earthquake aerial photos, human error in reading the coordinates of the measurement points, and other factors. The accuracy was estimated to be ± 22cm horizontally and ± 20cm vertically in this area.

Figures 6 to 9 show the interpretation results of typical ground deformations and results of aerial photo surveys in the areas A, B, C and E . The location of areas A ~ E is shown in Figure 4. Photos 5 to 8 show aerial vertical photos corresponding to Figures 6 to 9 each. Photos 9 to 11 show the ground deformations in the Areas B and E taken by the author. Also Figures 6 to 9 indicate the measured ground displacements. The vectors represent ground displacements in the horizontal direction, each with a number indicating the magnitude of movement in cm. The numbers in parentheses are displacements in the vertical direction in cm, signs + and - show upheaving and settlement of the ground surface respectively. As for Area D on the left bank upstream to the Shinei Bridge (see Fig. 4), it will be discussed in a later section together with the results of the ground investigation.

The following observations can be made from the aerial photo survey and interpretation of the ground deformation above.

- Horizontal ground displacement reached 2 ~ 3 meters in severe cases. Vertical displacements roughly correspond to locations with severe horizontal displacements, resulting in ground settlement ranging 50 to 100 cm. However, it is noted that the level of settlement in some areas is not precise because the water surface has been measured in flooded areas. The actual levels of settlement are thought to be greater in these areas.
- The horizontal ground displacements are generally directed toward the extant crescent lakes on the old riverbed (main stream) or waterways so that the ground fissures and vector direction cross perpendicularly in general. Nonetheless the displacements of the ground are extremely complex in some areas as can be seen in ground fissures.
- Those areas where ground deformation or sand boiling occurred can be clearly distinguished from the areas without them. Such borderlines often correspond to the topographical change points thought to be the old riverbeds.
- As for the points along the levee, the ground displaced mostly outward of the levee by scores of centimeters up to one meter. The displacements apparently show the spreading or flattening of levees.

GROUND DEFORMATION IN AICHI AREA AND SOIL CONDITION

The area of the left bank upstream from the Shinei Bridge (Aichi Area, Area D in Figure 4) was

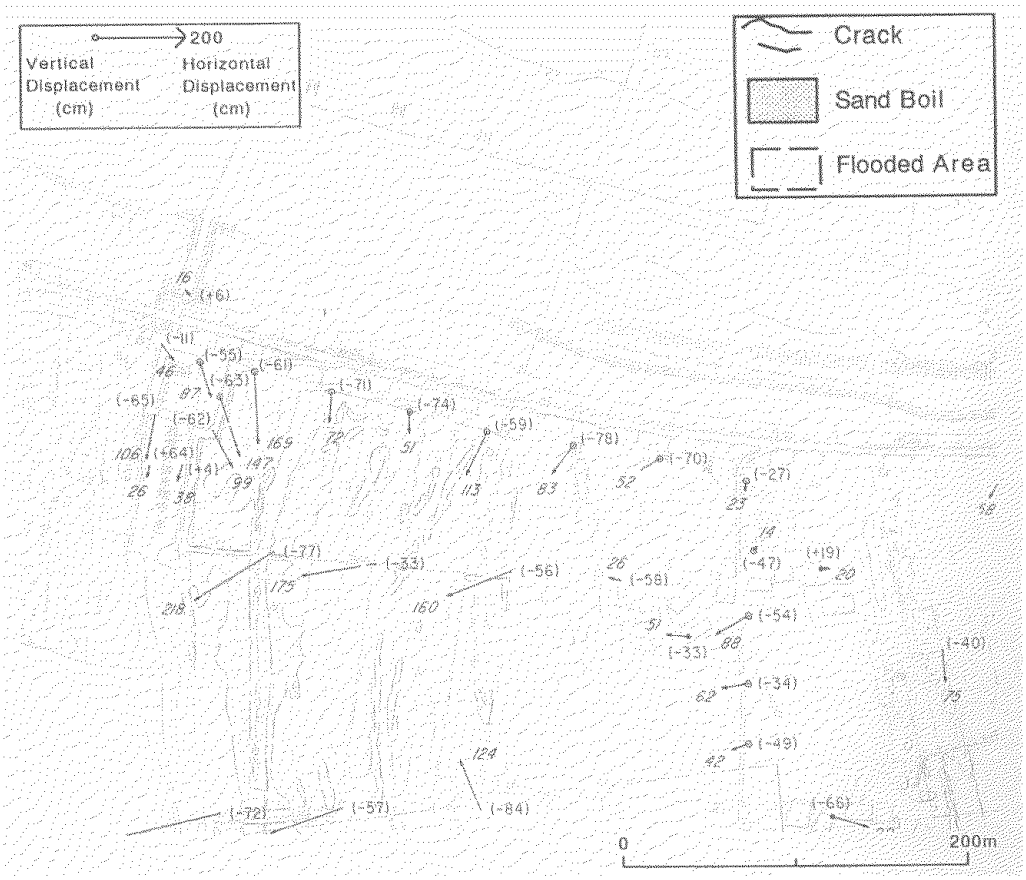

Figure 6 Map Showing Ground Deformations, Cracks and Sand Boils, Area A
(About 700 m Upstream from River-mouth, see Fig.4)

