



NORSK LUFTAMBULANSE
NORWEGIAN AIR AMBULANCE



Incident title: Truck and tunnel fire

Reporter

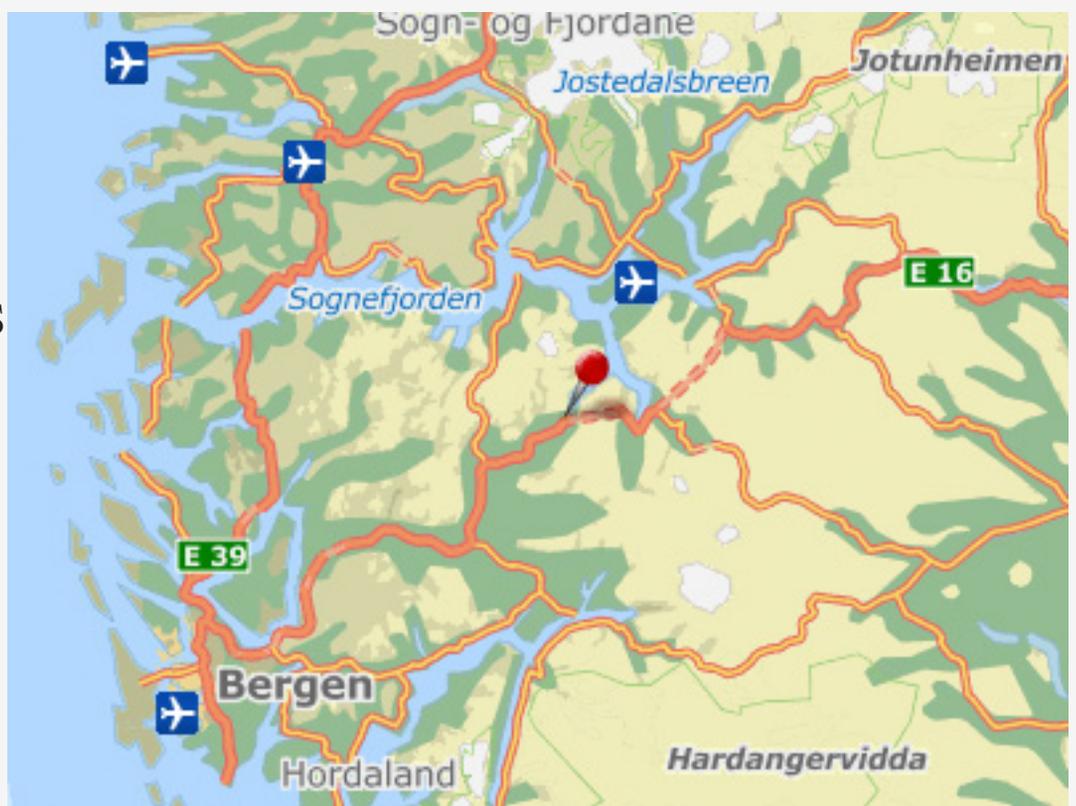
Dr. Jon-kenneth Heltne

MD

Haukeland University Hospital

Role in incident: Consultant at the Air Ambulance, one of several HEMS physicians on scene. Took part in the rescue efforts, triage and treatment of victims from Gudvanga tunnel fire.

Incident location



Summary

Country:  Norway

Truck and tunnel fire in Gudvanga tunnel in Western Norway. The Gudvanga tunnel is the second longest tunnel (11 kilometers) along the ferry free Europe road 16 between Oslo and Bergen. The incident happened in a sparsely populated area 40 kilometers from Voss with 14000 inhabitants, nearest large city Bergen has a population of about 300 000 people. Nearby several beautiful tourist attractions and fjords. Traffic authorities measured 1995 vehicles per 24 hours in average. There were 66 casualties, all of them taken to nearby hospitals some with serious inhalation injuries, but no fatalities. Although the biggest tunnel fire seen so far it has been hailed a miracle that there were no deaths. Emergency services communicated via old analogue network and local coverage in the area was poor. Challenges were communication systems not working inside tunnel and 2 evacuation sites, one on each side of tunnel reporting to 2 different dispatch centers. Effective triage by HEMS, appropriate use of transportation and several hospitals involved in patient distribution made the evacuation successful.

