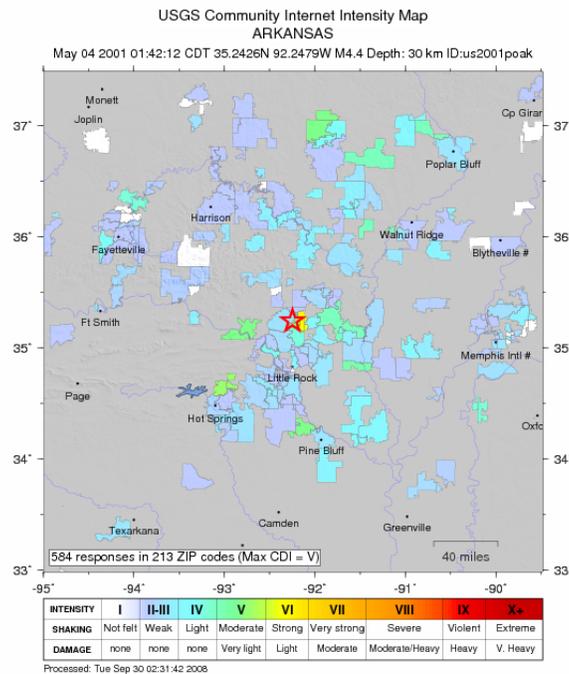


# The May 2001 Faulkner County Earthquakes

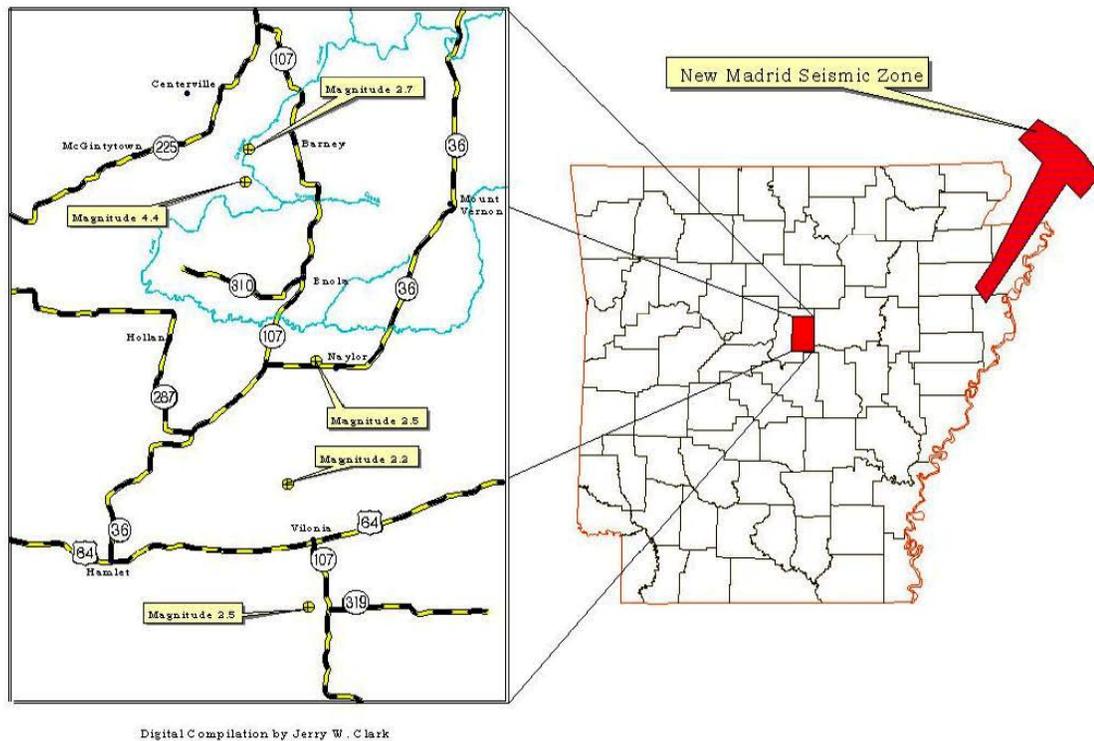
By John David McFarland  
 Arkansas Geological Commission  
 2001  
 Revised by Scott M. Ausbrooks  
 Arkansas Geological Survey  
 2010