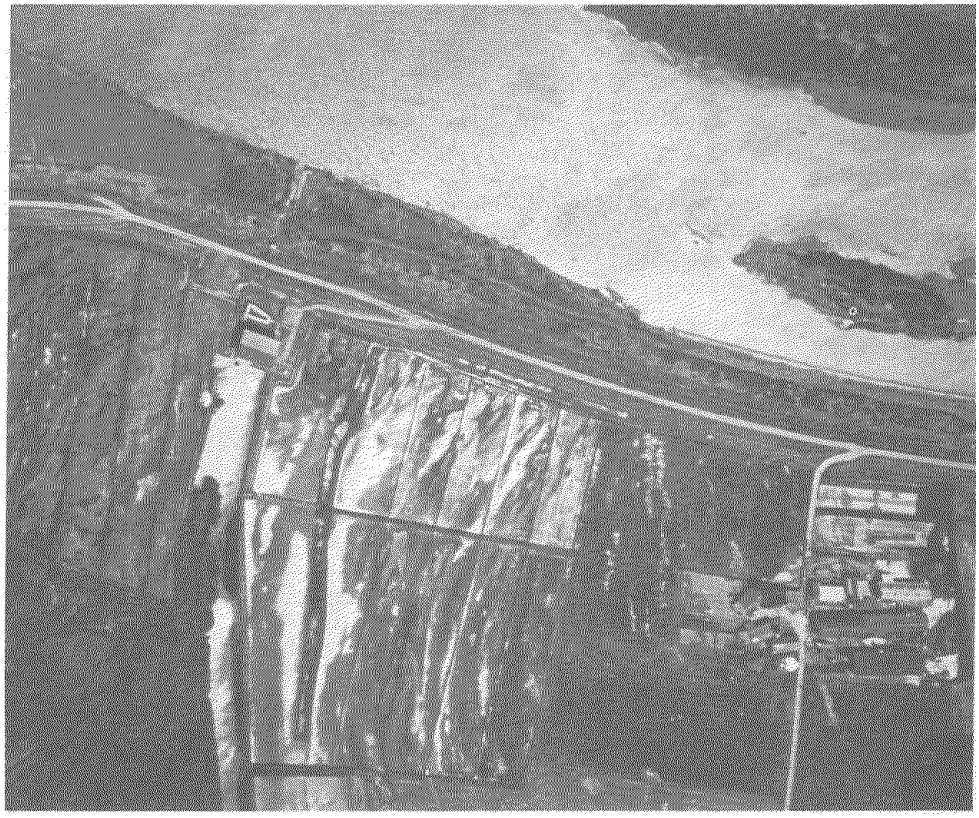

Photo 5 Aerial Photograph of Area A (Same Scale as in Fig.6)

