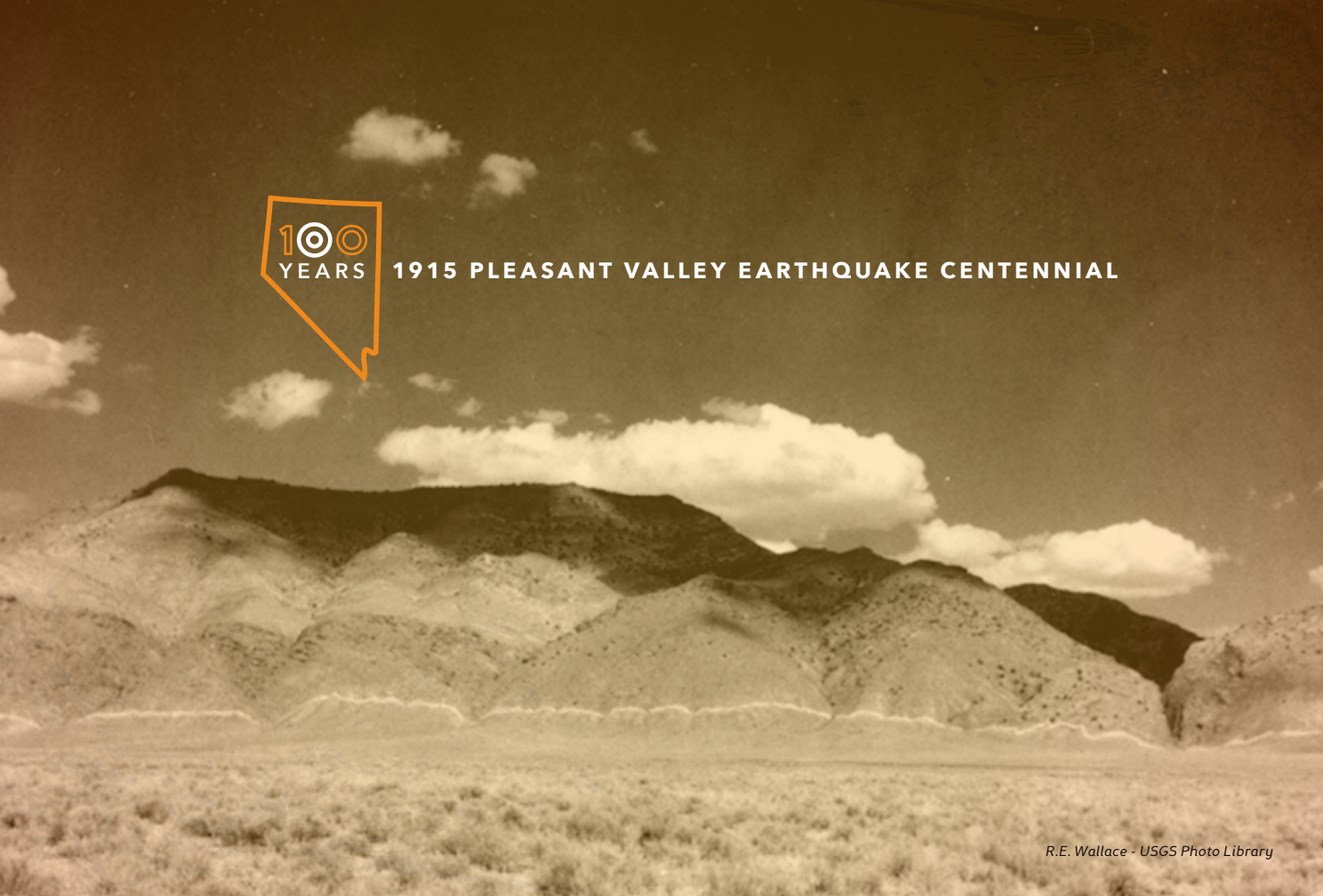




1915 PLEASANT VALLEY EARTHQUAKE CENTENNIAL





## **INTRODUCTION**

Can you imagine the ground under your feet shaking for 15 minutes? Or rumbling motions and roars continuing for hours. This brochure commemorates Nevada's largest historical earthquake, the 1915 Pleasant Valley Earthquake, magnitude 7.3. This centennial provides an opportunity to prepare Nevada for future earthquakes. A first-hand account of the 1915 earthquake follows.