On Friday, May 4, 2001, at 1:42AM CDT (06:42:12 UTC) central Arkansas was shaken by a magnitude 4.4 earthquake followed by over 2,500 aftershocks in the following two months. The epicenter was located in Faulkner County about three miles northwest of the small town of Enola (Lat. 35.237N, Long. -92.232W). Two of the larger aftershocks were detected in the same area during the next several hours: a 2.7 magnitude earthquake at 3:32AM and a 2.5 magnitude earthquake the next day (Saturday, May 5, 2001) at 2:39AM. Two other aftershocks occurred on May 22, 2001. The first at 2:28AM had a magnitude of 2.2; the other event occurred at 3:09AM CDT. Both of these small earthquakes were located near Vilonia (Figure 1 and Table 1).

The faults along which the movement occurred are approximately 6 miles below the surface in the Precambrian igneous “basement” rock. No surface trace of this fault is known to be evident. This event was felt widely in central Arkansas and some people were awakened by it. According to the USGS “Did you feel it” (DYFI) community intensity map, the earthquake was felt as far away as Texarkana, Ft. Smith, northern Mississippi and the Missouri border region (Map 1). It did not cause any structural damage, but cracked plaster, knocked objects off shelves and walls, and broke some china in the epicentral area.



**Map 1.** USGS (DYFI) Community Intensity Map for the May 04, 2001 M4.4 Faulkner County Earthquake

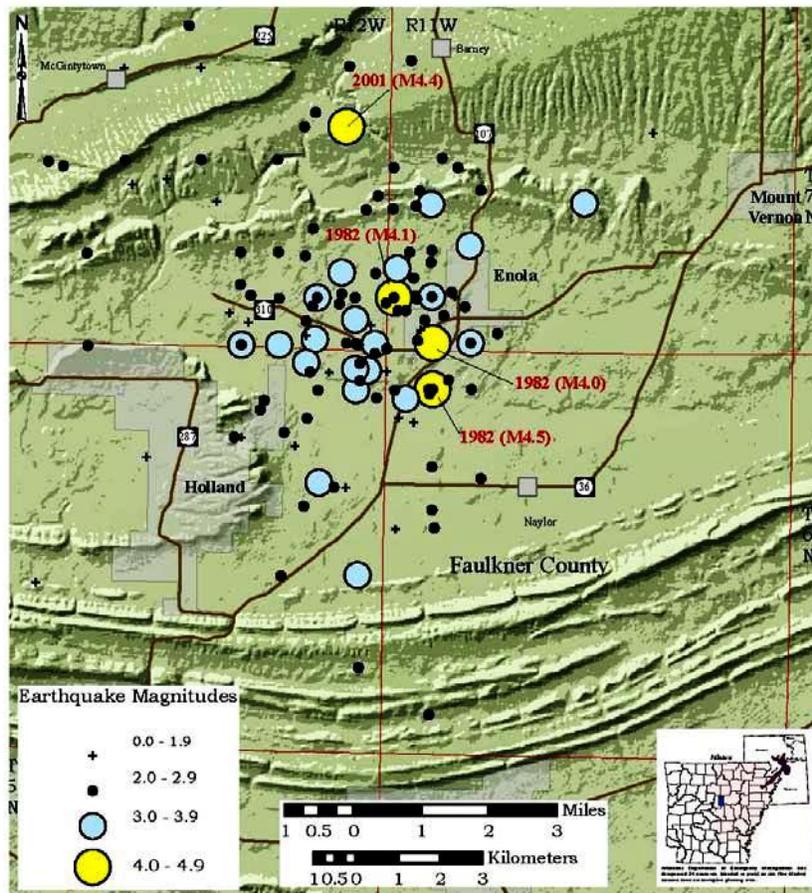


**Figure 1.** Locations of the May 2001 earthquakes in the Faulkner County area.

**Table 1.** Listing of the May 2001 earthquakes of Faulkner County

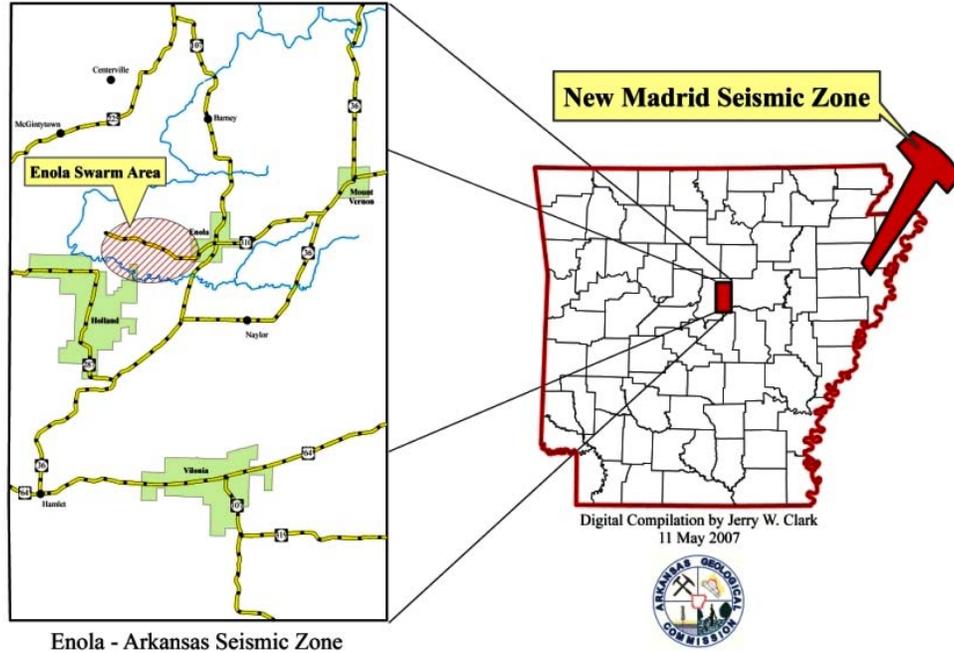
