



Rescue Trains – Requirements and Limitations

Tunelářské Odpoledne 4/09

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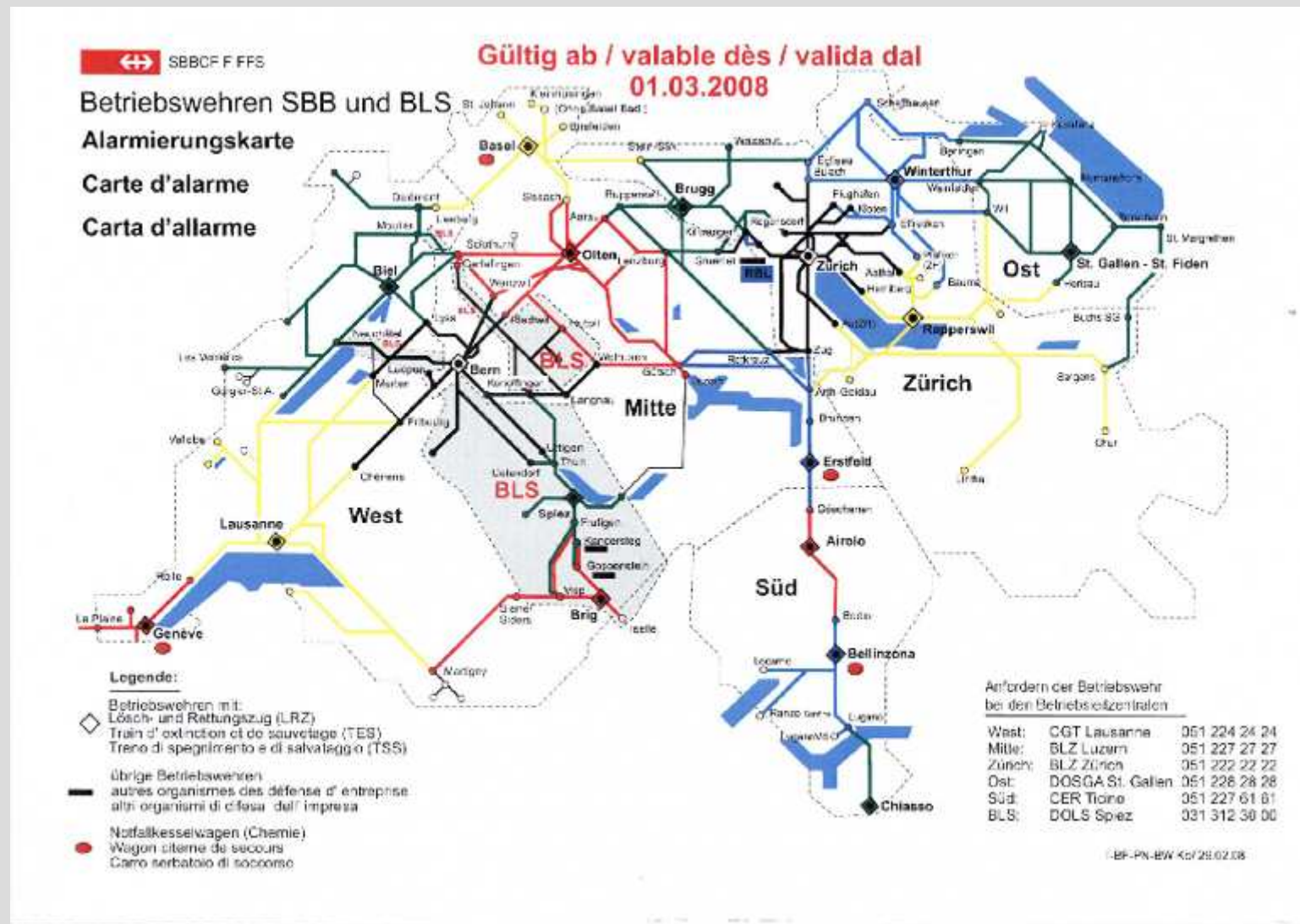
Rescue Trains – Requirements and Limitations

Facts on SBB Infrastructure

- 3011 Kilometers route network
- 7400 Kilometers catenary
- 804 Stations
- 727 control centres to operate 13'642 switches and 31'231 signals
- 307 Tunnels of totaly 259 Kilometers
- 5873 Bridges of totaly 87 Kilometers
- 10 Power stations for the production of electricity
- Total costs for operation and maintenance CHF 1.4 Billion