EMS background

1. Was an EMS coordinating centre (the centre responsible for dispatching and coordinating EMS units on-scene) available in the affected country/ies before the incident? *

Yes

2. Does a dialling number to Emergency Services exist? *

Yes

2-1. Is there a single and unique dialling number to EMS or one common dialling number for all Emergency Services (fire, police and EMS)? *

A single and unique dialling number

3. Can a major incident be declared directly by the person receiving an alert at the EMS coordinating centre? *

Yes

4. What is the background of staff in the every-day/normal staffing of EMS services? *

- Basic Life Support by non-EMS professional
- Basic Life Support by EMS professionals, non-physician
- Advanced Life Support by EMS professional, non-physician
- Advanced Life Support On-scene by Physician

5. What other resources are routinely available to assist the EMS service in a normal setting? *

- Fire brigade
- Police
- Coast guard
- Other / Unknown

5-3. Please specify other resources that are routinely available or leave blank if unknown.

rescue climbers, rescue divers and avalanche rescue persons with dog, first responders

6. Other resources that can be mobilized in a major incident *

- Fire brigade
- Police
- Voluntary organizations
- Coast guard
- Military
- Civil protection

6-1. Please specify which voluntary organizations are available *	first responders, rescue diver/climbers/
6-2. Please specify if the voluntary organizations available require authorization from police or other authorities to participate in the response phase *	no
6-3. Please specify other resources that can be mobilized or leave blank if unknown	rescue dog for Avalanche incidents
7-1. Are there any regional hospital/s with trauma specialty that exists within the EMS catchment system that was affected by the major incident? *	Yes
7-1.1. Please state the number of regional hospital/s with trauma specialty within the EMS catchment system that was affected by the major incident *	1
7-1.2. Is the number given above exact or estimated? *	Exact
7-2. Are there any regional hospital/s without trauma specialty that exists within the EMS catchment system that was affected by the major incident? *	No
7-3. Are there any local hospital/s without trauma specialty that exists within the EMS catchment system that was affected by the major incident? *	Yes
7-3.1. Please state the number of local hospitals without trauma specialty within the EMS catchment system that was affected by the major incident *	1
7-3.2. Is the number given above exact or estimated? *	Exact
7-4. Are there any other type of hospital/s that exists within the EMS catchment system that was affected by the major incident? *	Yes
7-4.1. Please state the number of other type of hospitals within the EMS catchment system that was affected by the major incident *	1
7-4.2. Is the number given above exact or estimated? *	Exact

7-4.3. Please specify what other type of hospital/s exist within the EMS catchment system that was affected by the major incident. *

local hospital With some trauma specialty

8-1. Is a pre-hospital on-scene triage system in use daily on a national level? *

No

8-2. Is a pre-hospital on-scene triage system in use daily on regional levels? *

Unknown

9-1. Is a pre-hospital on-scene triage system for major incidents in use on a national level? *

Unknown

9-2. Is a pre-hospital on-scene triage system for major incidents in use on regional levels? *

Yes

10. Does the pre-hospital on-scene triage system for major incidents include direct tagging/labelling of patients? *

Yes

11. For those employees within the pre-hospital EMS system who are intended to work on-scene: is major incident training mandatory? *

No

Incident characteristics

12. What was the mechanism/external factor that caused the incident? *

- Transport accident
- Fire

12-3. Is this incident coupled to another incident? *

No

13. What was the location of the incident scene? *

- Rural/countryside area
- Road
- Other / Unknown

13-1. Please specify other type of location of incident scene or leave blank if unknown:

tunnel fire

14-1. Did the EMS make use of wheeled vehicles to access patients for treatment at incident scene? *