| <b>Date</b>  | <b>Time</b> | <b>Latitude</b> | <b>Longitude</b> | <b>Magnitude</b> |
|--------------|-------------|-----------------|------------------|------------------|
| May 04, 2001 | 1:42am CDT  | N35.237         | W92.232          | 4.4              |
| May 04, 2001 | 3:32am CDT  | N35.2502        | W92.2315         | 2.7              |
| May 05, 2001 | 2:29am CDT  | N35.1607        | W92.1977         | 2.5              |
| May 22, 2001 | 2:28am CDT  | N35.1098        | W92.2118         | 2.2              |
| May 22, 2001 | 3:09am CDT  | N35.0582        | W92.2008         | 2.5              |

Residents of Faulkner County are no strangers to seismic activity. In January of 1982 a small earthquake that initiated a series of earthquakes jolted Faulkner County. That swarm of seismic activity lasted for years and produced over 40,000 earthquakes. Most of the thousands of seismic events were too small to be felt but at least 93 earthquakes were felt in the local area by at least one person during that first year. Also, the first year of the swarm produced 50 events that registered magnitudes greater than 2.5. The largest events of the 1982 Enola swarm were a magnitude 4.5 on January 21, 1982, 4.1 on January 24, 1982 and 4.0 on March 01, 1982. In the last several years the Enola swarm area (ESA) has been relatively quiet with only a small occasional event. The May 2001 earthquakes appeared to have occurred in the same area as the earlier 1982 swarm (Map2). Research has suggested that the lower seismic velocities in the Enola swarm area may indicate that a highly fractured zone exists or natural fluid migration may be playing a role in the earthquakes.



