



US Army Corps
of Engineers
Kansas City District

TUTTLE CREEK DAM

FACT SHEET

April 2001

EARTHQUAKE ANALYSES OF THE DAM

The original design of the dam was based on site investigation results and laboratory tests on soils below the dam and soil and rock used to build the dam. The following types of analyses were conducted to verify the safety of the dam:

- Stability of the slopes of the dam under various normal and extreme conditions.
- Seepage of water through and below the dam.
- Settlement of the dam and the soil below the dam.
- Design of the upstream rock to protect the dam against waves

Based on these calculations a very wide dam with internal zoning was designed. At the time of the design, little was known about Kansas earthquakes and the potential effect of earthquakes on dams or the soils under them. The only earthquake calculations performed at that time were on the intake tower. However, after the dam was constructed, five strong motion accelerographs were installed at the dam. These instruments are used for the recording of the level of shaking during a strong earthquake but are not sensitive enough to monitor earthquakes that cannot be felt.

Recent advances in earthquake soils engineering and improved knowledge of midwest earthquakes required that a detailed analysis of dam safety related to seismic stability. In this respect, the following activities have been performed and are currently being finalized:

- An earthquake study, with direct involvement of renown scientists in this field, to determine the size and probability of the largest earthquake that could be felt at the dam site.
- Computer modeling of the earthquake shaking felt by the dam.
- Detailed investigation of the properties of soils behavior during earthquakes including over 50 test holes.
- Evaluation of the potential for the sands beneath the dam to liquefy and loose strength.
- Earthquake evaluation of both the existing embankment and potential options for protection of the dam:
 - Post-earthquake stability computer modeling, assuming liquefied sand zones beneath the dam.
 - Computer modeling of the dam to determine how it will deform during an earthquake.

This fact sheet is published by the U.S. Army Corps of Engineers, the lead agency for the Tuttle Creek Dam Safety Assurance Program. Comments or questions about this fact sheet or the Dam Safety Assurance Program should be directed to Bill Empson of the Kansas City District, Corps of Engineers at (816) 983-3556 or by E-mail at tcdam.nwk@usace.army.mil.

Questions or comments about lake operations or Tuttle Creek project office activities should be directed to the on-site Operations Manager, Brian McNulty at 785-539-8511.

For additional information, visit our web site: <http://www.nwk.usace.army.mil/tcdam>



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