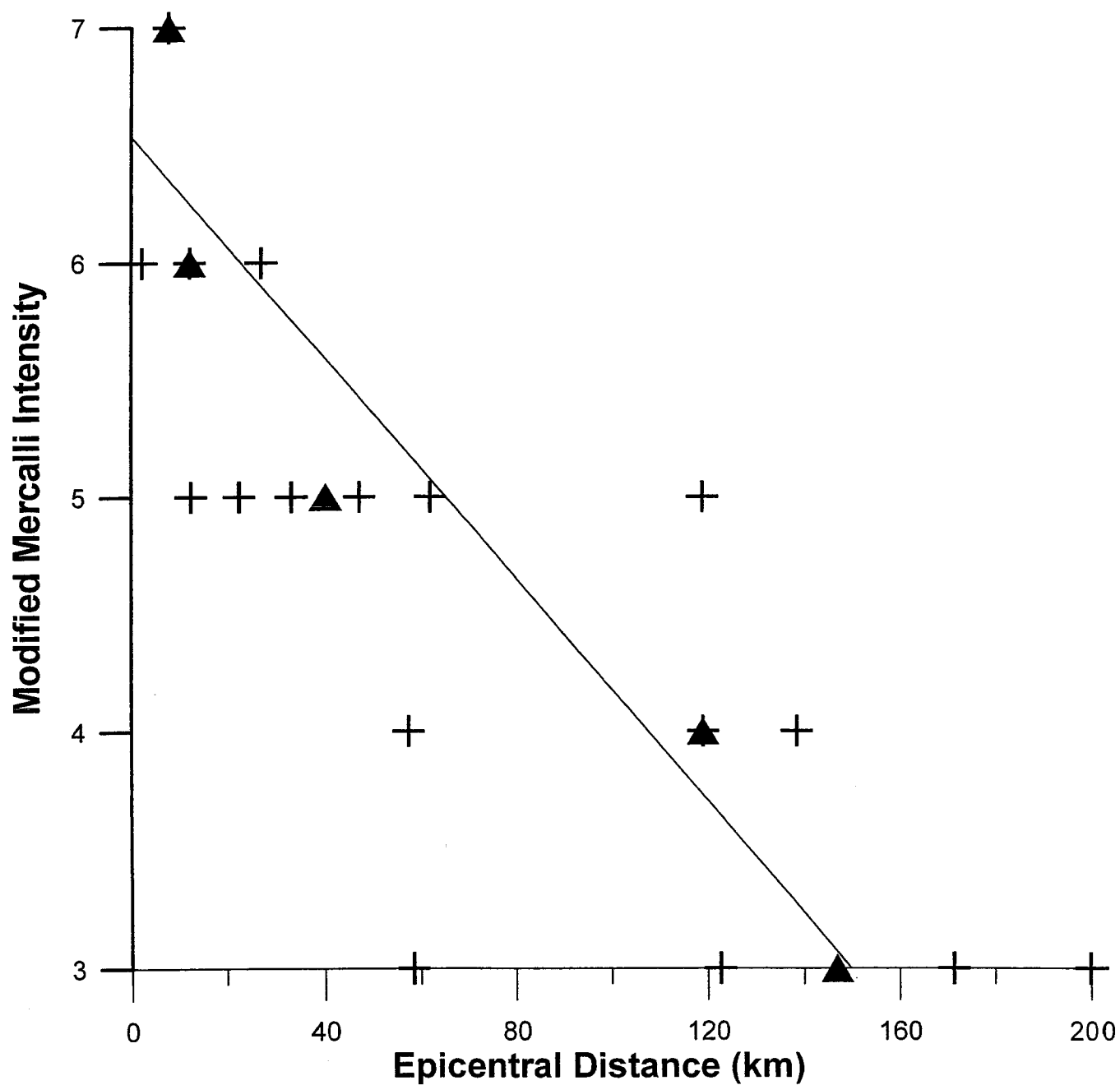
## 1984 Round Valley Eq., M5.8



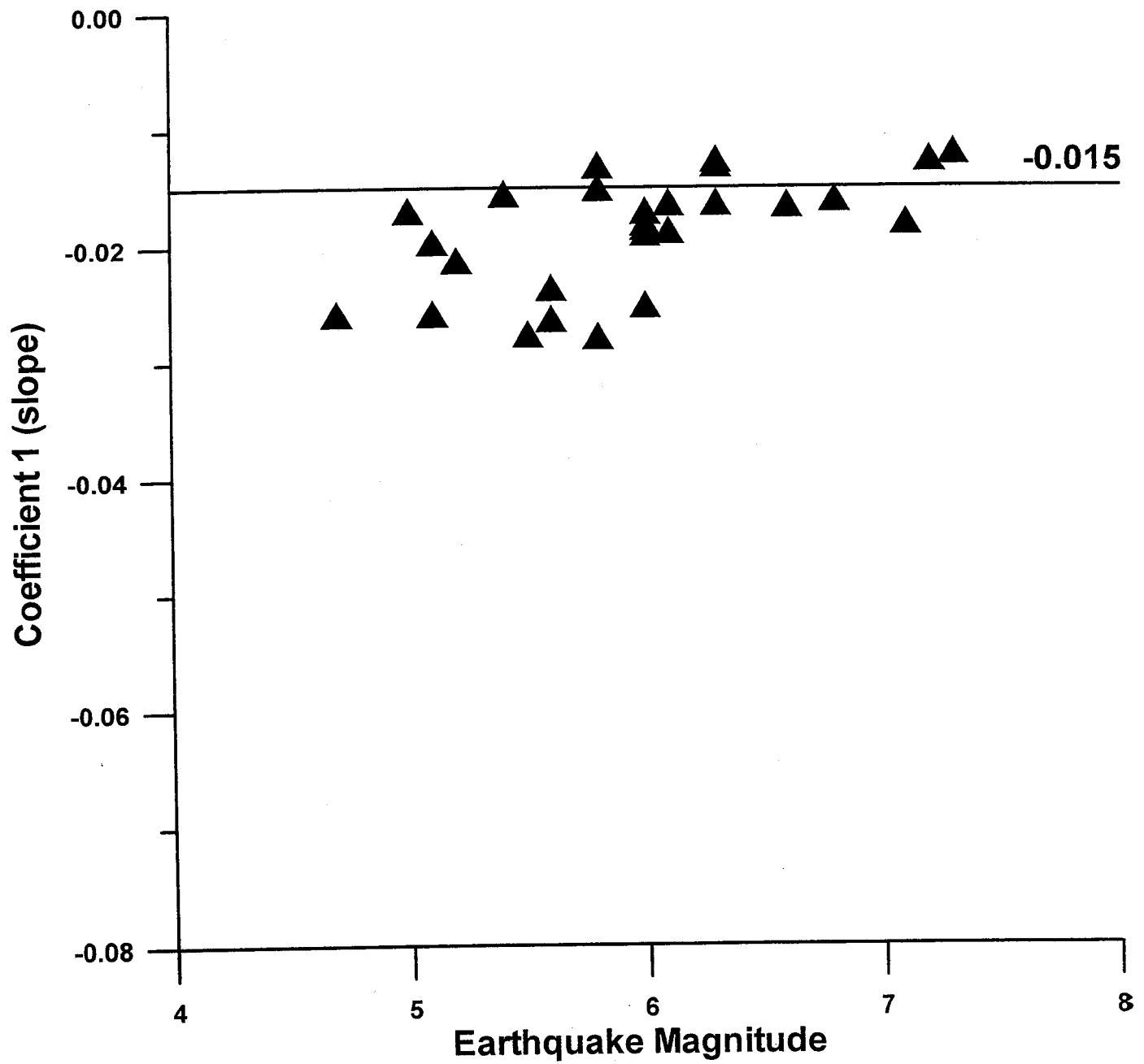