Nevada has a high level of earthquake activity and there are many actions residents can take to protect themselves and reduce the risk of damage to property during an event, as described in this brochure. But even the best efforts may not prepare us for the physical and emotional experience of an earthquake. To demonstrate this, here is a first-hand account of Nevada's largest earthquake.





## ACCOUNT OF 1915 EARTHQUAKE

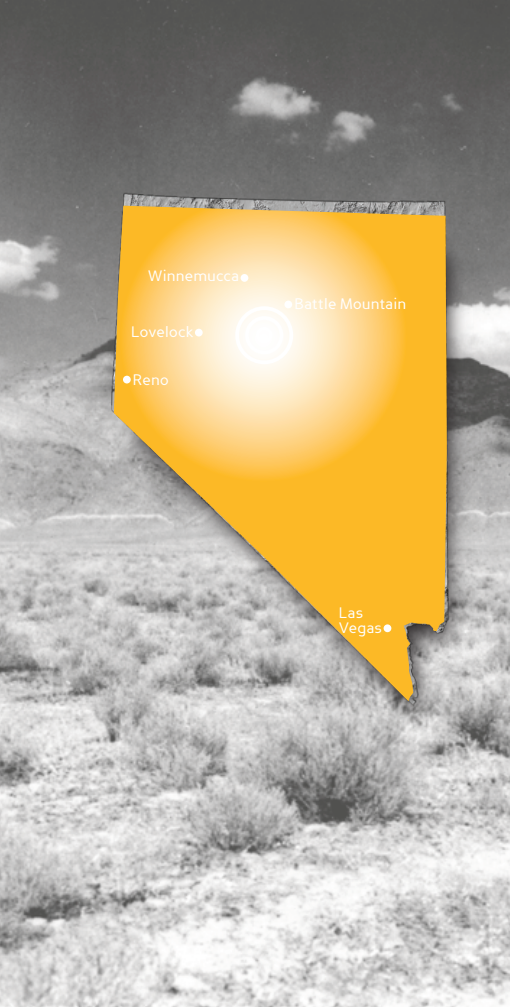
“The first indication of a disturbance was felt at exactly 3:40 p.m. Saturday when with a terrific report, similar to a large dynamite blast, the mountain side of Kennedy gave a lurch due north and then vibrated for about five seconds in a manner which I would say was rather violent,... This shock had hardly subsided when another deep rumble was heard, followed by swaying motion,... From this time on it was one continuous disturbance; one quake hardly died before a rumble announced another. This state of affairs occurred continuously until 5:45 p.m. when the only indication that conditions were not right was a sort of subdued rumble,...when all of a sudden without the slightest warning a great roar was heard and the earth's surface began to roll and sway up and down,... This convulsion continued without stop for fully one and a half minutes,... During this performance of the earth it was next to impossible for a person to stand erect. From this disturbance on, it was incessant continued disturbance, the earth never appeared quiet. About 9 p.m. we retired for the night and as near as I can imagine the situation, one could shut his eyes and imagine he was occupying a berth in a moving Pullman car,... At 10:55 things had quieted, or perhaps we were unconscious in sleep, when without the slightest warning a great roar and rumbling was heard and we were thrown violently out of bed and buffeted in all directions continuously for not less than fifteen minutes,... This shake started at 10:55 p.m. Western Union time, as recorded, when the disturbance subsided sufficiently to allow one to enter the house in quest of sufficient apparel, as it was next to freezing outside, I noted the time was 11:10 p.m.”

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*(“abbreviated version” account from a Letter to the Editor of the Silver State, October 5, 1915 edition, by L.D. Roylance)*

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This first-hand account captures the intensity and extent of Nevada’s largest recorded earthquake, the Pleasant Valley Earthquake of 1915. The eyewitness account clearly describes the event, which included a series of foreshocks, a main shock and aftershocks, with a recorded mainshock **magnitude of approximately 7.3**. This earthquake was caused by the rupture of a long range-front fault due to the long-term accumulation of tectonic strain within the Basin and Range Province, and was an impressive example of the earthquake activity that can take place in Nevada.



