

More Concerns on Providing Static Smoke Extraction System for Huge Underground Space

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There are a multitude of potential problems when static smoke extraction systems are installed in crowded underground spaces, in particular railway or subway stations in downtown areas. Some of the problems were pointed out previously [1], but there are at least two more matters of concern:

1. A thick enough smoke layer must be kept at high level to generate adequate buoyancy for driving smoke out by natural vents. However, such thick hot smoke would heat up the ground (or roof of the underground space !) in a big fire.
2. Smoke would be driven out from the underground to the ground level, affecting the surrounding buildings.

The risks stated above and illustrated in Fig. 1 must be avoided in the design of smoke extraction system for deep underground railway stations.

The authorities should investigate how constructors attempt to lower the above risks during inspection and testing through hot smoke tests [2,3], apart from conducting hazard assessment in the design stage using tools such as Computational Fluid Dynamics [4]. Note that burning a tall Christmas tree in the hall would give a heat release rate much higher than 20 MW. The whole underground space would be filled with flame and smoke. Therefore, the roof top can be very hot, and different from the estimations under a small 10 MW fire. The associated fire phenomena such as flame stretching and internal fire whirl are not yet understood [5,6].

References

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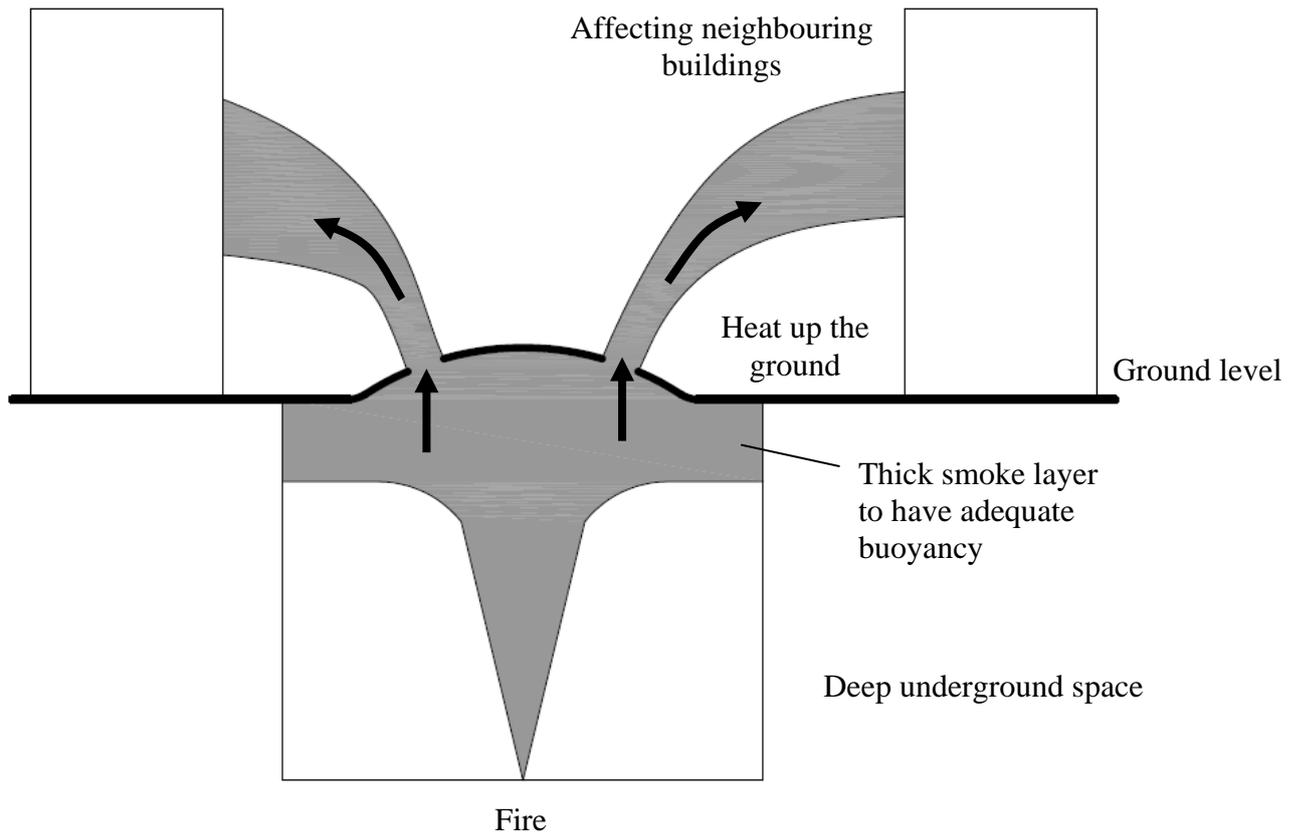


Fig. 1: Hazardous scene