1.2 Major Earthquake Sources in Riverside County

Many faults have the potential to generate strong ground shaking, surface fault rupture and secondary damage in Riverside County (see Figure 1-2). For the faults that pose the greatest threat to the County, summaries of current technical data and professional views are described in the next sections. Additional detail on Riverside County faults is provided in Appendix C.

1.2.1 San Andreas Fault Zone

Because of its relatively frequent (high recurrence rate), large earthquakes, the San Andreas fault is considered the "Master Fault", controlling the seismic hazard in Southern California. In the vicinity of Riverside County, the San Andreas fault zone is comprised of three segments: 1) the San Bernardino Mountains segment, 2) the Coachella Valley segment, and 3) the Mojave Desert segment. Between Cajon and San Gorgonio Passes, the County is bisected by the San Bernardino segment. The Coachella Valley segment of the San Andreas runs along the northeastern margin of the Coachella Valley.

The last major earthquake on the southern San Andreas fault was the 1857 M_w 8.0 Fort Tejon quake that ruptured the San Andreas from central California, near Parkfield, to Cajon Pass, about 15 miles north of the County. For this study, the "Southern Segment" is considered a simultaneous rupture of the San Bernardino and Coachella Valley segments. Paleoseismic evidence indicates that such simultaneous rupture has occurred at least twice since 1450.

The San Bernardino Mountains segment extends in a westerly to northwesterly direction between the Cajon Pass area and the San Gorgonio Pass (Figure 1-3). This segment is structurally complex because the fault makes a left-step, and bends to trend in a more westerly direction. Associated compression is expressed as a zone of reverse, lateral and oblique-slip deformation that is accommodated by several subparallel fault strands. The most important of these are the Mission Creek, San Gorgonio Pass, and Banning faults.

Several estimates of slip rate obtained independently indicate that the San Bernardino Mountains segment has a slip rate of 24± 6 mm/yr, with an average recurrence interval of 146 years (WGCEP, 1995). Paleoseismic studies at Wrightwood indicate that there have been six surface-rupturing earthquakes on this segment since AD 1192, with the most recent five events occurring, on average, every 106 years. The most recent surface-rupturing earthquake on this segment is thought to have occurred in 1812 (Jacoby and others, 1988). Stein and others (1992) indicate that the Landers earthquake sequence may have caused stress changes that advanced the occurrence of the next great San Andreas earthquake