ISSUES WITH INCORPORATING INDUCED-SEISMICITY HAZARD MODELS INTO BUILDING CODES

N. Luco¹

ABSTRACT

Since the 1997 National Earthquake Hazards Reduction Program (NEHRP) Recommended Provisions for Seismic Regulations for New Buildings and Other Structures, the U.S. Geological Survey (USGS) National Seismic Hazard Model (NSHM) has been used to quantitatively derive earthquake ground motion maps for building codes. Most recently, the 2014 USGS NSHM has been used to develop maps for the 2015 NEHRP Provisions, the 2016 ASCE 7 Standard (Minimum Design Loads for Buildings and Other Structures), and the 2018 International Building (and Residential) Code. Meanwhile, in 2016, 2017, and 2018, the USGS published a seismic hazard model for the Central and Eastern U.S. (CEUS) that accounts for so-called induced seismicity associated primarily with injection of wastewater from oil and gas production into deep underground wells. This induced-seismicity model adds to the hazard from natural seismicity that was accounted for in the 2014 NSHM, resulting in significant increases in Oklahoma—where induced earthquakes of magnitude 5.7 and 5.8 occurred in 2011 and 2016, respectively—and other CEUS areas. With these new hazard models in hand, many people have asked whether they will be used to develop new earthquake ground motion maps for building codes. This presentation will explain several reasons why the induced-seismicity hazard models (and any update of them in the near future) is unlikely to be used for building codes, and will identify issues that warrant broader discussion before any future incorporation. In doing so, the presentation will briefly describe the 2016, 2017, and 2018 USGS induced-seismicity hazard models themselves, as well as other potential or realized uses besides building codes.

¹Research Structural Engineer, U.S. Geological Survey, Golden, CO 80401 (email: nluco@usgs.gov)