

on the valley floor. The principal rivers in this system are the Alamo and New Rivers, which collect excess irrigation water from the valley, runoff from the surrounding foothills, and occasionally flood waters from the Colorado River, and then flow northward into the Salton Sea. These rivers have developed typical fluvial sedimentary features including channel, point-bar, levee, and overbank deposits. During the 1979 earthquake, ground cracks and sand boils developed on many fluvial deposits along these rivers, including those at the River Park site (16).

LIQUEFACTION EFFECTS

Heber Road Site.—A lateral spread severely disrupted the pavement on Heber Road about 1.0 mile (1.6 km) northeast of the Imperial Fault rupture. Principal features of the spread and locations of drill holes are shown on Fig. 3. The spread shifted the road and a parallel unlined canal as much as 7 ft (2.1 m) southward toward a 6.6-ft (2-m) deep depression in Heber Dunes County Park. This depression is a remnant of the old stream channel that previously passed through the area (Fig. 2). The spread was 530 ft (160 m) wide at Heber Road and about 330 ft (100 m) long from the edge of the depression to the northernmost crack in the field north of the road. Arcuate ground cracks and scarps formed around the margins and across the interior of the spread. Along the south edge of the road, scarps as high as 3 ft (0.9 m) formed between blocks of sediment carved out by the spreading movement. Sand boils erupted at several places on the spread, primarily along ground cracks north of the road. A linear group of small sand boils, parallel to Heber Road, erupted over a buried drain line in the field east of the spread.

River Park Site.—Hundreds of sand boils (Fig. 4), a slump, and numerous small ground cracks formed in a graded area long the east side of the New River at the southwest edge of Brawley, Calif. The graded area, called "River Park," contains a rodeo ground, a picnic area, a stock pasture, and a large unpaved area. The sand boils, which spotted the park with patches of sand, erupted mostly along small ground cracks and around fence and lamp posts. Water continued to seep from a few sand boils for two weeks following the earthquake. Most sand boil deposits were composed of gray sand; some, however (particularly those in areas near the bluff and those that came up around posts), contained brown silty sand or sandy silt. These differences indicate two sources for the ejected sand. The slump (Fig. 5) which formed along the bank of the New River was about 100-ft (30-m) long and 16-ft (5-m) wide with vertical displacement as great as 4 ft (1.2 m).

INVESTIGATIONS

In December 1979, we laid out a linear array of mechanical cone soundings across the Heber Road and River Park sites in order to establish preliminary cross sections. We verified these sections by taking continuous disturbed samples from selected holes. We then conducted SPT tests (using a safety hammer and reversing winch) and retrieved tube samples from selected holes. In January 1981, we reoccupied the Heber Road site and conducted CPT tests (with a mechanical cone) and