Yes

14-1.1. Were there any delays in accessing patients by wheeled vehicles? *	Yes
14-1.2. Please describe reasons for delay, which could include reasons such as: security issues, congested roads due to traffic, weather conditions: *	Security, congested tunnel due to heavy/possible toxic smoke
14-2. Did the EMS make use of railway system to access patients for treatment at incident scene? *	No
14-3. Did the EMS make use of air transport to access patients for treatment at incident scene? *	Yes
14-3.1. Were there any delays in accessing patients by air? *	No
14-4. Did the EMS make use of boat transport to access patients for treatment at incident scene? *	No
14-5. Did the EMS access patients for treatment at incident scene by foot? *	Yes
14-5.1. Were there any delays in accessing patients by foot? *	Yes
14-5.2. Please describe reasons for delay, which could include reasons such as: security issues, congested roads due to traffic, weather conditions: *	Heavy smoke/security
14-6. Did the EMS make use of other means to access patients for treatment at incident scene? *	Yes
14-6.1. Please specify what other means the EMS made use of to access patients for treatment at incident scene *	cars involved in fire/tunnel, quad bike (4 Wheel) by fire dept.
14-6.2. Were there any delays in accessing patients as specified in 14-6.1.? *	Yes
14-6.3. Please describe reasons for delay, which could include reasons such as: security issues, congested roads due to traffic, weather conditions: *	Heavy smoke
15-1. Did the EMS make use of wheeled vehicles to evacuate patients from the incident scene? *	Yes
15-1.1. Were there any delays in evacuating patients by wheeled vehicles? *	Yes
15-1.2. Please describe reasons for delay,	traffic, few ambulance resources available initially

which could include reasons such as: security issues, congested roads due to traffic, weather conditions: *

15-2. Did the EMS make use of railway system to evacuate patients from the incident scene? * No

15-3. Did the EMS make use of air transport to evacuate patients from the incident scene? * Yes

15-3.1. Were there any delays in evacuating patients by air? * No

15-4. Did the EMS make use of boat transport to evacuate patients from the incident scene? * No

15-5. Did the EMS evacuate patients from the incident scene on foot? * No

15-6. Did the EMS make use of other means to evacuate patients from the incident scene? * Yes

15-6.1. Please describe how patients were evacuated by other means? * bus/minibus

15-6.2. Were there any delays in evacuating patients as specified in 15-6.1.? * No

16-1. Was there damage to electrical power that affected EMS response? * Yes

16-1.2. Please specify the damage to electrical power and how it affected EMS response * Due to the fire in the truck inside the tunnel there was a meltdown of the electrical system that destroyed light in the tunnel at the site of fire. As a consequence there was not enough power to turn on the fans in the tunnel. The usual fire extinguishers (portable ones) were working, but not effectively. Access to the tunnel was denied due to heavy smoke in the whole tunnel.

16-2. Was there damage to telecommunication that affected EMS response? * Yes

16-2.1. Please specify damage to telecommunication and how it affected EMS response * telecommunications system in tunnel not working due to meltdown. In addition the incident site was located between mountains resulting in poor contact to mobile net.

16-3. Was there damage to other modes of communications that affected EMS response? * No

16-4. Was there damage to road that Yes

affected EMS response?*

16-4.1. Please specify damage to road and how it affected EMS response *

truck on fire blocked the road in the middle of the tunnel

16-5. Was there damage to rail that affected EMS response? *

No

16-6. Was there damage to the EMS or health structure that affected EMS response? *

No

16-7. Was there other damage to infrastructure that affected EMS response? *

Yes

16-7.1. Please specify what kind of other damage to infrastructure occurred that affected the EMS response, and how the response was affected by it. *

Fans in tunnel are supposed to turn on when there is a fire to push the smoke to a defined opening. These did not work properly during this major incident due to the fire.