## 1986 Chalfant Earthquake, M6.3



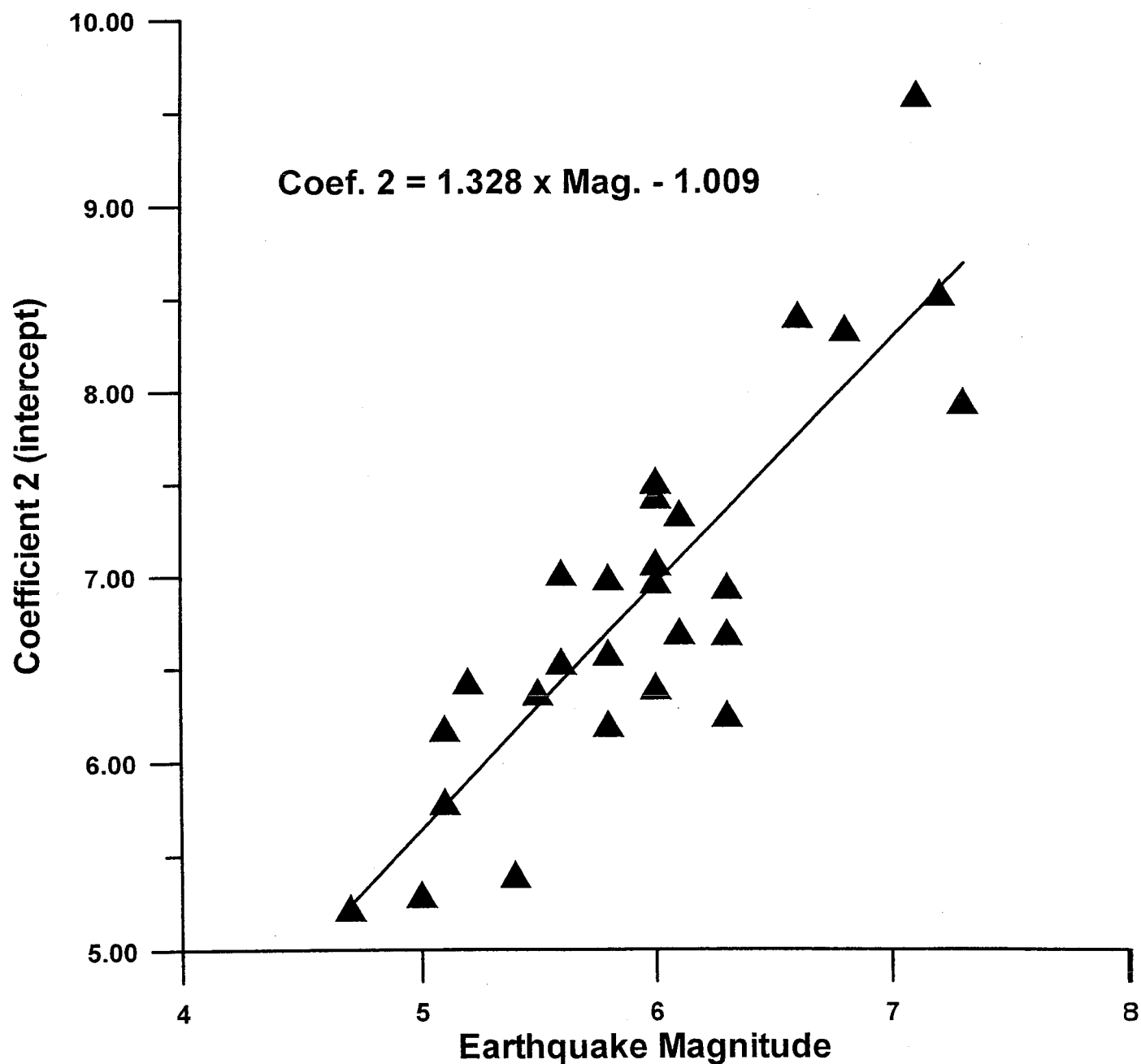
## 1992 Little Skull