SEISMIC RISK ANALYSIS APPLIED TO THE CENTRAL UNITED STATES

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The earthquake hazard in the Central United States has in the past been evaluated by the specification of design earthquakes for various seismic regions. For some engineering decisions, it is convenient to express this hazard in terms of the seismic risk, which is defined as the probability of exceeding a given level of ground motion over a certain exposure period, usually one year. The ground motion levels can be expressed in terms of a number of parameters widely used in earthquake engineering studies.

The method of engineering seismic risk analysis developed by Cornell, incorporates information on the geographic location and magnitudes of historical earthquakes and the attenuation of earthquake ground motion in order to evaluate this probability. A computer program written by McGuire performs the calculations using a numerical technique for a grid of sites, where source regions are specified as arbitrarily shaped quadrilaterals. For this data, contoured risk maps for various ground motion levels can easily be constructed.

Seismic hazard in the Central United States extends over a fairly large area due to the relatively

low attenuation of short period surface wave energy. In this study, the effect of seismic source regions in Missouri, Illinois, Tennessee, Kentucky, and Arkansas will be evaluated. The ground motion parameters to be considered are Modified Mercalli intensity and maximum sustained 1 Hz Lg velocity. In addition, contoured maps of ground motion at certain relevant risk levels will also be presented. These allow for an estimate of the ground motion level that a specific type of structure should be built to withstand.

The goal of this study is to investigate the seismicity of a portion of the Central United States and to apply this information in a seismic risk analysis of the region. An effort will be made to assess the usefulness and limitations of the results so that they can best be used to promote the design of seismically safe structures.