Nevada Bureau of Mines and Geology Special Publication 36

The 21 February 2008 M_w 6.0 Wells, Nevada Earthquake



A compendium of earthquake-related investigations prepared by the University of Nevada, Reno

Edited by Craig M. dePolo and Daphne D. LaPointe

2011



Nevada Bureau of Mines and Geology Mackay School of Earth Sciences and Engineering College of Science

University of Nevada, Reno

Nevada Bureau of Mines and Geology Special Publication 36

The 21 February 2008 M_w 6.0 Wells, Nevada Earthquake

A compendium of earthquake-related investigations prepared by the University of Nevada, Reno

Edited by

Craig M. dePolo and Daphne D. LaPointe

2011



Nevada Bureau of Mines and Geology Mackay School of Earth Sciences and Engineering College of Science

University of Nevada, Reno

CONTENTS

I. Summary
a. Summary of the 2008 Wells, Nevada Earthquake Documentation Volume
¹ Nevada Bureau of Mines and Geology and ² Nevada Seismological Laboratory, University of Nevada, Reno
II. Introduction
a. An Introduction to the February 21, 2008, M_w 6.0 Wells Nevada Earthquake
and the Earthquake Documentation Volume15
by Craig M. dePolo, Nevada Bureau of Mines and Geology, University of Nevada, Reno
b. Seismicity and Seismic Hazard of Northeastern Nevada
by John G. Anderson, Nevada Seismological Laboratory, University of Nevada, Reno
c. Wells Earthquake Relief Fund Video
by Layla Walz, Wells Rural Electric Company
III. Geologic and Geophysical Setting
a. The Regional Structural Setting of the 2008 Wells Earthquake and Town Creek Flat Basin–
Implications for the Wells Earthquake Fault and Adjacent Structures
by Christopher D. Henry ¹ and Joseph P. Colgan ²
¹ Nevada Bureau of Mines and Geology, University of Nevada, Reno and ² U.S. Geological Survey, Menlo Park, CA
b. Bedrock Geology of the Ranges Bounding the Wells Earthquake of February 21, 2008
by Charles H. Thorman' and William E. Brooks ²
U.S. Geological Survey Emerilas, Denver, CO and U.S. Geological Survey, Resion, VA
c. Quaternary Faults in the 2008 Wells Earthquake Area
by Alan R. Ramelli and Craig M. dePolo, Nevada Bureau of Mines and Geology, University of Nevada, Reno
d. Geophysical Setting of the February 21, 2008 M_w 6.0 Wells Earthquake, Nevada,
Implications for Earthquake Hazards
by Ponce, D.A., Watt, J.T., and Bouligand, C., U.S. Geological Survey, Menlo Park, CA
e. Shallow Shear-Wave Velocities Based on Refraction Microtremor Measurements
in Areas Damaged by the 2008 M_w 6.0 Wells, Nevada Earthquake
by Jim O'Donnell', Aasha Pancha ² , and Craig M. dePolo ³
Boulaer City, Ivevada, Optim SDS, Keno, IVV and Ivevada Bureau of Mines and Geology, University of Nevada, Reno

CONTENTS (continued)

IV. Seismic and Infrasound Studies

d. Ground Motions from the 2008 Wells, Nevada Earthquake Sequence

V. Geodetic and State-of-Stress Studies

VI. Earthquake Damage and Effects

a. Modified Mercalli Intensity Maps for the February 21, 2008 Wells, Nevada Earthquake205 by Craig M. dePolo and Bret Pecoraro, Nevada Bureau of Mines and Geology, University of Nevada, Reno

CONTENTS (continued)

c. Damage to Residential Houses from the 2008 Wells, Nevada Earthquake
d. Wells High School Analysis and Reconstruction Following the
February 21, 2008 Earthquake
by Thomas E. Trabert, M.S., P.E., Trabert Engineering, Reno, NV
e. 2008 Wells, Nevada Earthquake: Effects on Utility Systems
by Craig M. dePolo ¹ and Mike Ericksen ²
¹ Nevada Bureau of Mines and Geology, University of Nevada, Reno and ² Wells Propane, Inc.
f. Wells, Nevada M 6.0 Earthquake Impact on the Nevada Department of Transportation
by Michael E. Murphy, Nevada Department of Transportation, District III, Elko, NV
g. Effects on Geothermal Features Following the February 21, 2008
Wells, Nevada Earthquake
by Chris Sladek, Department of Geological Sciences, University of Nevada, Reno, Nevada
VII. Response to the Earthquake, Community Impacts, and Disaster Recovery
a. The Emergency Response to the 2008 Wells, Nevada Earthquake Disaster
by Craig M. $dePolo^{1}$ and Dale Lotspeich ²
¹ Nevada Bureau of Mines and Geology, University of Nevada, Reno and ² Elko County Sheriff's Department
b. Loss-Estimation Modeling Based on the 2008 Wells, Nevada Earthquake
by Jonathan G. Price, Ronald H. Hess, Gary L. Johnson, Craig M. dePolo, and Jordan T. Hastings Nevada Bureau of Mines and Geology, University of Nevada, Reno
c. Immediate Scientific Response to the 2008 Wells, Nevada, Earthquake
by DuRoss, C.B. ¹ , dePolo, C.M. ² , Koehler, R.D. ⁴ , Bowman, S.D. ¹ , McDonald, G.N. ¹ and Shaw, L.M. ³
¹ Utah Geological Survey, ² Nevada Bureau of Mines and Geology, University of Nevada, Reno, ³ Northern Arizona University; formerly Utah Geological Survey and ⁴ University of Nevada, Reno
d. The Impact of the 2008 Wells, Nevada Earthquake on the City of Wells:
Post-Earthquake Lessons for Rural Community Governments
¹ Nevada Bureau of Mines and Geology, University of Nevada, Reno and ² City of Wells
e. The Recovery of Wells, Nevada from the 2008 Earthquake Disaster
by Craig M dePolo, Nevada Bureau of Mines and Geology, University of Nevada, Reno

VIII. Lessons Learned

a. Lessons Learned from the February 21, 2008 Wells, Nevada Earthquake	.465
by Nevada Earthquake Safety Council with contributions and support from Nevada Bureau of Mines and Geology,	
Nevada Seismological Laboratory, Nevada Division of Emergency Management, Federal Emergency Management	
Agency, U.S. Geological Survey and City of Wells	

Appendices

Appendix A. Plate 1. Geologic Map of the Wells Area, Elko County, Nevada
¹ Nevada Bureau of Mines and Geology and ² U.S. Geological Survey Emeritus, Denver, CO
Appendix B. Interferometric Synthetic Aperture Radar Map of the 2008 Wells Earthquake
Appendix C. Photograph Gallery
Appendix D. Objects that were Thrown, Toppled or Slid by the 2008 Wells, Earthquake
Appendix E. Preliminary Earthquake Simulations for the 21 February 2008 Wells Earthquake505 by John Louie, Nevada Seismological Laboratory, University of Nevada, Reno
Appendix F. Wells Nevada earthquake–A 6.0 magnitude earthquake strikes the northeastern edge of the Basin and Range
by Corne Kreemer, Nevada bureau of Mines and Geology, University of Nevada, Reno