Evacuation of fluids in a separated system at the Lötschberg Tunnel (Switzerland) Verification of the hydraulic functional efficiency 2005

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Objectives

In the present study, a previous issue analysed in the years 2002/03 at the LCH has been examined once again, this time more in detail and focusing on different aspects.

Up to now, the evacuation system had been investigated on a physical model at reduced scale in order to specify energy losses. The obtained values have now been reused, modelling the evacuation system by numerical simulation.

The goal was to define the optimal configuration of the water barriers on the track way evaluated as useful in the previous study.

The evacuation system

The evacuation system is presented in a schematic way in Figure 1.

Results

In the simulations, a fluid loss of 125 l/s discharge during 10 minutes was assumed to occur. The conditions to be met by the evacuation system are a short distance (area) taken up by the fluid and a short detention time of the fluid on the track way. Therefore the water barriers have been simulated with different heights, in the range of 0 to 19 cm, where the functionality of the highest one had already been approved by the previous study. Higher water barriers are not ideal for train running operations, so that lower barriers are privileged.

The numerical simulations show that with lower barriers there is more water on the track, lying or running therefore during a longer time. The liquid overflows the barrier sooner and therefore more sections are concerned.

The assumption has been established that at maximum 2 sections (2 times 85 m of track, separated by a water barrier) should be touched by the accidental liquid. According to the numerical simulations the lowest acceptable barrier height lies between 8 and 12 cm, depending on the track slope. As a consequence the height of 12 cm has been recommended.

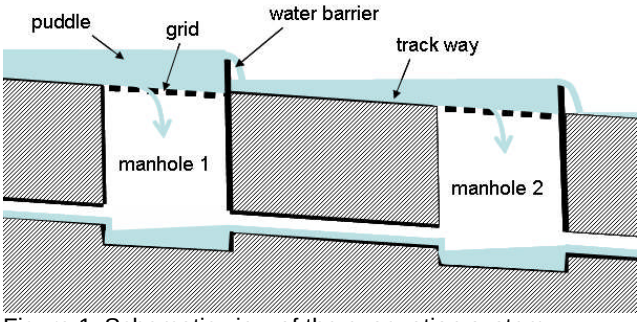

Figure 1 Schematic view of the evacuation system

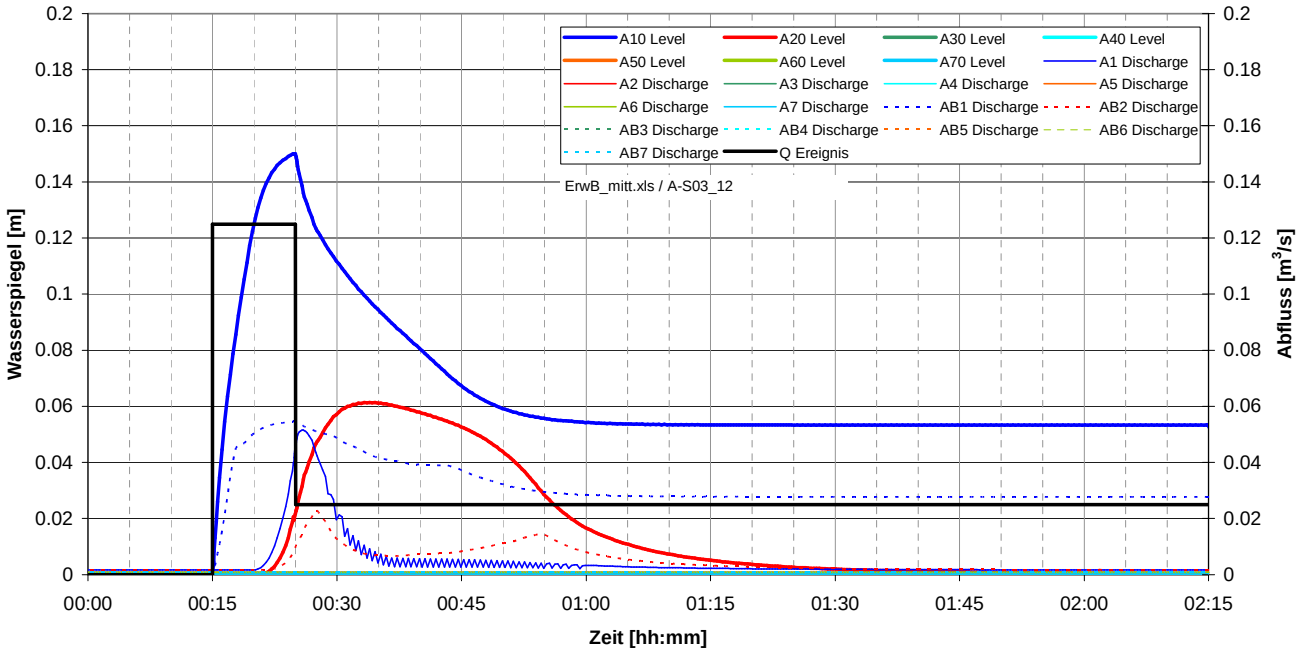

Figure 2 Liquid level, discharge on the track (level 0) and discharge into the evacuation system as a function of time. Water barrier 12 cm high. Track slope J = 0.3 %.