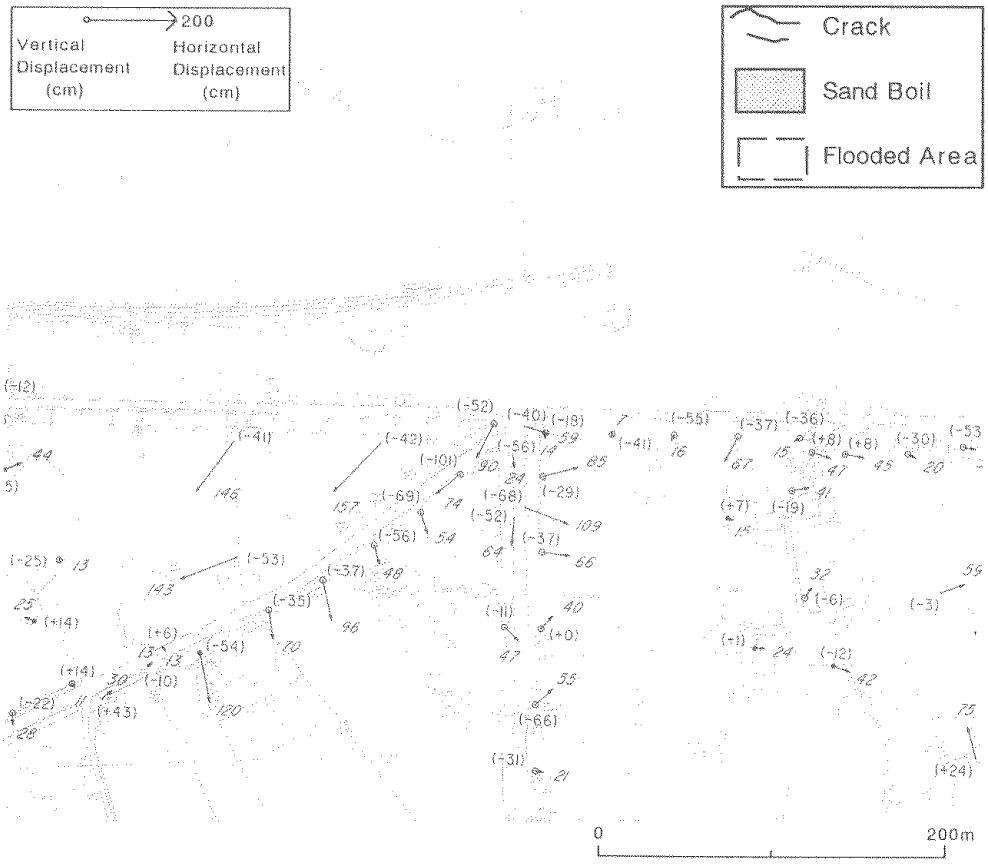

Figure 7 Map Showing Ground Deformations, Cracks and Sand Boils, Kabutono Area (Area B, see Fig. 4)

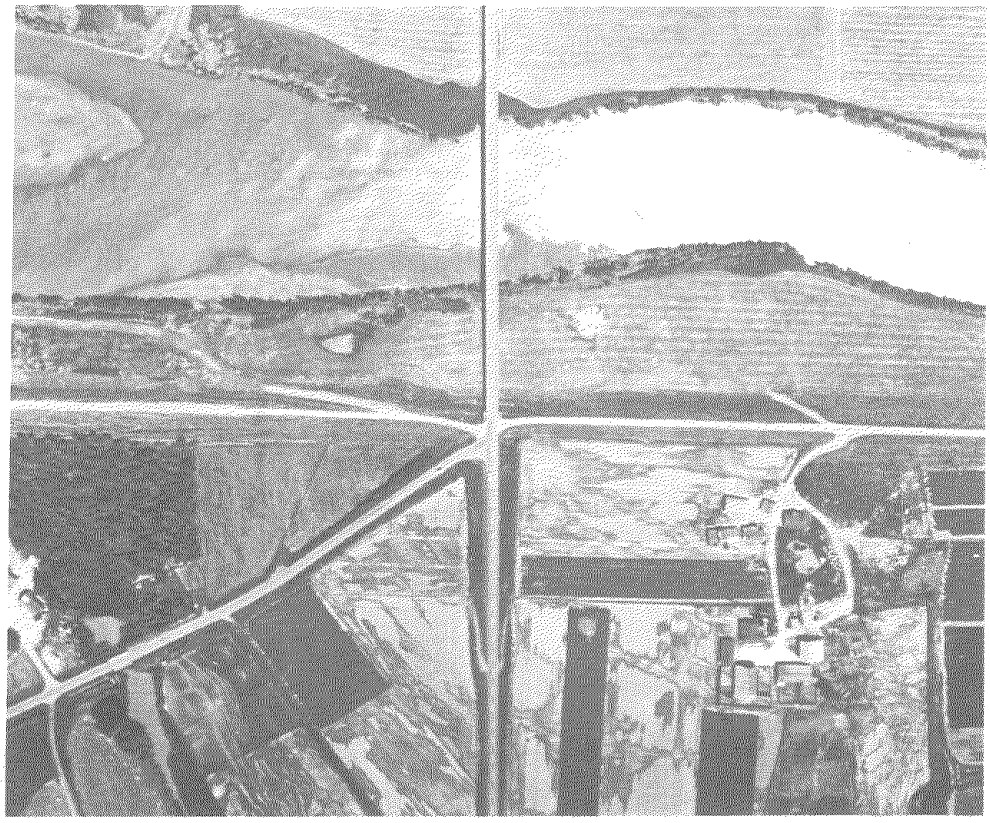

Photo 6 Aerial Photograph of Kabutono Area (Area B, Same Scale as in Fig.7)