



Ministerie van Verkeer en Waterstaat

Composition of DG- trains to prevent a hot BLEVE

11th Meeting working group on
tank on vehicle technology

19 May 2010

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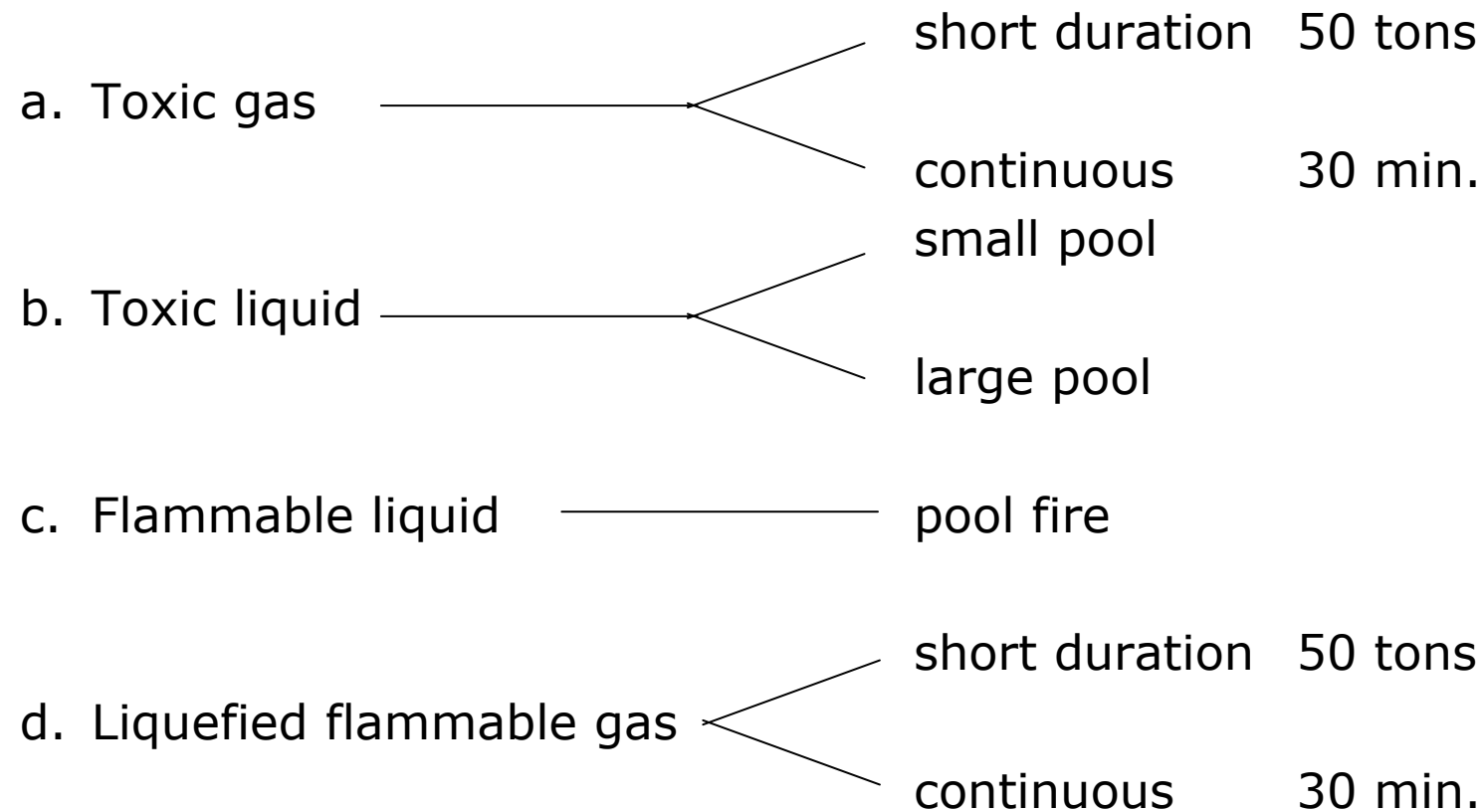