Mtn. Eq., M5.6



# Earthquakes from Nevada and E. California

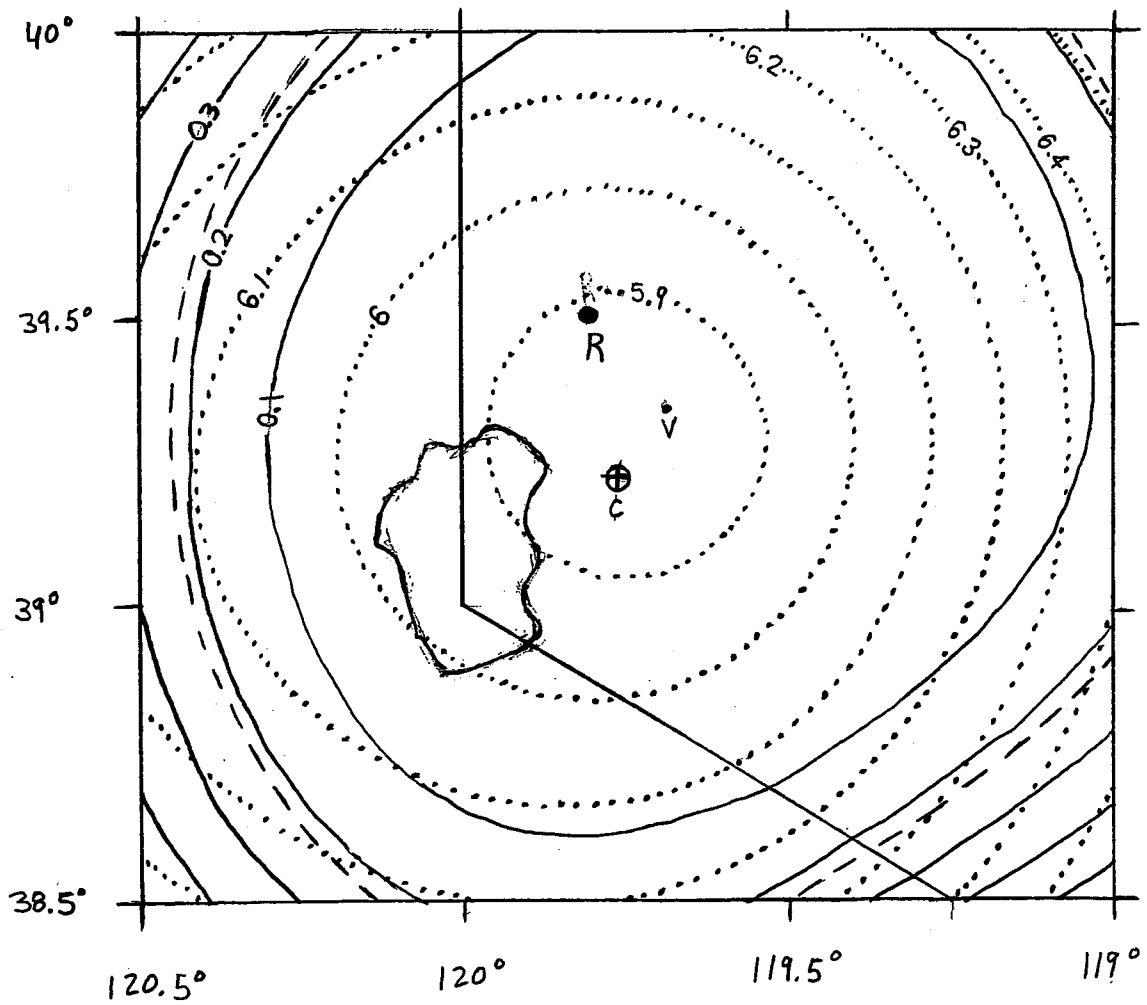


