

Technical Support for Safety Check and Recovery of Dams Affected by the Kumamoto Earthquake

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Key words: Kumamoto Earthquake, dam, site investigation, technical support

1. Introduction

In a series of earthquakes that hit Kumamoto Area, Kumamoto-ken, in April 2016, extraordinary inspections were conducted by administrators on a total of 228 sites in dam facilities etc. As the result, any deformed condition in the dam body, around the reservoir, etc. was reported in a total of 5 dams. In response to the request from Kyushu Regional Development Bureau, which administers dams and rivers, NILIM investigated the sites of two dams where deformation was confirmed with the dam body in order to check safety together with Public Works Research Institute.



Figure 1: Dam in which deformation was reported in the extraordinary inspection after the earthquake

2. Site investigation and results

For the site investigation, we left NILIM on the following day of the main shock (Apr. 16) and investigated Midorikawa Dam (side dam) and Jizobaru Dam, on which deformation in the dam body was reported, on April 18 and 19.

In the investigation of Midorikawa Dam (Photo 1), we found a crack in the paved surface of the road on the crown of the side dam (rockfill dam with a central earth core, 35.0 m high), but the width of the crack was relatively narrow and there was no crack in the upstream / downstream direction, squeezing on the upstream / downstream face, etc., which could cause a problem with the water cut-off function of the dam. In the displacement measurement, slight subsidence was observed in the dam body but no abnormality concerning water leakage was found.

In the investigation of Jizobaru Dam (earth dam, 21.8 m high) (Photo 2), some deformations were confirmed, including subsidence of the crown of the dam body and crack opening on the concrete diaphragm wall in the upstream face of the dam body, but there was no deformation in the downstream face. Leakage slightly

increased from the amount before the earthquake but was stable, and there was little change in the water level of the dam reservoir (seepage line).



Photo 1: Investigation of Midorikawa Dam (Downstream face of the side dam)



Photo 2: Investigation of Jizobaru Dam (Upstream face of the dam body)

3. Technical support for recovery

From the results of the investigation above, it was determined that deformations confirmed with both dams would not immediately cause any problem with safety. However, since some deformations were found, we made discussion and gave advice on the emergency measures for preventing infiltration of rain water, etc. and important monitoring objects for the present, etc. Then, administrators are striving hard to fully restore both dams. NILIM is continuously providing technical advice on detailed additional investigation including identifying of the deformed area in the dam body, recovery method, etc. in collaboration with Public Works Research Institute. We hope that both dams as well as disaster stricken area will fully recover as soon as possible.