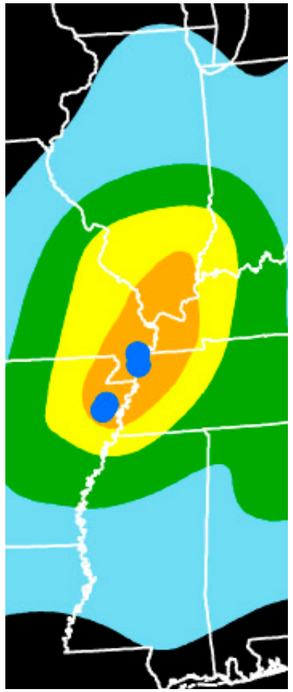
Estimated Impact and Damage in the New Madrid Region Following a Magnitude 7.7 Earthquake

State	No. Damaged Buildings	No. Damaged Bridges	Power Outages	Casualties	Direct Economic Loss
Alabama	15,400	0	235,000	1,000	$14 billion
Arkansas	162,000	1,100	333,000	15,300	$40 billion
Illinois	45,000	160	237,000	6,300	$44 billion
Indiana	14,000	0	222,000	2,000	$12 billion
Kentucky	68,400	250	329,000	6,900	$53 billion
Mississippi	57,500	10	233,000	6,100	$17 billion
Missouri	87,000	1,000	313,000	14,100	$49 billion
Tennessee	265,000	1,050	709,000	34,200	$69 billion
Total	714, 300	3,570	2,611,000	85,900	$298 billion



This map shows relative shaking hazards in the central United States. The probability of strong shaking increases from moderate (turquoise, green, and yellow) to high (orange and dark blue). Source: USGS

- Nearly 715,000 damaged buildings
- Limited medical, firefighting, and law enforcement services
- Over 3,500 damaged bridges
- 2.6 million households without electricity and 1.1 million households without water
- 86,000 casualties and 3,500 fatalities
- $300 billion in direct economic loss
- More than 730,000 people permanently displaced 42,000 search and rescue personnel required for nearly 1,500 teams
- 425,000 breaks to utility pipelines
- Local flooding due to damaged dams and levees
- Damage to 130 hospitals

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Alabama
Arkansas
Illinois
Indiana
Kentucky
Mississippi
Missouri
Tennessee

Earthquake Hazard and Impact in the New Madrid Region

CATASTROPHIC EARTHQUAKE RESPONSE PLANNING
NEW MADRID SEISMIC ZONE

Damage to Structures

After an earthquake strikes, one of the most visible forms of damage is to buildings, bridges, and other structures. Structural damage includes:

- Cracked or unstable foundations
- Damaged support beams or walls
- Broken connections in walls or floors
- Collapsed tiers

Damage to Transportation Networks

Road, rail, air, and river travel in the Central USA would be impacted in the event of an earthquake. Some of the main affected areas and the corresponding impacts follow:

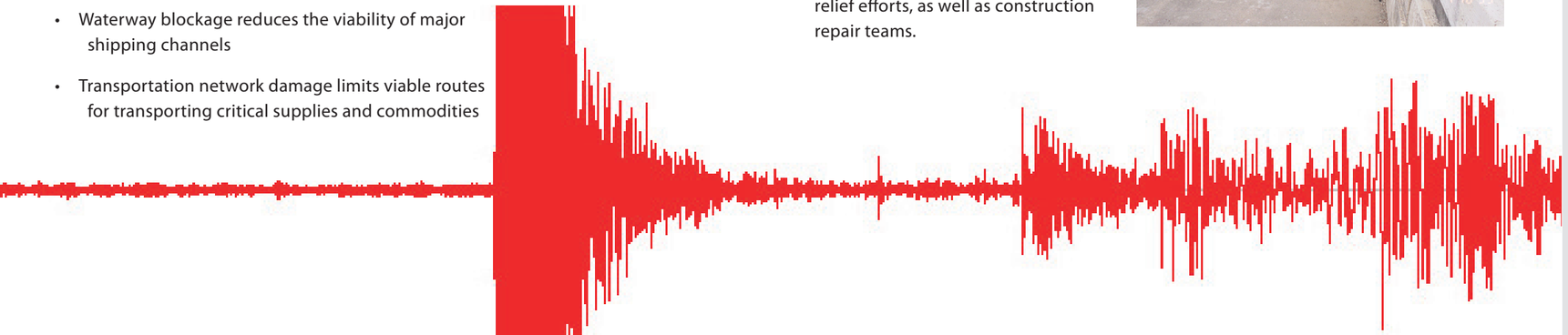
- Bridge and road damage interrupts rescue workers, construction repair teams, and disaster relief efforts
- Transportation of goods on rail lines is limited
- Airport damage restricts business, freight, and recreational travel
- Waterway blockage reduces the viability of major shipping channels
- Transportation network damage limits viable routes for transporting critical supplies and commodities