Rescue Trains – Requirements and Limitations

Faster respond time due to lesser area covered



Rescue Trains – Requirements and Limitations

FFRT's in Switzerland

- 1964** Installation of the first „Tunnel Rescue Train“ in Göschenen used mainly for the Gotthard Tunnel
- 1976** Installation of 10 FFRTs consisting of 1 Fire Fighting-, 1 Rescue- and 1 Utilities- Waggon. Air supply via hose and mask only.
BLS has also installed an identical train in Spiez
- 1978** The „Tunnel Rescue Train“ from Göschenen has been re-designed several times and has finally be stationed in Luzern
- 1996** Delivery of 6 new FFTR with an air tight Rescue Car. Masks no longer needed.
- 2000** 2 Trains on either side of the Veraina Tunnel (RhB)
- 2004** 1 Train each for SBB and BLS
- 2008** 8 Trains for SBB

Rescue Trains – Requirements and Limitations

Evolution of Rescue trains

Performance

1900

1920

1940

1960

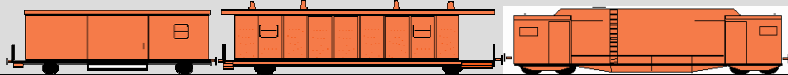
1980

2000



Rescue Trains – Requirements and Limitations

Operational concept of SBB (1996)



Rescue Trains – Requirements and Limitations

The new concept



The FFRT is based on a MPV® comprising a driver cab, a loading deck with container interlocks, and the drive system in the under frame.

Dimensions: 59560/3150/4420mm

Rated power: 4 x 390 kW

Max. speed: 100km/h

It can pull max. 730t

Rescue Trains – Requirements and Limitations

The rescue car



- Airtight container with air lock and air curtain.
- 491'000 litres air stored in 36 cylinders.
- Designed to hold casualties and other passengers to be evacuated.
- Holds 60 persons standing or alternatively 9 persons on stretchers.

MPV and Rescue Container

Rescue Trains – Requirements and Limitations

The equipment car



- The Equipment Car is permanently coupled to the Fire Extinction Car.
- Container with workshop and storage room for fire fighting equipment
- Holds an breathing air compressor to recharge the cylinders
- Electric power generator rated at 50 kW

MPV and Equipment Container

Rescue Trains – Requirements and Limitations

The fire extinction car



- Fire Fighting media are Water/Foam/CAFS
- Tank volume approx. 50'000 litres
- Pump output of 6'000 litres/min at 10 bar allowing jet distance of 60 - 70 meters.
- The fire fighting monitor on the roof can be remotely controlled from the driver's cab.

Tank Waggon with machinery and Cab

Rescue Trains – Requirements and Limitations

Interior of the train



Rescue Trains – Requirements and Limitations

Personell required to run the train

In case of an emergency it needs 4 people to operate the FFRT:

