RELATIVE ACTIVITY OF NORTH BRANCH SPLAYS (NBS) OF THE NEWPORT-INGLEWOOD FAULT ZONE, WEST NEWPORT OIL FIELD, NEWPORT BEACH, CALIFORNIA

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The Newport-Inglewood fault zone (NIFZ) is a ~1.5-2.5 km wide, N45-60W, mainly right-lateral tectonic structure in southern California extending from the Santa Monica Mountains on the north to offshore connection with the Rose Canyon fault at San Diego on the south. A major NIFZ segment boundary occurs near the mouth of the Santa Ana River at Newport Beach where regional strike changes ~15-20 degrees, and where the zone widens to ~5 km as defined by many short-length faults identified in subsurface oil-field structures collectively deemed "North Branch Splays" (NBS).

Traditionally enigmatic is whether all NBS are "active" (Holocene) for purpose of engineering design. Some NBS are demonstrably Holocene, for they display 30-50 cm vertical displacement at ~1-2 ka recurrence. Others, however, as now shown from trenches, roadcuts and bluff exposures at the West Newport Oil Field, are less than a few km long and covered by unbroken ~350 ka marine sediments ("San Pedro fm") or by ~200 ka (marine isotope stage 7) regressive marine deposits capped by cumulic, strongly developed soil profiles. Locally, however, two post-200 ka NBS were encountered; these designated the "northern and southern" segments, respectively. These faults have no geomorphic expression, are less than 0.5 km long, are right-stepping, have little or no gouge, but vertically displace the base of the ~200 ka soil argillic horizon ~2 m. They also flower upward into ~1-2 m wide, now-buried "grabens" filled with probable latest Pleistocene and Holocene mixed eolian and colluvial-derived sediments; and hence, for conservatism, are deemed "active".

These particular NBS record only two observable events in the past ~200 ka, and thus are low-slip, long recurrence structures. Based on exposures in the West Newport Oil Field we therefore judge that few, if any, NBS have geomorphic expression; that slip rates varies greatly from splay to splay; that the faults are relatively short and terminate abruptly; that recurrence increases to the south; and that, accordingly, relative activity and related engineering-design judgments can only be determined by site-specific investigation.