

Train Fire In Zuerich-switzerland

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Citation

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Abstract

The original case report was published in German language by "Rettungsdienst" (Author Olivier Wenker). It is re-published with full authorization of "Stumpf & Kossendey Zeitschriftenverlag-Buchverlag" in Germany. The original reference is: Wenker O: S-Bahn-Brand in Zuerich. Der Rettungsdienst 1992; 5: 352-357.

April 16, 1991. A rapid train (S-9) consisting of 6 wagons speeds through a tunnel in direction of the rail station "Stadelhofen" in Zuerich-Switzerland. A female passenger discovers a fire in the 5th wagon and pulls the emergency break. However, as she does not pull the break entirely, a decrease of the pressure in the breaking circuitry of the train occurs. The train engineer recognizes the changes on his monitors and stops the train, thinking he is dealing with a technical problem. The train stops about 500 meters away from the tunnel exit. Wireless communication from the train to the railroad headquarters is not functional because of the current location within the tunnel. Therefore, no alert can be given as the fire grows. At the same time, a second train (S-5) enters the tunnel from the opposite side. The S-5 train engineer discovers the fire in the tunnel and tries to stop and to pull his train back out of the tunnel. Unfortunately, most of the electrical cable on the roof of the tunnel above the S-9 is burning and electrical failure for both trains occurs. The trains are stuck in the tunnel a few meters apart from each other. In the meantime, the train engineer of the S-9 is able to reach one of the telephones located at several places in the tunnel and at 20:33 p.m. he alerts the headquarters of the Swiss Railroad SBB (Schweizerische Bundes Bahnen). 140 passengers are trapped in the 2 trains, one of which is burning.

Figure 1

The burned S-9 train



CHAIN OF ALERT

- 20:33 Alert SBB headquarters
- 20:37 Alert Fire Brigade Zuerich
- 20:39 Alert Emergency Medical Services EMS-Zuerich
- 20:40 Alert Zuerich Police Department ZPD
- 20:41 The police, the fire brigade, 2 ambulances and 2 emergency physician vehicles are on the way to the accident. The University Hospital of Zuerich is on alert.
- 20:49 Internal alert at the railroad headquarters
- 20:50 A general disaster alert for the region of Zuerich is issued and in effect. All rescue forces including the Swiss Air Rescue REGA and hospitals in the area around Zuerich are alerted.

SCENE OF ACCIDENT

Upon arrival of the first rescue team, coughing passengers are stumbling out of the tunnel. Their faces, skin and clothes are blackened from the smoke. They are immediately directed to the waiting room of the railroad station "Stadelhofen" which is located approximately 50 meters from the tunnel exit. Arriving paramedics and emergency physicians take care of the quickly raising number of patients. All patients are marked with the Casualty Handling System CHSTM, a specially developed system to identify, guide and handle a large number of patients in disasters.

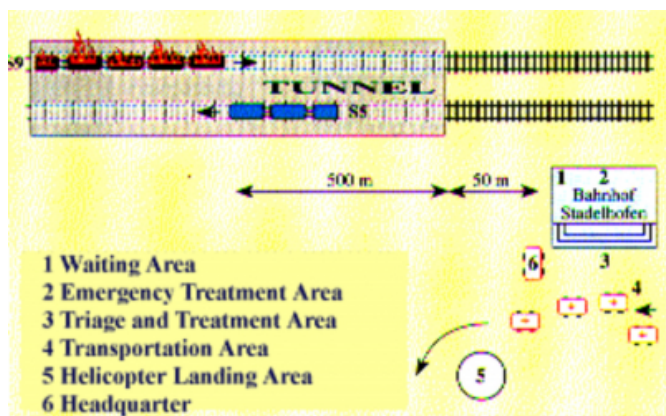
Figure 2

Casualty Handling System CHSTM



More and more patients exit the tunnel. The waiting room of the railroad station is quickly filling with patients and the decision is made to direct further patients to the wide stairway in front of the station.