1 Chief of Operation

1 Group leader

2 Drivers

additional fire fighters if necessary



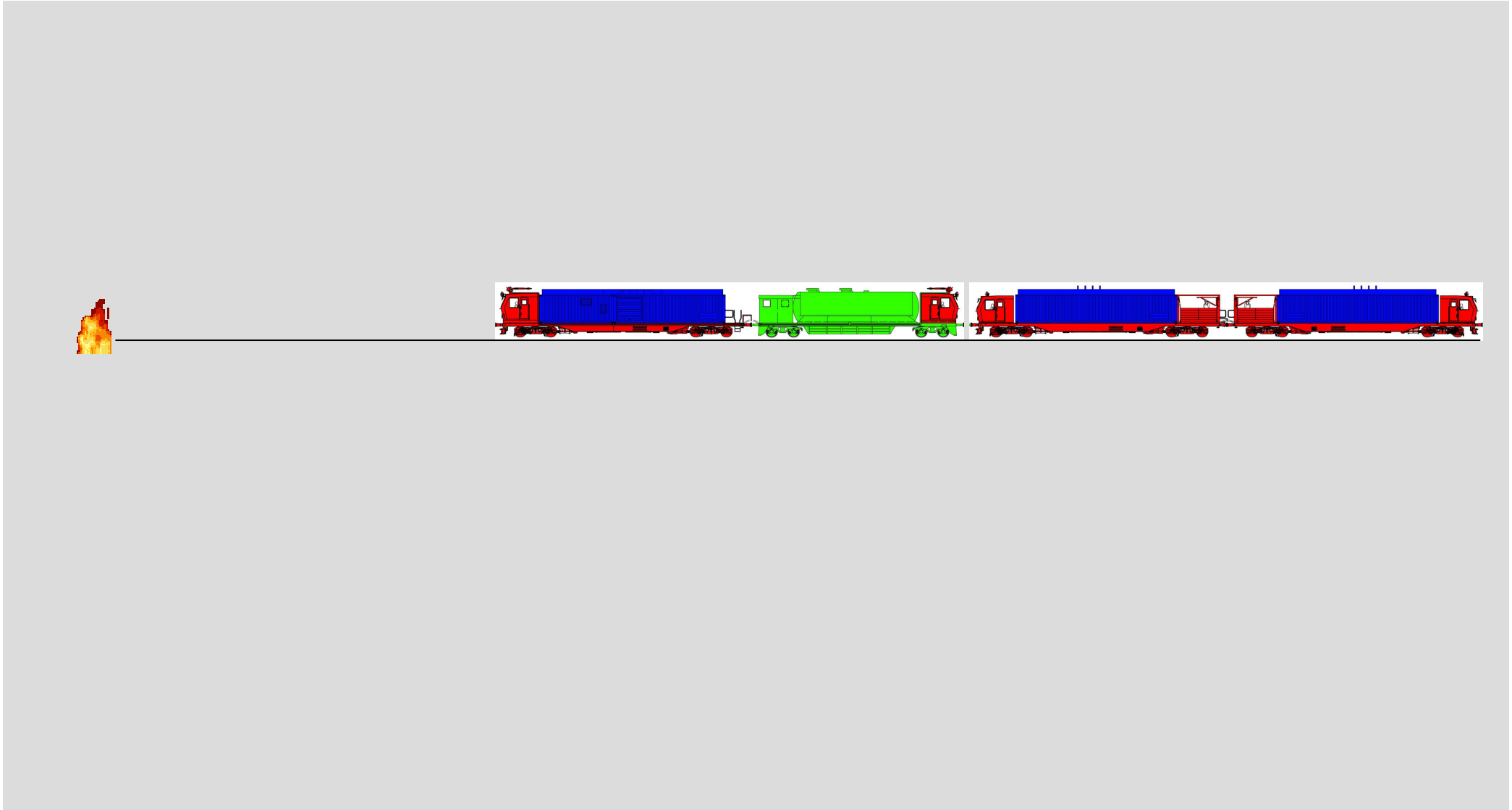
Rescue Trains – Requirements and Limitations

Operational concept of SBB (2004)



Rescue Trains – Requirements and Limitations

Operational concept of BLS (2004)



Rescue Trains – Requirements and Limitations

Organisation and working hours

Organisation

Professional organisation since July 1st, 2006

1 Centre of competence in Berne (3 FTE)

1 Logistic centre in Härkingen (5 FTE)

15 Professional intervention sites (182 FTE)

2 Non-professional intervention sites in Chiasso and RB Limmattal (ca. 40 FTE)

Working hours

24 hours on 365/366 days in Zurich (at the BF Zurich)

All other intervention sites Mo – Fr 06:00 – 20:00. Pikett from 20:00 – 06:00

Rescue Trains – Requirements and Limitations

Dispatch times

- 2 Minutes in Zurich
- 5 Minutes at the other sites from 06:00 – 20:00
- 15 Minutes from 20:00 – 06:00 and Sat/Sun

