

Embankment Dams

Purpose

This demonstration is to show:

1. The erosion by waves in the reservoir of the side of the dam leading to dam failure.
2. The effect of paving to prevent this erosion.
3. The cause of rotational failures at the bottom of the dam
4. The beneficial effect of a gravel layer
5. The reason why embankments often have a slope of only 1:10.

Requirements

Sand about 3 litres

Gravel about 100cc 2mm to 4mm

A glass tank 2m by 10cm by 10cm.

8 grains of Potassium manganate 7

A piece of glass or tile about 10cm by 10cm which will fit in the tank.

Instructions

Make a pile of sand in the centre of the tank about 9cm high.

Place 4 grains of potassium manganate in the sand next to the glass as in diagram

Fill one end with water, rapidly but without disturbing the sand. Fill the tank so that the water is just below the crest of the dam.

Watch the way the water penetrates the sand. Sketch the water movement paths shown by the potassium manganate.

The water will seep out of the bottom and a series of rotational slumps will take place eventually eating back to the dam crest and allowing water over the dam. Complete destruction of the dam follows. Now build a second dam like the first but with a layer of 2mm to 4mm gravel 1cm thick under part of it. It is more interesting if the new dam is made from dry sand. Place the potassium grains in the sand again. Note how the flow lines have changed and that there is much less slumping.

Place the glass plate on the upper part of the water side of the dam and create small waves. They should not affect the sand. Now remove the plate and create more waves. These will erode the dam and eventually lead to its failure.

Gentler slopes are less likely to fail by slumping.

This activity has been modified from one described by Dr. W. Taylor and N. C. Hunt in *Geology Teaching* vol 8 no 3.

