Highlights of the Strong-Motion Data from the M6.0 South Napa Earthquake, on August 24, 2014

Strong-motion records for the magnitude 6.0 Napa Valley earthquake that occurred on August 24, 2014 at 03:20:44 AM PDT are available at the Center for Engineering Strong Motion Data (CESMD) at www.strongmotioncenter.org. According to the California Integrated Seismic Network (CISN) solution, the epicenter is about 7 km NW of the small city of American Canyon and 9 km south of downtown Napa. It occurred between the Hayward-Rodgers Creek Fault on the west and the Concord-Green Valley Fault on the east. Some reports place the earthquake on the West Napa Fault. The fault mechanism is strike-slip on a nearly vertical fault.

As of August 28, over 330 records with amplitudes above 0.5% g have been recovered by the CISN seismic networks (BDSN, CGS/CSMIP, USGS/NCSN and USGS/NSMP), and are available at the CESMD website (www.strongmotioncenter.org) for view and download. Records with peak ground accelerations below 0.5% g are available for download through the FTP link at the bottom of the CESMD Internet Quick Report page for the earthquake. More strong-motion records are still being added.

The largest peak ground acceleration of 99%g was recorded by the surface instruments of the Crocket - Carquinez Br Geotech Array #1 (CGS 68206). The peak ground velocity at this station is 22 cm/s. A station on Main Street in downtown Napa (USGS N016), where the heaviest damage occurred, had a peak acceleration over 60% and a PGV of 47 cm/s. Napa Fire Station 3 (USGS 1765) in the northern part of Napa had the largest PGV, at 93 cm/s, with a PGA of 43%g. The duration of strong shaking was generally 10 to 15 seconds or less.

The earthquake had high accelerations that decayed relatively rapidly with distance. Figure 1 shows the peak horizontal ground acceleration vs. epicentral distance. For reference, the PGA values are compared with the ground motion predictions from Boore and Atkinson (2008; BA08) assuming a Vs30 of 760 m/s and strike-slip faulting. Figure 2 shows the peak horizontal ground velocity vs. epicentral distance, compared with the ground motion predictions from BA08, again assuming a Vs30 of 760 m/s and strike-slip faulting. In both the PGA and PGV plots, the observed values are higher than the values that would be predicted at distances less than about 20 km, while they generally drop off more rapidly than would be predicted beyond that. Note that in these preliminary plots, the maximum of the two horizontal components is used instead of the geometric mean which used in BA08 prediction.

The last significant shaking in the Bay area was in the 1989 Loma Prieta. Many structures and sites have been instrumented since then, so this is the first set of significant data for many of these stations. The structures include the major Caltrans toll bridges in the Bay area, for which Caltrans also supported installation of geotechnical (downhole) arrays. The most striking structure, the new Bay Bridge East Span, is not fully instrumented yet, though many channels were recorded. Another striking structure with the first significant recording is the recently instrumented concrete-core Rincon tower in San Francisco.

CESMD staff at USGS and CGS
August 28, 2014

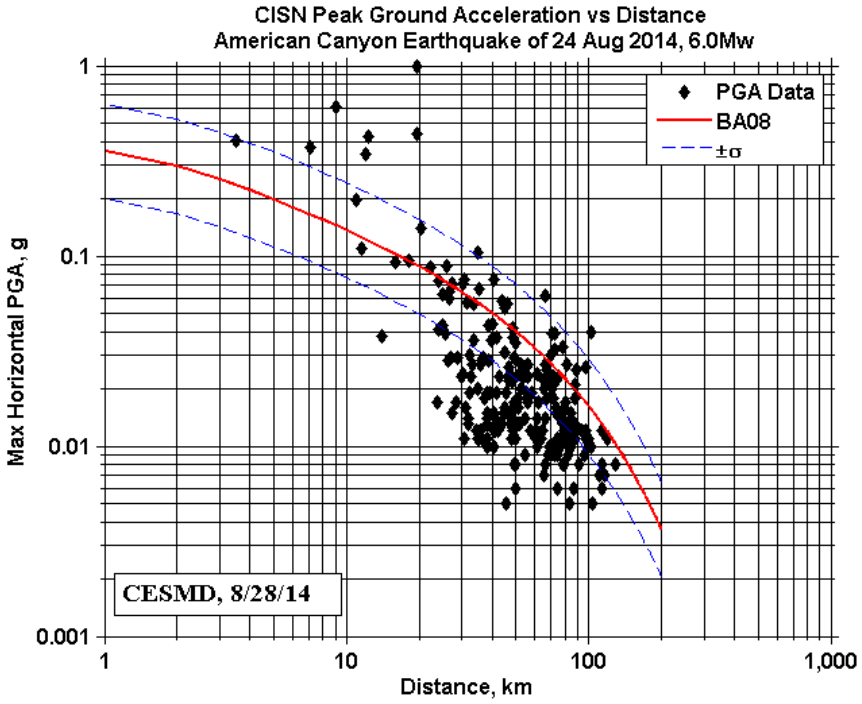

Figure 1. Plot of observed PGA vs. epicentral distance compared with the NGA ground motion prediction equation of Boore and Atkinson (2008).

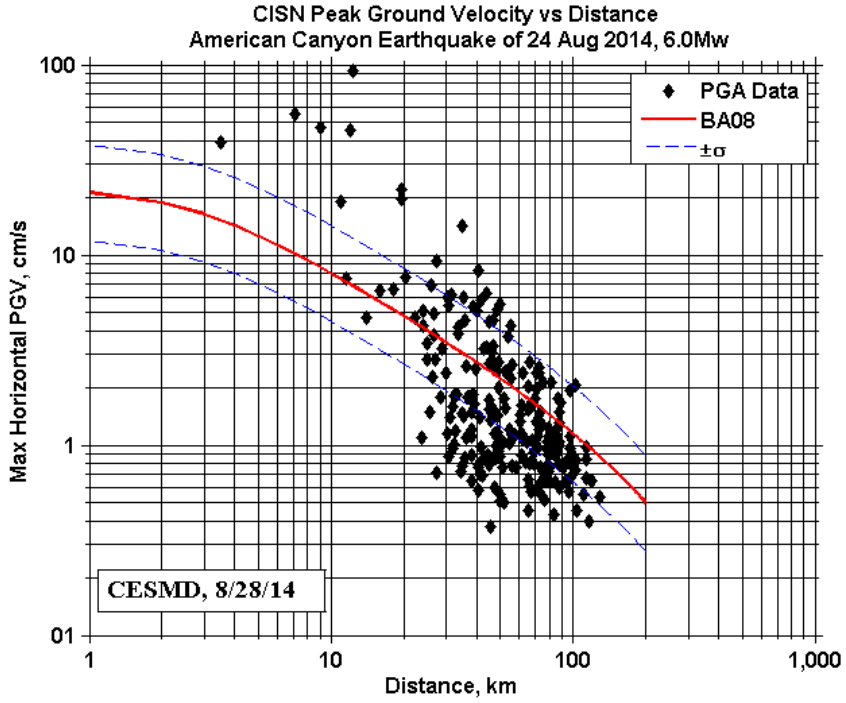

Figure 2. Plot of PGV vs. epicentral distance compared with the NGA ground motion prediction equation of Boore and Atkinson (2008).