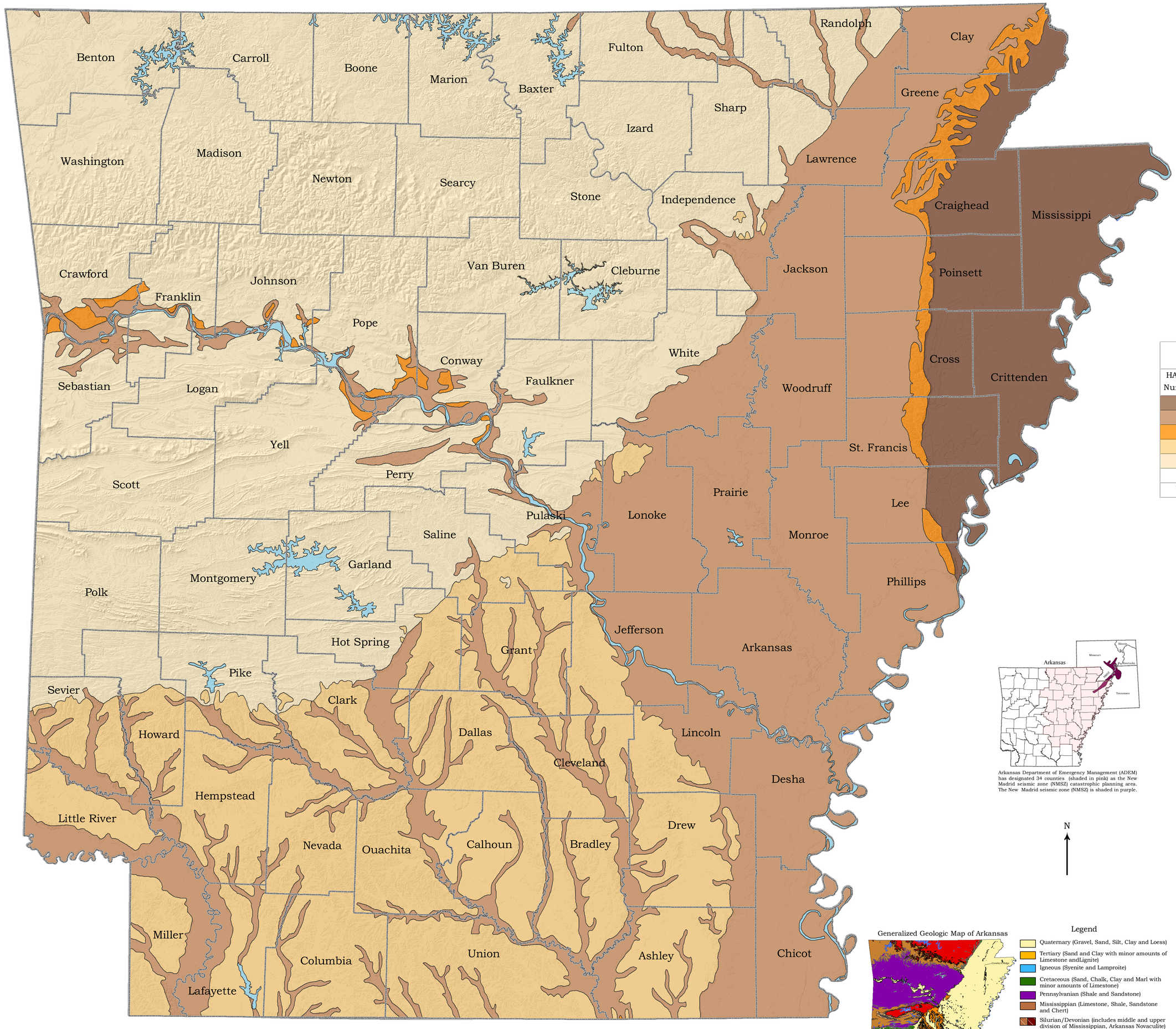
Arkansas Geological Survey
Bekki White, Director and State Geologist

GH-EQ-LSM-006

Liquefaction Susceptibility Map of Arkansas



About the Map

Earthquake-induced ground failures such as liquefaction have historically brought loss of life and damage to property and infrastructure. Liquefaction is the transformation of a granular material from a solid state into a liquefied state as a consequence of increased pore-pressure and decreased effective stress (Youd, 1973). Types of ground failure resulting from liquefaction can include sand boils, lateral spreads, ground settlement, ground cracking and ground warping. The distribution of liquefaction is not random but is restricted to areas underlain by loose, cohesionless (unconsolidated) sands and silts that are saturated with water. Areas of liquefaction susceptibility can be qualitatively assessed and delineated on the basis of physical properties of near-surface deposits and depth to groundwater through geologic, geomorphic, and hydrologic mapping and map analysis (Tinsley and Holzer, 1990; Youd and Perkins, 1978).

