

## **Decrease of Liquefaction Resistance on Artificial Sand Bed by Mixing of Pumiceous Ash**

KAZAOKA, O.\*, KUSUDA, T.\*, KAMURA, K.\* and NIREI, H.\*\*

\*Research Institute of Environmental Geology, Chiba \*\*Center for Water Environmental Studies of Ibaraki University

At the 1968 Off Tokachi Earthquake, Hachinohe pumice bed, upper Pleistocene, liquefied and fluidized in Hachinohe City, northern Japan (Institute of Geology and Paleontology, Tohoku University, 1969). The pumice bed is composed of un-weathered pumice, 0.5 mm to 20 mm grain diameter. The liquefaction resistance of the specimen by disturbed sample of Hachinohe pumice increase little with density (Kazaoka et.al., 1995). Then artificial sand beds with pumiceous ash on the wet land liquefied and fluidized at the 1993 Off Kuroshima Earthquake and the 1994 East Off Hokkaido Earthquake (RIEGC & TCPLC, 1993; Kazaoka et. al., 1995). At the 1987 east off Chiba prefectural earthquake, there were many sand volcanoes with pumiceous ash on reclaimed land along river. From above them it may be inferred that artificial sand bed with un-weathered pumiceous ash have low liquefaction resistance.

The relation between mixing rate of fine-medium sand with pumiceous ash and liquefaction resistance is examined by cyclic un-drained triaxial test. Testing samples are blended by clean fine-medium sand from Mandano formation and pumiceous ash from Hachinohe pumice bed. Void ratios of specimens were controlled by pluviation method and hammer blows on metal mold. They were cyclic loaded on sine wave after completed saturation with water.

The results of the test on each sample are as follows. Liquefaction resistance is compared with the samples on the basis of void ratio,  $e - e_{min}$ . Liquefaction resistances decrease largely at mixing pumiceous ash only 10% with sand. For this reason it is important to make artificial bed by sediments without pumiceous ash.