## IMPORTANT 1915 EARTHQUAKE FACTS

The largest earthquake in Nevada's history occurred 100 years ago in Pleasant Valley, south of Winnemucca. The main shock struck at 10:53 p.m. on October 2nd and had an estimated 7.3 magnitude. It was preceded by a foreshock at 3:40 p.m. that was strong enough to be felt in Reno, and an even stronger foreshock of 6.1 magnitude at 5:45 p.m. In the epicentral area, there was nearly incessant, continuous motion and intermittent shaking for hours before the main event. The 1915 Pleasant Valley Earthquake was felt from Washington and south to Mexico, and from the Pacific Coast and to Colorado. The earthquake broke the surface in four different places over a distance of 37 miles, one of the longest surface ruptures in Nevada's history. The surface rupture resulted in 19 feet of vertical offset, the largest in Nevada's history.

Although only about 100 aftershocks were specifically noted, thousands must have occurred. Other natural effects of the earthquake included landslides, rock falls, subsidence, earth fissures, and a phenomenon called liquefaction, where water-saturated ground temporarily acts like a liquid because of severe shaking.

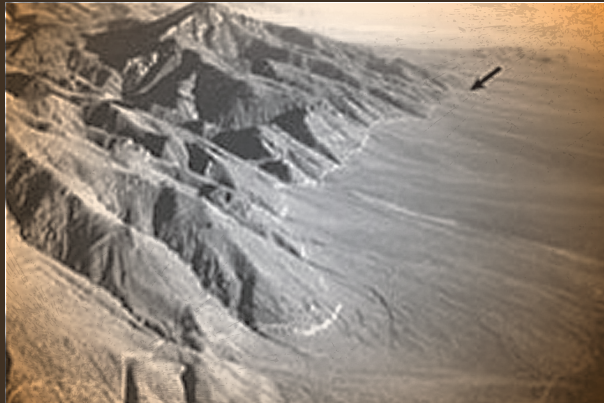
In the City of Kennedy, two adobe houses were destroyed, mine tunnels collapsed and concrete mine foundations cracked. In Winnemucca, adobe buildings were damaged and multistory brick buildings lost their moldings and parts of upper walls. Numerous chimneys were destroyed. Water tanks collapsed at Battle Mountain, Kodiak, Lovelock and Parran. Plaster was broken and fell in buildings at Battle Mountain, Fallon and at a ranch east of Austin TX. There was damage to several ranches at the southern end of Pleasant Valley, and houses were displaced from their foundations. The earthquake also caused large increases and decreases in the flow of springs and streams throughout northern Nevada.



Rift crossing a stream at Pierce Ranch, showing fault scarps. The 1915 surface rupture crossed a stream here and formed a waterfall 10 feet high behind the man. Stream flow increased by 4 times because new springs opened during the earthquake. (Jones, 1915)

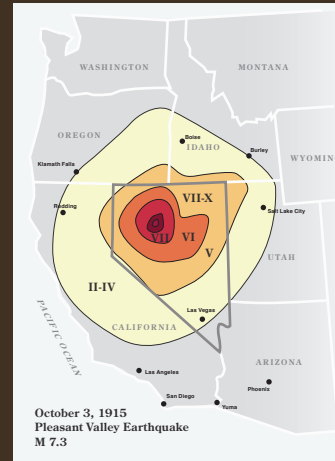


The first story of the Siard Ranch poultry house collapsed in the 1915 Earthquake. (Jones, 1915)



Light-colored line along the base of the Tobin Range (shown at arrow) is an 8- to 15- foot vertical offset of the ground that occurred during the 1915 Pleasant Valley Nevada Earthquake. The Tobin range (on the left) moved up vertically away from the valley (on the right).