Figure 3



A mobile trauma room is installed in the small main lobby of

the station, capable of treating 3 severely injured patients at a time. The helicopter team is prepared to act as mobile sorting team MST. Rescue teams from the fire brigade equipped with closed breathing systems are searching the tunnel and trains. At 21:10, approximately 40 minutes after the start of the fire, they report that the damage area is cleared and that all passengers are in safety.

Figure 4

Inside the S-9



THERAPY/TRANSPORTATION

Of the 140 passengers, 58 are diagnosed with smoke inhalation injury. Of these 58, 3 are treated for additional commotio cerebri, 2 for additional knee injury and 1 for an additional ankle fracture. All 58 patients with signs of inhalation injury (coughing, conjunctivitis, shortness of breath, nasopharyngeal pain) are treated with oxygen and bronchodilator sprays. For the duration of approximately 15 minutes a shortage of oxygen and sprays was noted. 40 patients with light symptoms were transported to 5 smaller hospitals in the area of Zuerich. 18 patients with more severe symptoms were transported to the 2 main hospitals of Zuerich (University Hospital and Triemli Hospital). Within 90 minutes all 58 patients were treated and transported to their destination hospitals. This was possible due to the favorable location of the accident (center of the town, good traffic connections, time of low traffic) and the availability of a sufficient amount of transportation vehicles (18 ambulances, 2 emergency physician vehicles, 2 helicopters).

Figure 5

“traffic loop” for ambulances



Figure 6

landing zone for helicopters



PROGRESS

33 patients were treated as inpatients and 25 as outpatients. All outpatients were re-examined the next day by their primary care physicians. 1 inpatient had to be intubated upon arrival at the ER of the hospital because of respiratory insufficiency. He was ventilated with positive endexpiratory pressure PEEP for 48 hours. Extubation was uneventful. 4 patients revealed borderline arterial blood gas analysis and had to undergo bronchoscopy and bronchial lavage. One of these patients had to be intubated and ventilated for 24 hours with PEEP. The recovery of all 4 patients was uneventful. A total of 16 patients showed signs of obstructive lung disease and were treated with respiratory therapy, bed rest, and albuterol spray. One of these 16 patients had a history of pre-existing chronic obstructive

pulmonary disease COPD.

In summary:

- 2 patients - potentially lethal inhalation injury
- 3 patients - severe inhalation injury
- 16 patients - moderate inhalation injury
- 31 patients - light inhalation injury
- 6 patients - additional conventional injuries

CONCLUSION

140 passengers have to be evacuated out of a tunnel. 58 suffer a smoke intoxication and 6 an additional conventional injury. Eighteen months prior to this accident the rescue teams of the town of Zuerich practiced and trained at exactly the same spot. A disaster scenario similar to the actual accident was used as a mockup for disaster relief training. A majority of the involved personnel was now involved in the real disaster relief mission and knew about the location and some of the problems concerning an evacuation from this spot. Distribution of the patients to different hospital was efficient. The fact that many of these hospitals were nearby and that the accident happened at a time of low traffic near main traffic routes in the town of Zuerich was helpful. No problems with the chain of alert were encountered. The Swiss Air Rescue REGA was able to alert and contribute an additional 7 physician within a short period of time. A total of 70 medical professionals were active on the spot (50 paramedics from the emergency services of Zuerich, 15 physicians/paramedics from the REGA and 5 physician from the neighborhood). The Casualty Handling System CHSTM was a success. Triage and distribution was effective. All hospital in and around Zuerich and the media were informed about type and dangers of involved smoke gases.

The following problems were encountered: 1) Identification of medical personnel was not optimal (more special jackets are needed). 2) The headquarters were not marked sufficiently. 3) Several pressure reduction valves on the oxygen bottles were missing. 4) A shortage of bronchodilatory sprays was noted for about 20 minutes. All these problems were addressed at later meetings and consequently solved. Safety issues in the tunnel (missing illumination and water hydrants in the tunnel, better wireless communication system in the tunnels, temporary disabling of the emergency break system [operated by passengers] within the tunnels) are discussed at the level of the

government and the Swiss Railroad SBB.

The most probable cause of the fire was incendiarism.

ACKNOWLEDGMENT

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References

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