**Map 2.** Historic seismicity map for the 1982 Enola swarm area (ESA)

These earthquakes are not associated with the New Madrid seismic zone (NMSZ) of northeast Arkansas and there is no history or research that suggests any cause/effect relationship between the two regions. Arkansas has minor seismic activity in several areas not associated with the NMSZ. Although we detect and feel earthquakes in these other areas from time to time, the history of these regions does not suggest that they represent any significant hazard.



**Figure 2.** Location of the Enola swarm area (ESA) and the New Madrid seismic zone (NMSZ)

Again, these most recent Faulkner County earthquakes and the earthquakes of Enola swarm are not thought to indicate a seismically area that represents a significant hazard to the public, but we cannot be 100% sure. We have no recorded history of any large damaging earthquakes outside the NMSZ. (At the same time, we have little data and almost no research on any of these other seismic areas.) Recorded history is too short to fully characterize the risks associated with each of the seismic regions. The NMSZ is known to be a great hazard because of what it did in 1811-12. Modern data collection and research has illuminated many of the characteristics of the NMSZ and permitted us to outline its potential dangers with a fair degree of confidence. In general, less research has been conducted and even less has been accomplished on understanding the characteristics of faults and their risks outside of the NMSZ (Figure 2).

Although some activity has been observed from faults outside the NMSZ it is not expected that any of these other faults will generate earthquakes large enough to cause significant damage. The NMSZ is the most hazardous fault zone east of the Rocky Mountains. Large to great earthquakes have occurred along the NMSZ in the past and will occur again. Based on current understanding of the activity documented and associated with the NMSZ over the last 30 years, a magnitude 6 or greater earthquake has a 25% to 40% probability of occurring along the NMSZ in the next 50 years. There is a 7% to 10% probability of a magnitude 7.5 or greater earthquake occurring in the same time frame. Typically, magnitude 6 earthquakes will concentrate considerable damage in its epicentral region but damage will diminish fairly quickly further away. However, larger earthquakes will spread the destruction to a much wider area. A magnitude 7.5 event along the southwest segment of the NMSZ will cause damage throughout Arkansas, though the most serious damage will be in the northeast portion of the state.

Just remember that “it’s usually not the earthquake that hurts you: it’s the building that falls on you”. Earthquakes are a natural hazard that no one can stop or, at this time, predict. Only by studying the earthquakes, locating the active faults, and developing the seismic characteristics of each of the active areas can we properly advise the public of the true nature of the risks. Through this research, society can develop and bring about preparedness and mitigation measures that reduce the risk to life and property.

For more information on earthquakes in Arkansas:

<http://www.geology.ar.gov/geohazards/earthquakes.htm>

To report a “felt” earthquake:

<http://earthquake.usgs.gov/eqcenter/dyfi.php>

For information about what you can do to prepare and make your home, school, or business more earthquake resistant contact the Arkansas Department of Emergency Management:

<http://www.adem.arkansas.gov/documents/Earthquake/index.aspx>

### **Selected References**

- Burroughs, R., K., 1988, Structural Geology of the Enola Arkansas Earthquake Swarm: A Masters Thesis, University of Arkansas.
- Johnston, A., Metzger, A., Everett, S., and Nava, S., 1983. The Central Arkansas Earthquake Swarm. Tennessee Earthquake Information Center Special Report #8, Parts I and II.
- Rabak, I., Langston, C., Bodin, P., Horton, S., Withers, M., Powell, C. 2010. The Enola, Arkansas, intraplate swarm of 2001. *Seismological Research Letters*; May/June 2010; v. 81; no. 3; p. 549-559.
- Schweig, E. S., VanArsdale, R. B., Burroughs, R. K., 1991. Subsurface structure in the vicinity of an intraplate earthquake swarm, central Arkansas. *Tectonophysics*, V. 186, p. 107-114.