Photo 9 Fissures and Sharing of Ground Appeared in Kabutono Area
( Area B. see Fig. 4, View to Crescent Lake taken at September 1993)

Photo 10 Fissures Appeared in Kabutono Area ( Same Place as in Photo 9.
Taken at July 20, 1993 from right-hand side of Photo 9)

Photo 11 Fissures Appeared in Aichi Area ( Area D. see Fig. 4.Edge of Crescent Lake)

selected for its relatively extensive surface change and several ground investigation results already available, where somewhat detailed investigations including soil surveys were undertaken.

*Deformation and Damages*

The results of the survey and aerial photos of this area are shown in Figure 10 and Photo 12. It is noted that pre-earthquake aerial photos are available only for the portion along the levee (upper half of the Figure). Figure 11 shows the old topography the area upstream of the Shinei Bridge including Area D and E, interpreted by means of stereoscopying of the aerial photos taken by the US Forces in 1948.

In this area the ground displaced toward the old riverbed including crescent lakes and waterways, generating circular fissures along the old river bed, demonstrating the typical pattern of the ground deformation along the Shiribeshi-toshibetsu River. Horizontal displacements were generated right next to the old riverbed toward the lake by approximately 1.5 to 3.0 meters. On the other hand, the displacement is small in the center area of the arc.

Ground surface along the cross section shown in Figure 10 were compared for before and after the earthquake. The result is shown in Figure 12. This shows that the somewhat elevated topography in the center of the arc was depressed toward the old riverbed. The horizontal displacements can be seen from the movement of the ridges of rice paddies. The settlement, which reached approximately 80 cm in the center of the arc and 50 to 80 cm bear the old riverbed, occurred in the entire area. However, the pre-earthquake topography dates back ten years, possibly differing from what immediately preceded the earthquake.

Photos 13 shows fissures, sand boils and damage to the electric poles in this area. For the positioning of the photos, refer to Figure 10. As Photo 13 shows, there were two power transmission pylons; one with four legs (piled foundation) located in the center of the arc had no damage by settlement or tilting despite sand boiling from the foundation (Photo 13 (c) ). The other gate-shaped pylon settled, moved toward the waterway and tilted approximately 10 degrees as shown in Figure 13 (b). Electric poles along the levee (Photo 13(a) and (e)) settled and tilted as a result of the settlement of the levee. In this area the levees of the Shiribeshi-toshibetsu River settled in general. Damages to the levees , however, are noteworthy especially somewhat upstream from here while fissures on the levees and settlements here are relatively minor.

*Soil Conditions*

Four boring tests and 16 Swedish sounding tests were conducted. Soil profiles were prepared along the cross sections shown in Figure 10. Figure 13 shows these soil profiles. The ground surface

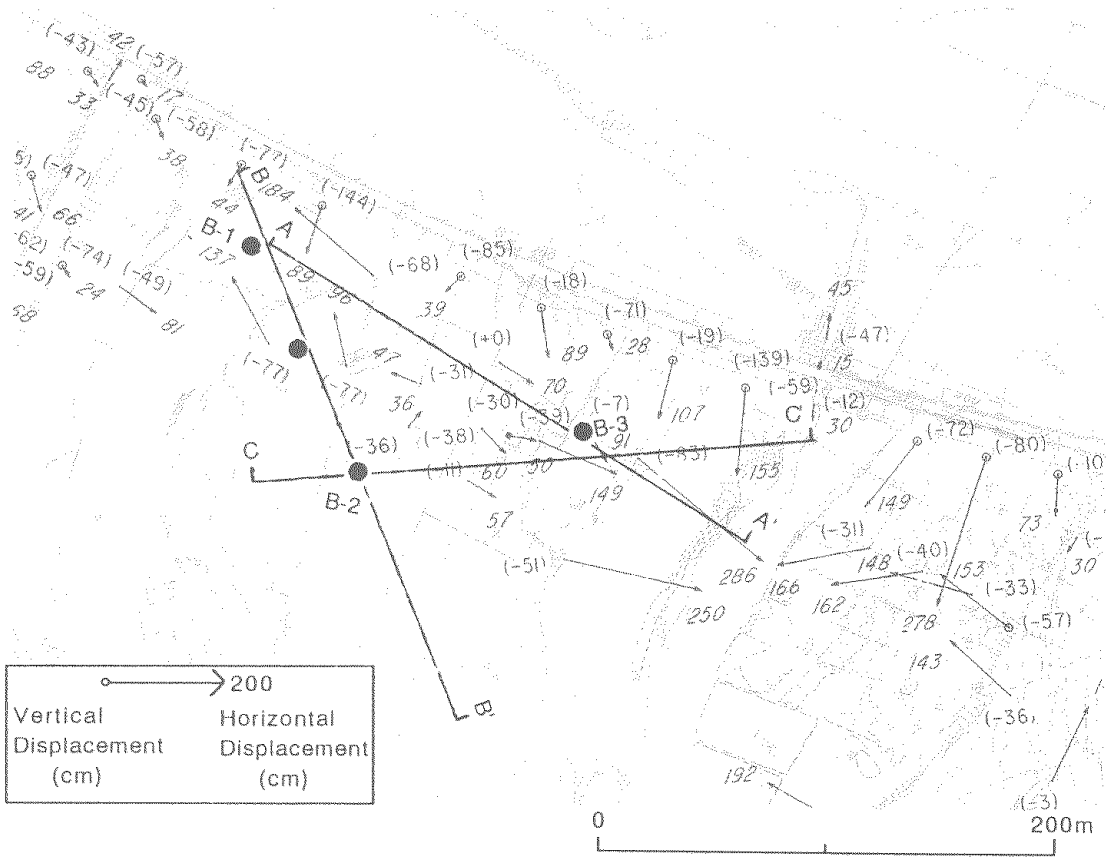


Figure 10 Map Showing Ground Deformations, Cracks and Sand Boils, Aichi Area ( Area D, see Fig. 4)

Photo 12 Aerial Photograph of Aichi Area ( Area D, Same Scale as in Fig.10)