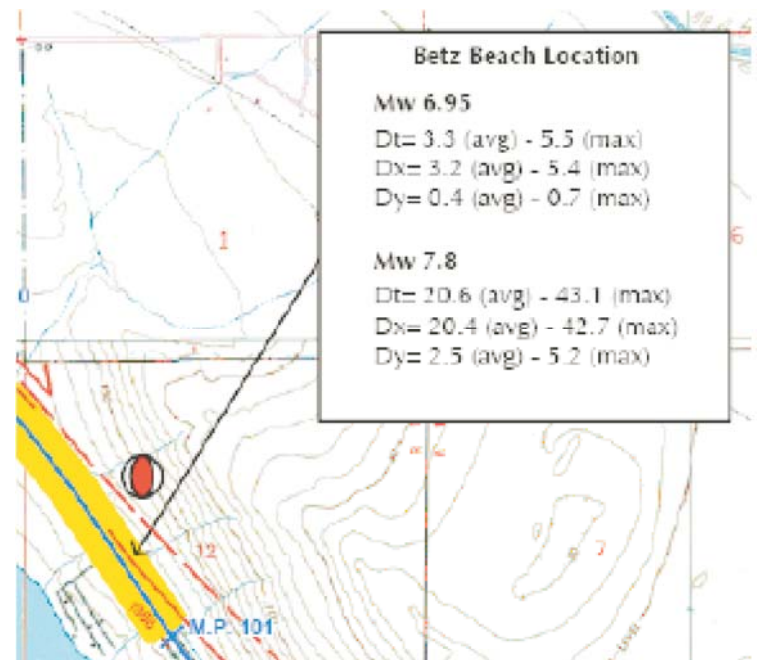


EVALUATION OF FAULT RUPTURE SUSCEPTIBILITY for a Network of Petroleum Product Pipelines in the Southwestern United States

PROJECT DESCRIPTION

Earth Consultants International evaluated nearly 2,500 miles of pipelines carrying jet fuel, gasoline, and diesel throughout the southwestern US, from the El Paso region in west Texas to southern California, and from central and northern California into Nevada (see Figure 1). The purpose of the study was to identify, verify and characterize the active and potentially active faults crossed by the pipelines. Each fault identified was researched to obtain data on its style of faulting (right-lateral strike-slip, left-lateral strike-slip, reverse, normal, or a combination thereof), length, recurrence interval and last rupture(s). Using the length data, we calculated the maximum magnitude earthquake each fault is thought capable of generating, and the average slip per event should the fault rupture in a maximum magnitude earthquake. For pipelines in the southern California area near the San Andreas fault, we were asked to define the fault-pipeline crossings, estimate the average and maximum slip per event and vector displacements based on the approach angle between the pipeline and the fault trace, and identify those pipeline sections that will be in tension or compression when the San Andreas fault ruptures next.



1) Map of the southwestern US showing the pipelines (blue lines) that were the subject of this study. 2) Topographic map showing a small section of the CALNEV pipeline (dark blue line) along the eastern side of the Salton Sea, near Betz Beach, showing that at this location the pipeline is subparallel to and locally over the main trace of the San Andreas fault.

SOLUTION

A total of 59 Quaternary faults are intersected by the network of pipelines that was the subject of this study. We conducted a risk assessment for each fault-pipeline crossing based on three principal criteria: distance to population center or transportation network such as a freeway or railroad track, total anticipated displacement of the pipeline should the fault rupture, and probability that the fault will rupture in the near future.

Pipeline sections that ranked high in all three criteria were identified as high priority, to be retrofitted and/or strengthened first to make them more earthquake resistant.