# Earthquakes from Nevada and E. California



1868  
Earthquake

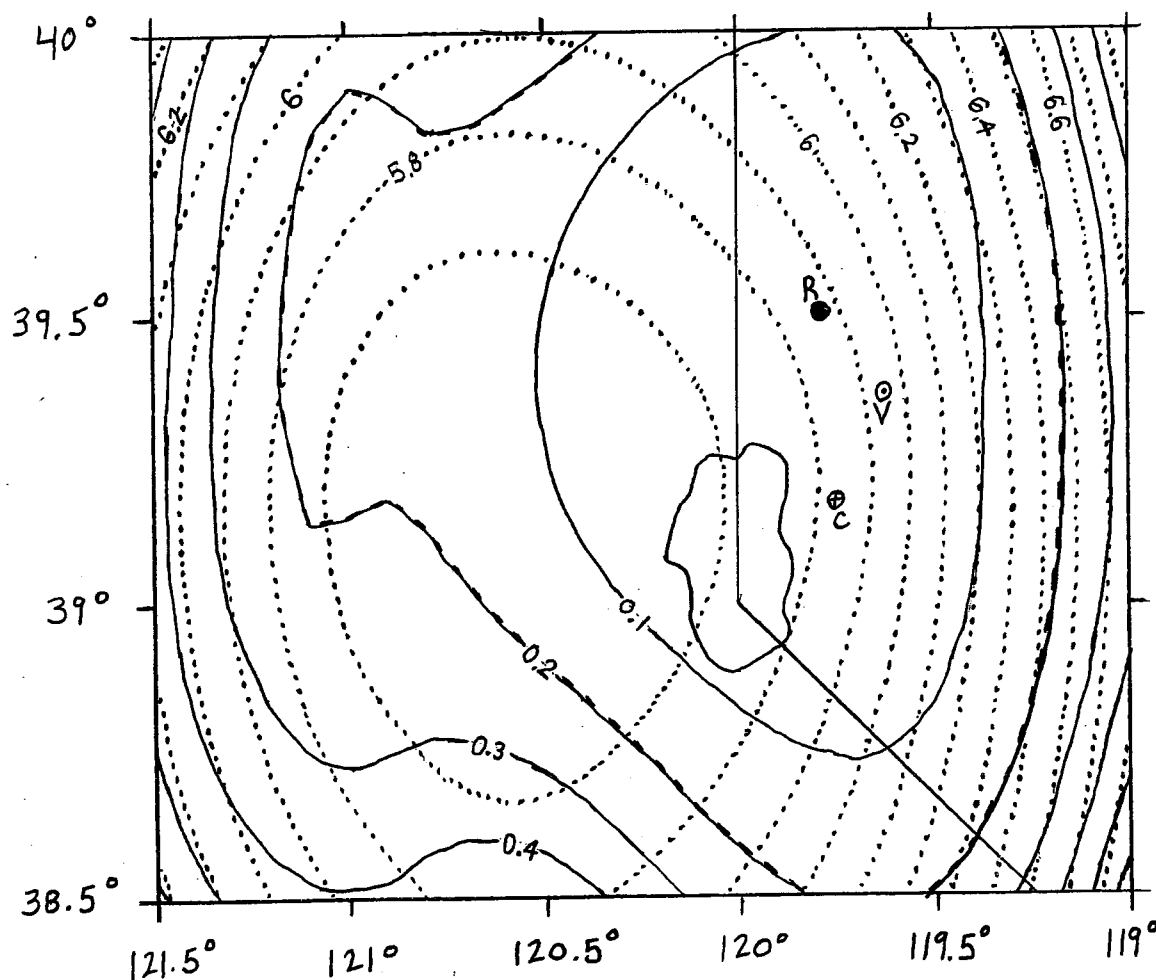
California  
Nevada



..... Contours of  $M_I$   
—— Contours of  $RMS(M_I)$   
- - - ~95% confidence RMS