Rescue Trains – Requirements and Limitations

Costs

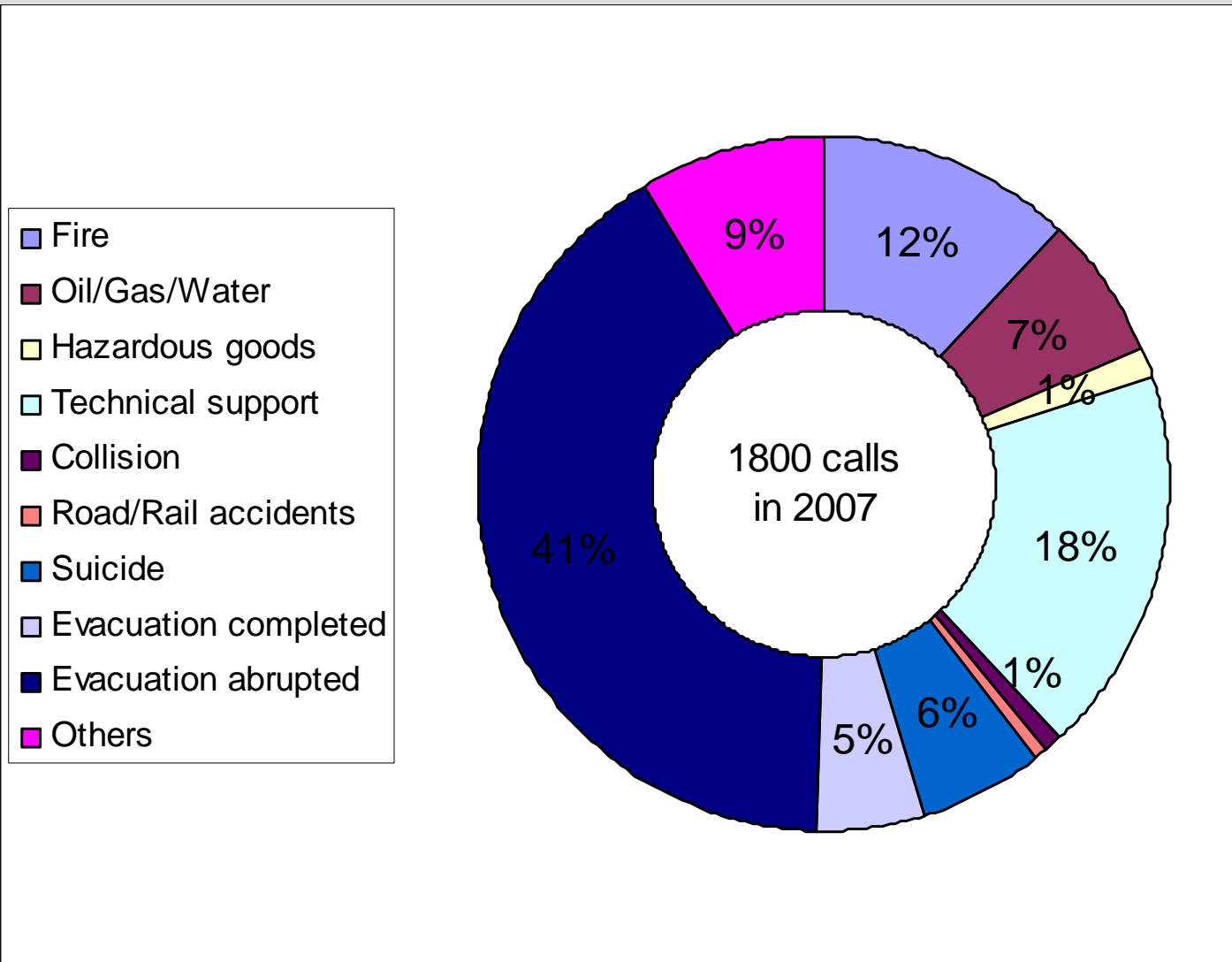
Total costs CHF 30 Mio p.a. (€20 Mio.)

Current investments:

8 new Rescue Trains CHF 70 Mio (€47 Mio.)

Rescue Trains – Requirements and Limitations

Statistics



Rescue Trains – Requirements and Limitations

Limitations

1. Temperature -20°C – 60°C
2. Oxygen content $>15\text{Vol}\%$
3. Evacuation capacity 60 people
4. Defective tracks
5. Availability of resources (personnel, equipment, etc)

Rescue Trains – Requirements and Limitations

Conclusion

1. Growing traffic frequencies and topographic obstacles (i.e. mountains, rivers) make it necessary to construct traffic arteries underground. This also applies to inner urban areas and affects both rail and road traffic. This results in the need for preventive constructional fire protection on the one hand, in order to prevent serious damage occurring to the structure, and on the other, to ensure that users can escape or be rescued
2. Time is crucial. Passengers should ,whenever possible, be able to rescue themselves and make their way to the nearest emergency exit. Suitable rescue means need to be provided to rescue people and limit infrastructure damage.
3. Fire Fighting and Rescue Trains are used to save people, fight fires, deal with accidents involving hazardous freight and to protect property. The major and specific application of the Rescue Trains for this application is to assist in the shortest possible time.
4. FFRTs offer the possibility to operate where road based vehicles don't have access, in particular in mountain areas and rail tunnels.
5. The new concept reduces both investment and maintenance costs.



Thank you for your attention!