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SEISMIC SAFETY REGULATIONS IN WESTERN KENTUCKY: THE ROLE OF GEOLOGY IN PUBLIC POLICY

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Seismic risk is commonly understood to be higher in San Francisco, California, than in Paducah, Kentucky. Paducah has more stringent seismic safety regulations, however. For example, the design ground motion in Paducah is about 30 percent higher than in San Francisco according to the 2000 International Building Code (IBC-2000) and International Residential Code (IRC-2000). IBC-2000 and IRC-2000 were based on probabilistic seismic hazard maps with 2 percent probability of exceedance (PE) in 50 years. Although IBC-2000 and IRC-2000 were adopted by the Commonwealth of Kentucky in 2001 and became KBC-2002 and KRC-2002, implementing KBC-2002 and KRC-2002 in western Kentucky has created many problems, ranging from building a single-family home to environmental clean-up of a Superfund site.

The Kentucky Geological Survey has been called upon by the Commonwealth to address the problems. The key finding by KGS is that geologists who conduct seismic hazard assessments have not made sufficient effort to communicate their products: what the maps are or what they mean. In particular, the seismic hazard maps have been incorrectly communicated. For example, the ground motion with 2 percent PE in 50 years is seismic risk by definition, but has been presented as seismic hazard. Even worse, the ground motion with 2 percent PE in 50 years has been presented as the ground motion that will occur in 2,500 years; it actually means there is about a 20 percent probability of that ground motion being exceeded if a large earthquake of about M7.7 occurs in 500 years in the New Madrid Seismic Zone. But because there is no historical or geological record to indicate the large earthquakes that could occur in 2,500 years in the New Madrid Seismic Zone, we do not know what ground motion could occur in 2,500 years, because ground motion is a consequence of earthquakes.

These miscommunications contribute to the difficulty in adopting and implementing policies for mitigating seismic hazard and risk in western Kentucky. Geologists should not only conduct seismic hazard and risk assessments, but also communicate their findings clearly to policy-makers and the public.

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