This liquefaction susceptibility map was developed from existing geologic and surficial materials maps including the *USGS I-2789: Map of Surficial Deposits in the Eastern and Central United States (Fullerton, D.S., et al, 2003)*, as well as available groundwater and standard penetration (SPT) data. The correlation between the near-surface materials and their relative susceptibility to liquefy was determined on the basis of type, general distribution, and age of deposits by following procedures outlined in Youd and Perkins (1978). Liquefaction susceptibility values obtained from this map may be incorporated into the Federal Emergency Management Agency's (FEMA) HAZUS software for estimating potential losses from earthquakes. This map is for screening purposes only and is not intended to be a substitute for a site specific evaluation. Copies of this map are available from the Arkansas Geological Survey, Little Rock, Arkansas.

LIQUEFACTION SUSCEPTIBILITY CLASSIFICATION

HAZUS Number	Susceptibility	Unit On Map
5	Very High	Yes
4	High	Yes
3	Moderate	Yes
2	Low	Yes
1	Very Low	Yes
0	None	No
W	Water	Yes

References

Fullerton, D.S., Bush, C.A., and Pennell, J.N., 2003, Map of surficial deposits and materials in the Eastern and Central United States (east of 102° west longitude): U.S. Geological Survey Geologic Investigations Series Map I–2789, 1 sheet, scale 1:2,500,000; pamphlet, 48 p., http://pubs.usgs.gov/imap/i-2789/.

Rhea, Susan, and Wheeler, R.L., 1995, Map showing synopsis of seismotectonic features in the vicinity of New Madrid, Missouri: U.S. Geological Survey Miscellaneous Investigations Series Map I-2521, 1 sheet, scale 1:250,000.

Sims, J.D. and Garvin, C.D., 1995, Recurrent liquefaction at Soda Lake, California, induced by the 1989 Loma Prieta earthquake, and 1990 and 1991 aftershocks: Implications for paleoseismicity studies, Seismological Society of America Bulletin, v. 85, p. 51-65.

Tinsley, J.C., and Holzer, T.L., 1990, Liquefaction in the Monterey Bay region: U.S. Geological Survey Open-file Report 90-334, pp. 642-643.

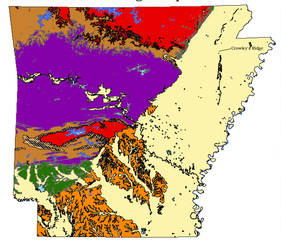
Youd, T.L., 1973, Liquefaction, flow, and associated ground failure: U.S. Geological Survey Circular 688, 12 pp.

Youd, T.L. and Perkins, D.M., 1978, Mapping of Liquefaction Induced Ground Failure Potential: Journal of Geotechnical Engineering Division, American Society of Civil Engineers, Vol. 104, No. 4, pp.433-446.

Arkansas Department of Emergency Management (ADEM) has designated 34 counties (shaded in pink) as the New Madrid seismic zone (NMSZ) catastrophic planning area. The New Madrid seismic zone (NMSZ) is shaded in purple.

N

Generalized Geologic Map of Arkansas



Legend

- Quaternary (Gravel, Sand, Silt, Clay and Loess)
- Tertiary (Sand and Clay with minor amounts of Limestone andLignite)
- Igneous (Syenite and Lamproite)
- Cretaceous (Sand, Chalk, Clay and Marl with minor amounts of Limestone)
- Pennsylvanian (Shale and Sandstone)
- Mississippian (Limestone, Shale, Sandstone and Chert)
- Silurian/Devonian (includes middle and upper division of Mississippian, Arkansas Novaculite)
- Silurian/Devonian (Limestone, Shale and Sandstone)
- Ordovician (Limestone, Dolostone, Sandstone and Chert)
- Cambrian (includes portion of Lower Ordovician Collier Shale)
- Water

Disclaimer

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2008

Revised Date:	Scale:	Digital Compilation:
2 July 2010	1 : 600,000	Jerry W. Clark