1869a  
Earthquake

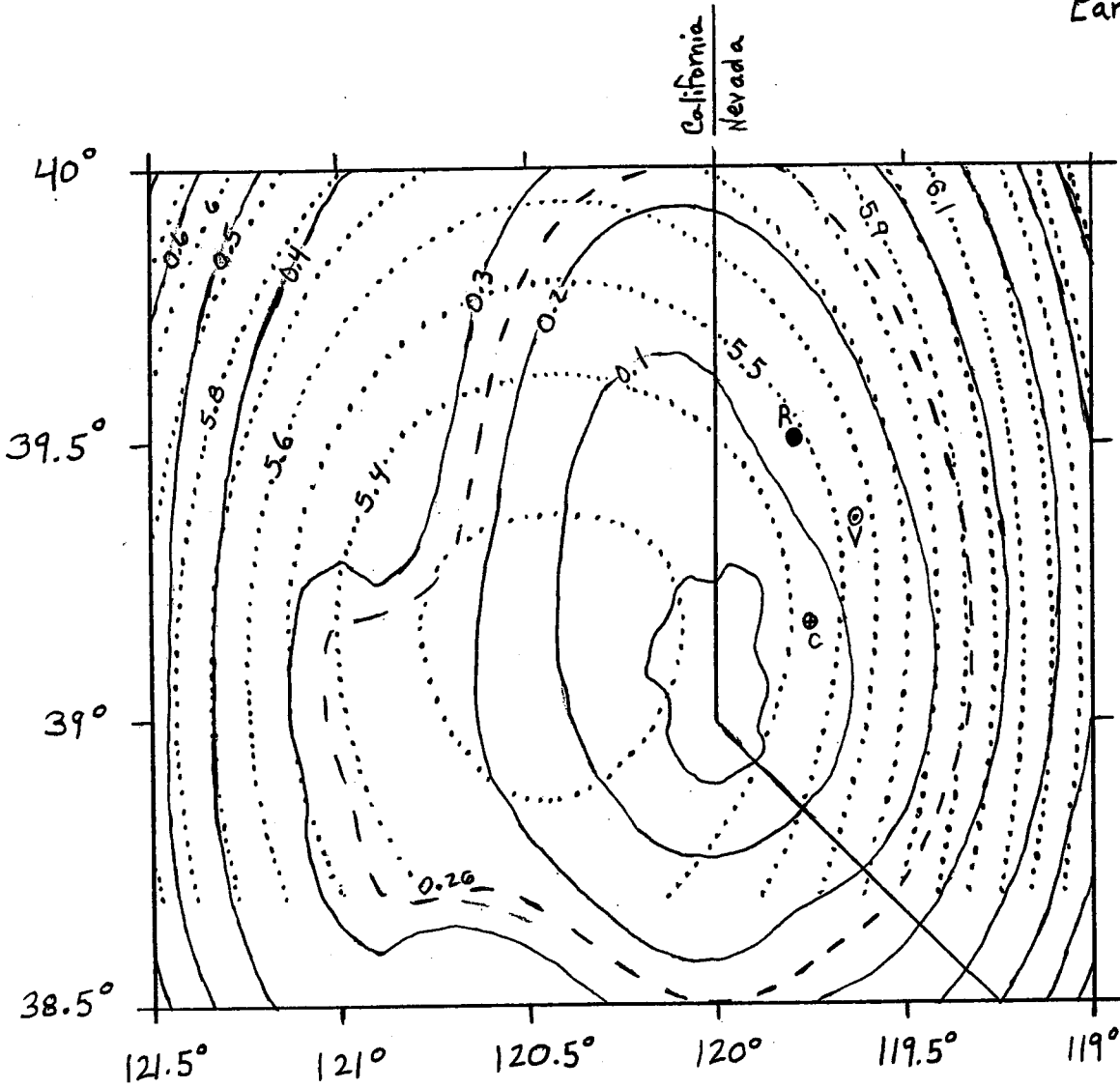
California  
Nevada



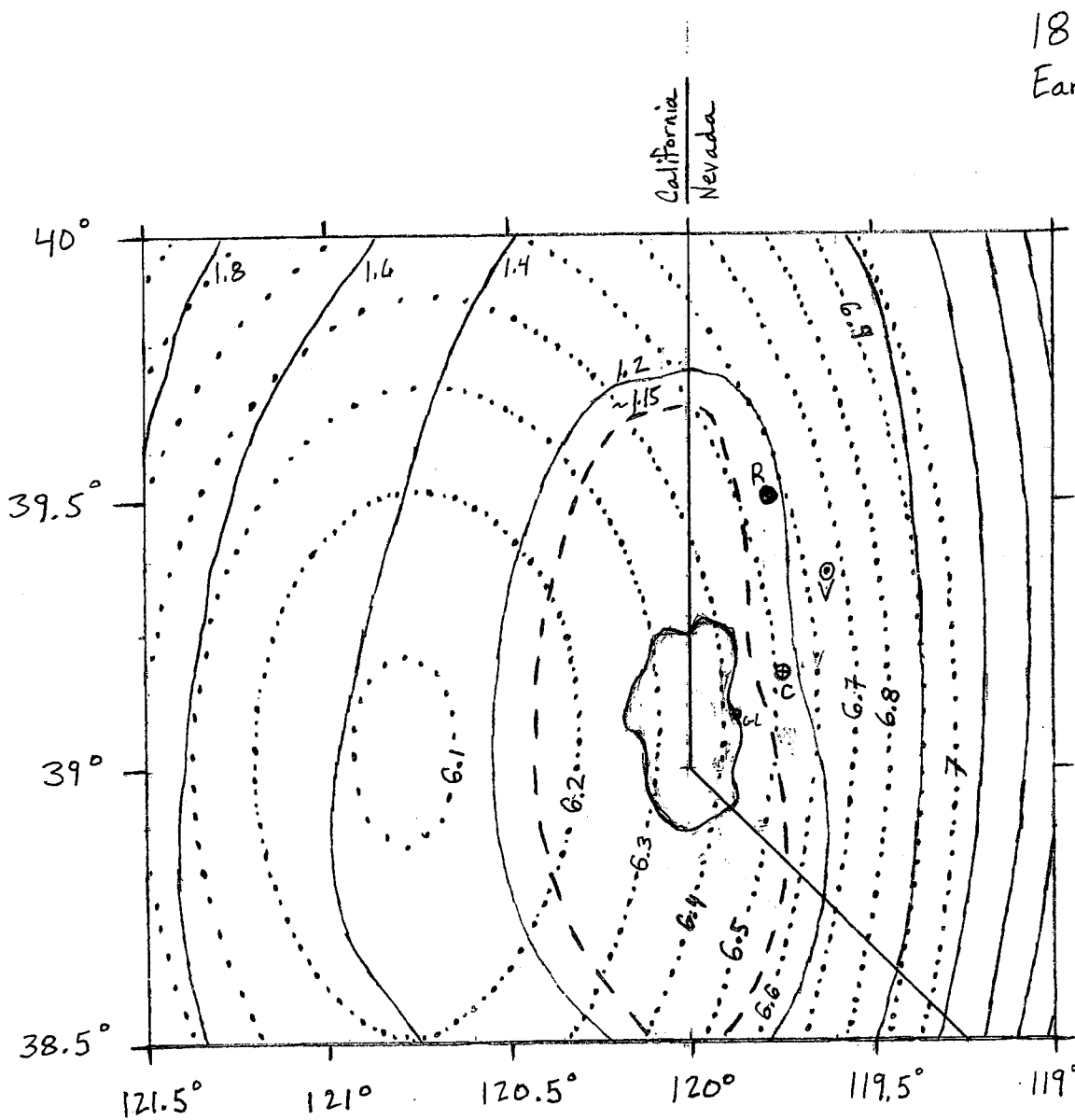
..... Contours of  $M_I$   
—— Contours of  $RMS(M_I)$   
--- ~95% confidence RMS



1869b  
Earthquake



..... contours of  $M_I$   
—— contours of  $RMS(M_I)$   
--- ~ 95% confidence  $RMS$



..... contours of  $M_I$   
—— contours of  $RMS(M_I)$   
- - - ~95% confidence  $RMS$