Damage to Utility Networks

Utility system and energy pipeline damage is key to measuring and understanding the social and economic impacts of earthquakes in the New Madrid Seismic Zone. Without energy sources, rescue, repair, and relief efforts are hindered and quality of life is significantly reduced. In the case of a major earthquake, damage sustained by facilities, networks and lines running through the central states would extend beyond the NMSZ region. Interruption of oil, natural gas, electricity, and water delivery is likely.

Damage to Dams and Levees

The Mississippi, Wabash, and Missouri Rivers flow through the New Madrid Seismic Zone and pose a significant flood risk in the wake of an earthquake. Structural damage to dams and levees would displace more people in the wake of an earthquake and cause roadway blockage. High waters and impassible roadways would hinder the rescue and disaster relief efforts, as well as construction repair teams.



The Threat

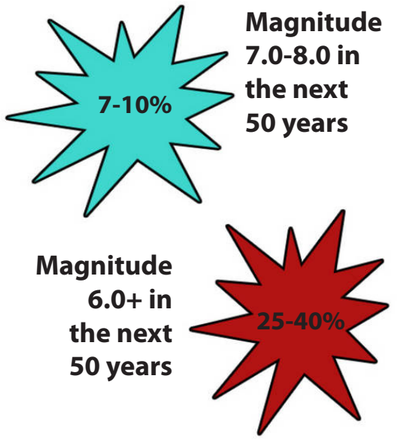
Minor earthquakes occur frequently in the New Madrid region, but it is only a matter of time before a major damaging earthquake occurs. USGS and CERI scientists estimate that there is a 25-40% chance of a magnitude 6.0 or greater earthquake occurring in the next 50 years. If a strong New Madrid earthquake, with a magnitude equal to the historic 1811-1812 earthquakes (7.0-8.0), were to occur today, estimated damage to the central USA would be in the tens or even hundreds of billions of dollars. There is also a 7-10% chance of a magnitude 7.5-8.0 earthquake occurring in the New Madrid Seismic Zone within the next 50 years (USGS, CERI).

The New Madrid Region

The New Madrid Seismic Zone is approximately 40 miles wide and 200 miles long. Encompassing parts of Alabama, Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri, and Tennessee, the zone straddles a large section of the central U.S. Major cities in the central Mississippi River and Wabash Valley that are near the zone include Memphis, Tennessee, and St. Louis, Missouri.

Why Earthquakes Happen

Earthquakes happen when parts of the Earth's crust move. The plates that cover the outer surface of the Earth move under, over, or past one another, causing earthquakes. The outer edges of the large plates are the most seismically active.



Strong earthquakes occur when plates move about a meter or two. Smaller earthquakes happen with movements as small as a few millimeters.

Earthquake Energy

The amount of energy released during an earthquake is measured with the Moment Magnitude Scale. The amount of energy released increases exponentially with each number on the scale. For example, a 6.0 magnitude earthquake releases 1.06×10^{13} of energy in joules, while a 7.0 event releases 3.29×10^{14} energy in joules. This is equivalent to approximately 2,534 and 78,633 tons of explosives for each of the earthquakes, respectively. An increase of one step on this logarithmic scale corresponds to nearly 32 times more energy released during the event, and an increase of two steps results in approximately 1000 times more energy released.