Photo by: Burt Slemmons



### Modified Mercalli Intensity Scale (MMI)

<b>X</b>	<b>Intense</b>
<b>VII</b>	<b>Very Strong</b>
<b>VI</b>	<b>Strong</b>
<b>V</b>	<b>Rather Strong</b>
<b>IV</b>	<b>Moderate</b>
<b>III</b>	<b>Slight</b>
<b>II</b>	<b>Weak</b>

Serious earthquake effects occur well beyond the epicentral dot on a map. The Modified Mercalli Intensity (MMI) is a scale that is based on shaking effects. The map shows that when a magnitude 7 earthquake strikes Nevada, it can be felt across the entire state, and large, multi-county areas can have damaging effects (MMI VII and greater).

Source: NBMG, Damaging Earthquakes in Nevada 1840s to 2008



## **WHAT IS IMPORTANT ABOUT THIS EVENT TO NEVADANS? WHAT RISKS ARE THERE FOR THE AREA TODAY?**

The State of Nevada lies within the Basin and Range Province, one of the most seismically active regions in the United States. Nevada ranks 3rd behind Alaska and California for the larger earthquakes in the last 150 years. Although earthquakes do not occur at regular intervals, the average frequency of earthquakes of magnitude 6 and greater in Nevada has been about one every ten years. The magnitude 7 and greater earthquakes average once every 27 years. Earthquakes can happen any time of day in any season and temperatures and storms can increase the challenges following the shaking.

Major earthquakes, including the 1915 Pleasant Valley Earthquake, can be used to remind and motivate Nevadans to prepare for future earthquakes. These events can propel communities to seismically strengthen existing vulnerable structures and construct new buildings to current earthquake codes and standards. Nevadans who experience the next major earthquake, whether in a rural or urban setting, the financial and psychological impacts for Nevadans can be life changing.



## MAJOR EARTHQUAKES IN NEVADA

DATE	LOCATION	MAGNITUDE
1860	Western Nevada	6.5
1869	Virginia Range	6.4
1915	Pleasant Valley	7.3
1932	Cedar Mountain	7.1
1954	Rainbow Mountain	6.2
1954	Stillwater	6.8
1954	Fairview Peak	7.1
1954	Dixie Valley	6.9
2008	Wells	6.0

Magnitudes from NBMG OFR 13-7

## HOW TO MITIGATE THE NEGATIVE CONSEQUENCES OF THESE RISKS

Make your home safer to be in during earthquakes and more resistant to earthquake damage by assessing the contents of your home and the building itself. Depending on when and how it was designed and built, the structure you live in may have weaknesses that make it more vulnerable to earthquake damage. Common examples include structures not anchored to their foundations; weak crawl space walls; unbraced pier-and-post foundations; and unreinforced masonry walls or foundations.

What is in your home can be as or more dangerous and damage-prone than the structure itself. Any unsecured objects that can move, break or fall as an earthquake shakes your home are potential safety hazards and potential property losses. Walk through each room of your home and make note of these items, paying particular attention to tall, heavy objects such as bookcases, home electronics, appliances (including water heaters – your personal emergency water supply), and items hanging from walls or ceilings. Secure these items with flexible fasteners, such as nylon straps with closed hooks, or relocate them away from beds and seating to lower shelves or inside cabinets with latched doors. Ensure that plumbers have installed flexible connectors on all gas appliances. More descriptive, visual information for homeowners to identify and fix at-risk areas of their homes to reduce future earthquake damage and disruption can be accessed at: <https://www.fema.gov/medialibrary/assets/documents/3261>.

If you own your home, find and correct earthquake weaknesses. It is recommended that you consult a professional when making structural changes to your home. If you are a renter, ask what has been done to strengthen the property against earthquakes, and consider this information in deciding where to rent. If you are building or buying a home, make sure that it is built to the seismic provisions of your local building code.



## **“BEATING THE QUAKE” CREATING AN EARTHQUAKE-AWARE SOCIETY IN NEVADA**

Nevada is located in “earthquake country,” and earthquakes will produce strong shaking within several communities in the future. It is wise for Nevadans to learn lessons from past events in order to know how to actively prepare for and react to an earthquake. To “Beat the Quake,” Nevadans need to prepare a disaster plan, have a disaster kit and become earthquake resilient by mitigating hazardous contents and seismic weaknesses in buildings. Earthquakes will continue to occur in the future, but the impact they have on our lives can be lessened by preparing for earthquakes and by fostering the pioneering spirit, resolve and know-how that Nevadans have always shown to prepare for threats to their homes and families, and to their businesses and coworkers. A wise course of action for Nevadans is to heed the lessons of past events, such as the 1915 Earthquake, learn how to respond when they feel an earthquake and proactively prepare for future earthquakes.