Introduction

- Risk of transport of dangerous goods
 - Individual risk
 - Societal risk
- Calculation using (Dutch) guidelines
- Substances:
 - Liquefied flammable gas (A)
 - Toxic gas (B2/B3)
 - Toxic liquid (D3/D4)
 - Flammable liquid (C3)



Relevant incident scenarios

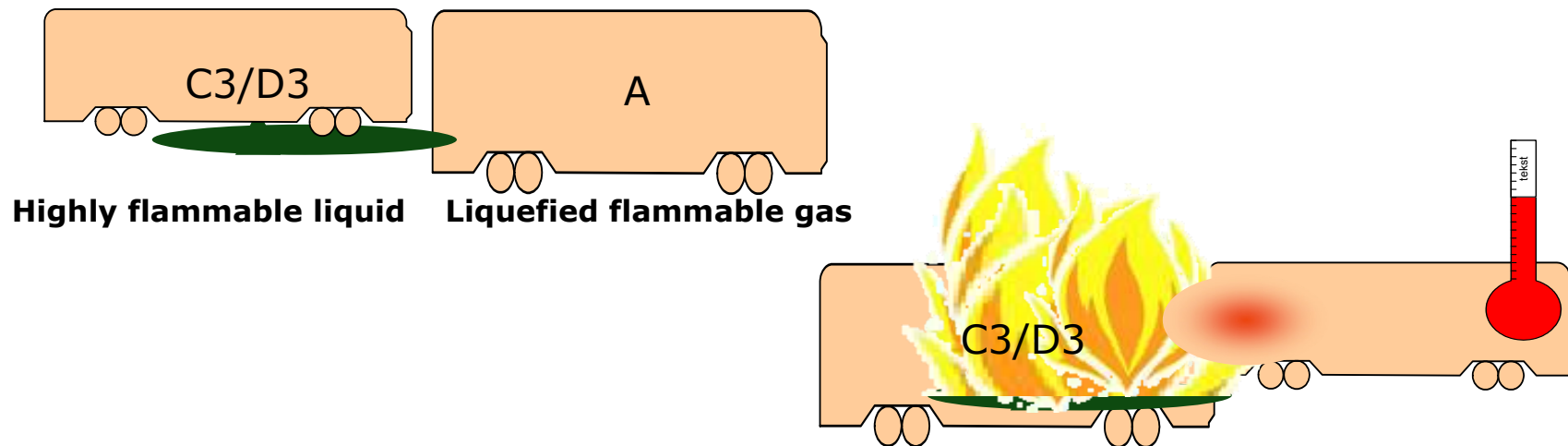




Short duration LFG-scenarios

Possible effects

1. Flash fire or explosion
2. BLEVE (direct ignition)
3. Hot BLEVE (ignition caused by scenario c)





Hot BLEVE

Conditions:

- Train with LFG and LF
- Tank-wagons with LFG and LF next to each other
- Not enough time for effective measures
- Trains with only LFG are excluded



Effect of a BLEVE

	Hot BLEVE	Cold BLEVE
• 100% Fatalities	200 meter	140 meter
• 1% Fatalities	450 meter	380 meter

Area in which:

- 100% Fatalities hot vs. cold $\approx 2!$ (higher societal risk)
- 1% Fatalities hot vs. cold $\approx 1,4!$



Influence of a hot BLEVE on risk level

- Basic rail network
- Risk vs. spatial planning
- Societal risk is caused by LFG, especially a hot BLEVE
- SR far beyond the acceptable risk on certain tracks

