

CONTINUITY OF THE WEST NAPA FAULT ZONE INFERRED FROM AFTERSHOCK RECORDINGS ON FAULT-CROSSING ARRAYS

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ABSTRACT

In an attempt to determine the continuity and lateral extent of the causative fault(s) of the 24 August 2014 Mw 6.0 Napa earthquake and possible interconnections with other mapped faults, we recorded aftershocks on three closely spaced (100 m) seismograph arrays that were positioned across the coseismic rupture zone and across mapped faults located north and south of coseismic rupture. Array 1 was located in northwest Napa, between Highway 29 and the intersection of Redwood and Mt. Veeder roads, array 2 was located southwest of Napa, ~1 km north of Cuttings Wharf, and array 3 was located south of San Pablo Bay, within the town of Alhambra. Our intent was to record high-amplitude guided waves that only travel within the causative fault zone and its extensions (Li and Vidale, 1996). Preliminary analysis of seismic data from an M 3.2 aftershock shows high-amplitude (up to 1 cm/s) seismic waves occurred on seismographs within 100 m of mapped surface ruptures and fault zones. Northwest of Napa, the high amplitudes along array 1 coincide with zones of structural damage and wide spread surface ground cracking, and along array 2 near Cuttings Wharf, the high amplitudes occur slightly east of surface ruptures seen along Los Amigas Road. We also observe relatively high-amplitude seismic waves across the Franklin Fault (array 3), approximately 32 km southeast of the mainshock epicenter; this observation suggests the West Napa and the Franklin faults may be continuous or connected. Existing fault maps show that the Franklin Fault extends at least 15 km southward to the Calaveras Fault zone and the West Napa Fault extends at least 25 km north of our array 1. Collectively, the mapped faults, surface ruptures, and guided waves suggest that the West Napa- Franklin Fault zone may extend more than 85 km before it merges with the Calaveras Fault. Assuming a continuous fault zone, the West Napa – Franklin Fault zone may be capable of generating a much larger magnitude earthquake than the Mw 6.0 that occurred on 24 August, 2014.