Many solutions on how to stay safe and protect your property from earthquakes can be found in *Living with Earthquakes in Nevada* at: <http://crack.seismo.unr.edu/ep/nvguide/nvguide.pdf> (NBMG Special Publication 27) and *Earthquakes in Nevada and How to Survive Them* at: <http://crack.seismo.unr.edu/ep/nvsurvival/e16.pdf> (NBMG E16).

## LINKS FOR EARTHQUAKE PREPAREDNESS AND MITIGATION

### ShakeOut

Everyone, everywhere should know how to protect themselves in an earthquake. For information on the Great Shake Out earthquake drills and other resources, visit: <http://shakeout.org/nevada/>

### Nevada Seismological Laboratory

For more information on the Nevada Seismological Laboratory and its overall responsibility for instrumental studies of earthquakes in the Nevada region, please visit: <http://www.seismo.unr.edu/>

### Nevada Bureau of Mines and Geology

For ideas on staying safe and protecting your property from earthquakes, see Living with earthquakes in Nevada, NBMG Special Publication 7, and earthquakes in Nevada and How to Survive Them, NBMG E16 available at: <http://www.nbmng.unr.edu>

### Nevada Division of Emergency Management

For information on Earthquake activity being monitored by the Nevada Division of Emergency Management, visit: <http://dem.nv.gov/>

### University of Nevada, Las Vegas Earthquake Site

For more information on earthquake hazards in Southern Nevada, visit: <http://earthquakes.unlv.edu/>

### Federal Emergency Management Agency

FEMA's QuakeSmart Toolkit provides guidance and user-friendly, interactive tools to help businesses reduce the potential for injuries, damage, and financial losses from earthquakes.

Access the Toolkit here: <http://www.fema.gov/media-library/assets/documents/23902>

## **FEMA Earthquake Safety Checklist**

This quick reference guide helps individuals and families prepare for an earthquake and prevent earthquake-related damage to their homes. The easy-to-read booklet features instructions on conducting earthquake drills and “hazard hunts.” Also included are a checklist of disaster supplies, tips on what to do during and after an earthquake and additional resources. <https://www.fema.gov/media-library/assets/documents/3234>

## **FEMA Earthquake Home Hazard Hunt Poster**

This poster provides visuals and descriptions so that homeowners can identify and fix at-risk areas of their homes to reduce future earthquake damage and disruption. <https://www.fema.gov/media-library/assets/documents/3261>

For additional information from FEMA on how communities can reduce loss of life, injuries and property damage from earthquakes, visit: <http://www.fema.gov/earthquake-publications/earthquake-publications-individuals-and-families>

To order free FEMA publications, call 1-800-480-2520. [www.fema.gov/earthquake-publications](http://www.fema.gov/earthquake-publications)

## **Federal Alliance for Safe Homes (FLASH)**

For tips to protect your family, home and business, [http://www.flash.org/peril\\_earthquake.php](http://www.flash.org/peril_earthquake.php)

## **National Earthquake Hazards Reduction Program (NEHRP)**

NEHRP’s goal is to mitigate earthquake losses in the United States through basic and directed research and implementation activities in the fields of earthquake science and engineering, <http://www.nehrp.gov>

## **Ready.gov**

Learn what protective measures to take before, during and after an earthquake at <http://www.ready.gov/earthquakes>

## **U.S. Geological Survey**

The USGS offers information on a variety of earthquake topics and provides educational resources, <http://www.earthquake.usgs.gov/learn>

## **Western States Seismic Policy Council**

Nevada is a member State of the WSSPC, established in 1979 as a regional and multidisciplinary forum to support and enhance seismic hazard mitigation, <http://www.wsspc.org>

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