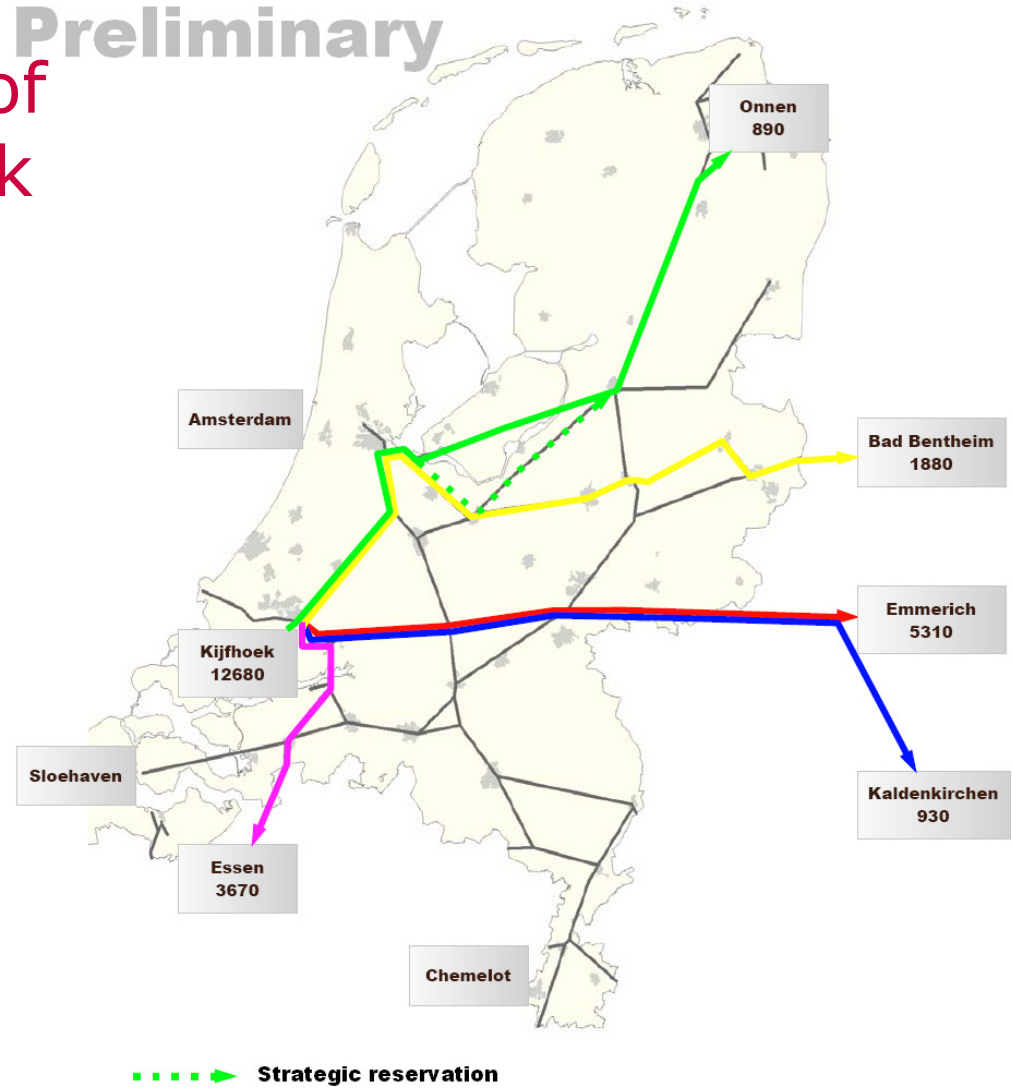


Preliminary Transportation routes of LFG with origin Sloehaven



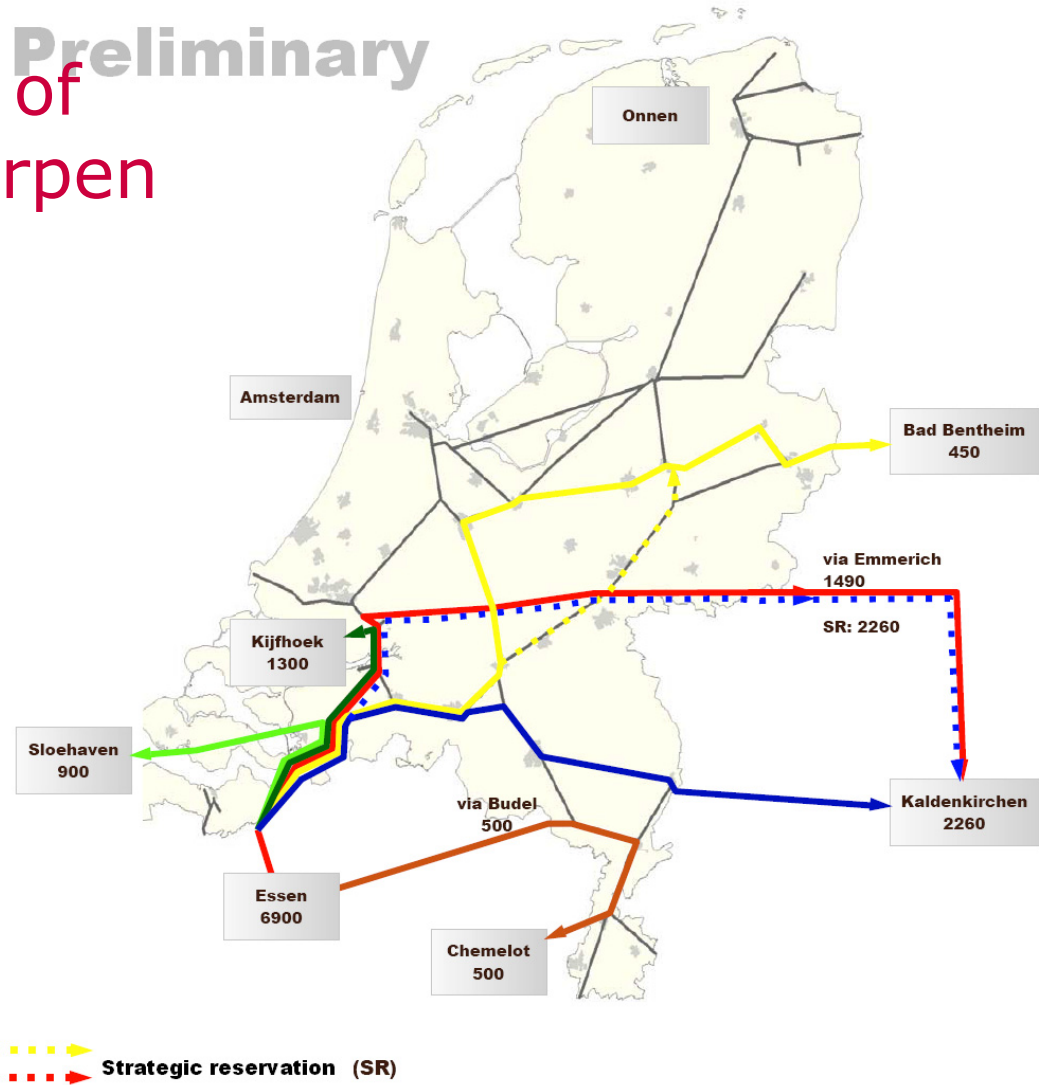


Preliminary Transportation routes of LFG with origin Kijfhoek



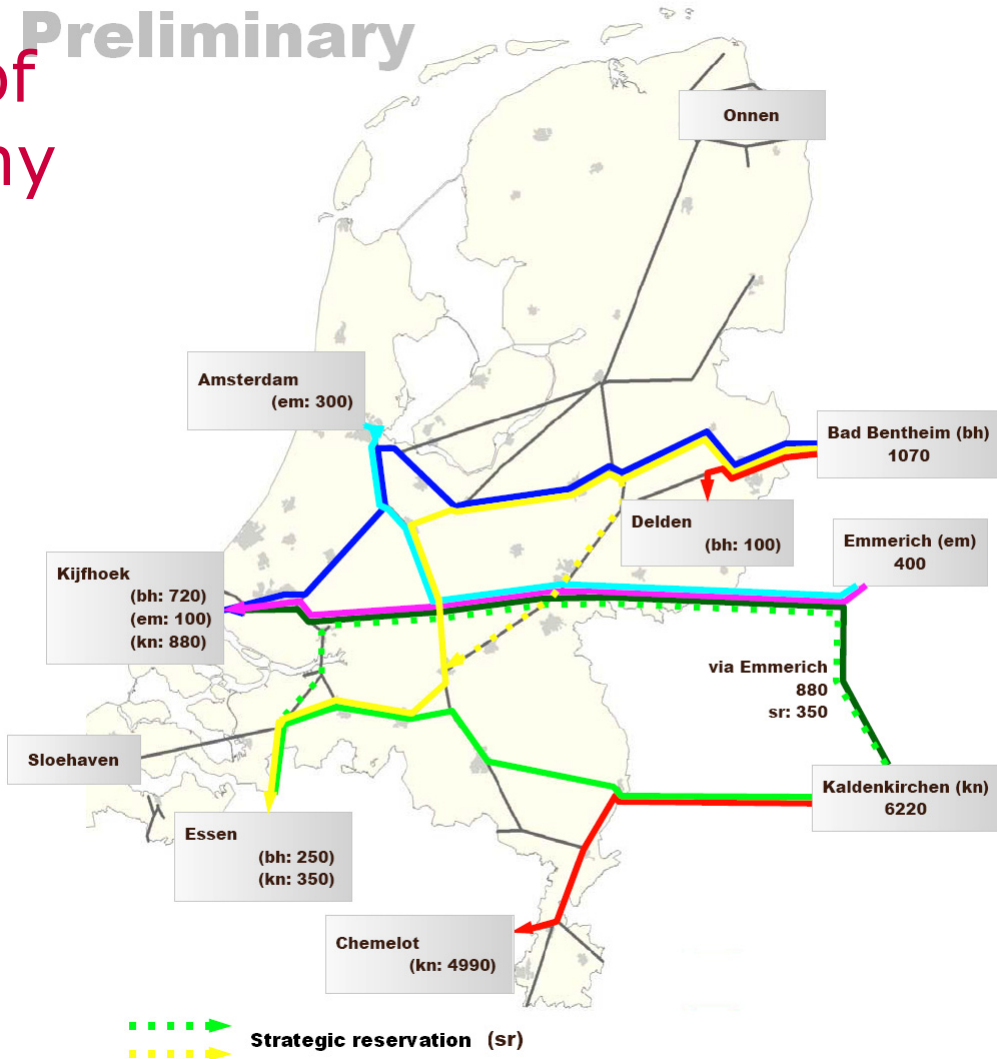


Preliminary Transportation routes of LFG with origin Antwerpen





Transportation routes of LFG with origin Germany





Large influence of a hot BLEVE on the societal risk

- Pressure to reduce the risk
- Commitment of parties involved to compose trains hot BLEVE proof (HBP)
- Initiative by ministries and transport sector



Realization hot BLEVE proof transportation goals

Measure	HBP minimal	HBP medium	HBP maximal
1. HBP containers NL Abroad	100% 0%	100% 80%	100% 100%
2. HBP composing at Kijfhoek	50%	80%	100%
3. HBP composing at location of origin	50%	90%	100%
4. Rerouting over the Betuweroute	Not relevant		
5. International aspects/agreement	0%	50%	100%



Results societal risk

	HBP minimal	HBP medium	HBP maximal
Number of kilometers			
1 < SR < 3	98	74	48
3 < SR < 10	69	46	27
SR > 10 x acceptable	40	8	1
Total SR > 1	207	128	76



Conclusion

- Hot BLEVE proof transport reduces the societal risk significantly
- Contribution of transport from abroad is also important for risk reduction and realization of the basic rail network



Questions

Therefore: Please share your view with us on the topic of composing trains hot Blevé proof

- feasibility
- experience