Survey web page http://earthquake.usgs.gov/eqcenter/eqinthenews/2007/nc40204628/nc40204628.php). Geologists did not find any surface rupture along the fault; surface rupture is unusual for an earthquake of this size and depth.

2.4 Background Seismicity

To account for the hazard from background (floating or random) earthquakes that are not associated with known or mapped faults, regional seismic source zones were used in the DRMS seismology study (URS/JBA, 2007a). In most of the western United States, the maximum magnitude of earthquakes not associated with known faults usually ranges from **M** 6 to 6½. Repeated events larger than these magnitudes generally produce recognizable fault-or-fold related features at the earth's surface (e.g., dePolo, 1994). An example of a background earthquake is the 1986 **M** 5.7 Mt. Lewis earthquake that occurred east of San Jose.

For a probabilistic seismic hazard analysis (PSHA), like that performed for the DRMS study, earthquake recurrence estimates of the background seismicity in each seismic source zone are required. The DRMS site region was divided into two regional seismic source zones: the Coast Ranges and Central Valley (URS/JBA, 2007a). The recurrence parameters for the Coast Ranges source zone were adopted from Youngs, et al. (1992). They calculated values for background earthquakes based on the historical seismicity record after removing earthquakes within 10-km-wide corridors along each of the major faults. The recurrence values for the Central Valley zone were estimated by URS as part of the DRMS study (URS/JBA, 2007a and Figures A-6 and A-7). The maximum earthquake for the source zones is **M** 6.5 $\pm$ 0.3.

2.5 Seismic Hazards

The DRMS study (URS/JBA, 2008) evaluated the vulnerability of levees to seismic hazards. Historically, there have been 166 Delta and Suisun Marsh flood-induced levee failures leading to island inundations since 1900. No reports have been found to indicate that seismic shaking has ever induced significant damage. However, the lack of historical damage is not a reliable indicator that Delta levees are not vulnerable to earthquake shaking. Furthermore, the present-day Delta levees, in their current configurations, have not been significantly tested by the moderate to high seismic shaking that can be expected. Unlike flood-induced failures, earthquake-induced levee failures tend to extend for thousands of meters if not kilometers.

The largest earthquakes experienced in recent history in the region include the 1906 Great San Francisco earthquake and the 1989 Loma Prieta earthquake. The 1906 earthquake occurred while the levees were in their early stages of construction, were much smaller than they are today, and were not representative of the current configuration. The epicenter of the 1989 Loma Prieta earthquake was too distant and registered levels of shaking in the Delta too small to cause perceptible damage to the levees. Nonetheless, the DRMS seismic analysis team performed a special simulation analysis of the 1906 Great San Francisco earthquake to evaluate the potential effects of this event on the current levees (URS/JBA, 2008).

In addition to the simulation of these largest regional earthquakes, the DRMS study also evaluated recent smaller and closer earthquakes (URS/JBA, 2008). The earthquakes, and their impacts, that were evaluated include the 1980 Livermore earthquake (**M** 5.8) and the 1984