17. How many sites required separate EMS infrastructure (such as on-scene leadership and casualty clearing stations) in the response phase? *

2

17-1. Is the number given above exact or estimated? *

Exact

18-1. Was ongoing violence or risk of further violence a threat to rescuers on scene? *

No

18-2. Was fire a threat to rescuers on scene? *

Yes

18-2.2. Please specify the fire and how this affected the rescuers on scene *

tunnelfire in 11 kilometer long tunnel, primarily dark smoke, irritating the airways for rescuers

18-3. Was collapsing building/s a threat to rescuers on scene? *

No

18-4. Was climate a threat to rescuers on scene? *

Yes

18-4.2. Please specify the climate and how this affected the rescuers on scene *

10 degrees, windy

18-5. Was lack of electricity a threat to rescuers on scene? *

Yes

18-5.2. Please specify the lack of electricity and how this affected the rescuers on scene *

no light for patients walking for up to 8 km in dark tunnel

18-6. Was lack of water/food a threat to rescuers on scene? *

No

18-7. Were other hazard/s a threat to rescuers on scene? *	Yes
18-7.1. Please specify the other hazards and how these affected the rescuers on scene *	possible explosion, burns, inhalational injuries
19-1. Was on going violence or risk of further violence a threat to patients on scene? *	No
18-2. Was fire a threat to patients on scene? *	Yes
19-2.2. Please specify the fire and how this affected the patients on scene *	Heavy smoke in tunnelfire, smoke inhalational injuries
19-3. Was collapsing building/s a threat to patients on scene? *	No
19-4. Was climate a threat to patients on scene? *	No
19-5. Was lack of electricity a threat to patients on scene? *	Yes
19-5.2. Please specify the lack of electricity and how this affected the patients on scene *	no electrical light in tunnel, no sight
19-6. Was lack of lack of water/food a threat to patients on scene? *	No
19-7. Were other hazard/s a threat to patients on scene? *	Yes
19-7.1. Please specify the hazards and how this affected the patients on scene *	possible explosions

EMS response data

20-1. Did the first medical team to arrive on-scene assume the role of medical commander? *	Yes
20-1.1. If possible, please provide the time the first medical team to arrive on-scene assumed the role of medical commander	2013-08-05
Hour	13
Minutes	01

20-1.2. Is the time given above exact or estimated? *	Exact
20-2. Did the first medical team to arrive on-scene begin to make an assessment of scene safety? *	Yes
20-2.1. If possible, please provide the time the first medical team to arrive on-scene begun to make an assessment of scene safety	2013-08-05
Hour	13
Minutes	02
20-2.2. Is the time given above exact or estimated? *	Exact
20-3. Did the first medical team to arrive on-scene communicate a situation report to EMS coordinating centre? *	Yes
20-3.1. Was this done according to a pre-existing system or mnemonic? (E.g. METHANE)? *	No
20-3.3. If possible, please provide the time the first medical team to arrive on-scene communicated a performed situation report to EMS coordinating centre	2013-08-05
Hour	13
Minutes	15
20-3.4. Is the time given above exact or estimated? *	Exact
20-4. Did the first medical team to arrive on-scene request additional resources? *	Yes
20-4.1. Please specify what type of resources where requested *	ambulances, and personell, blankets, shelter, oxygen bottles and masks
20-4.2. If possible, please provide the time the first medical team to arrive on-scene requested additional resources	2013-08-05
Hour	13
Minutes	10
20-4.3. Is the time given above exact or estimated? *	Exact
20-5. Did the first medical team to arrive on-scene initiate any safety related	Yes

actions? *

20-5.1. Please describe the safety related actions initiated by the first medical team to arrive on-scene *

in cooperation with police an expanded perimeter for spectators was set up, a bus/minibus was requested and a suitable evacuation site and ambulance exit point was pointed out.

20-5.2. If possible, please provide the time the first medical team to arrive on-scene initiated any safety related actions

2013-08-05

Hour

13

Minutes

05

20-5.3. Is the time given above exact or estimated? *

Estimated

20-6. Did the first medical team to arrive on-scene delegate responsibility for other tasks on scene? *

Yes

20-6.1. Please describe which other tasks the first medical team to arrive on-scene delegated responsibility for *

evacuation of patients from tunnel by fire brigade, involved in pointing out a suitable evacuation site. There was an initial traffic jam, this was discussed with police and a change of traffic direction was performed by the police and truck drivers.

20-6.2. If possible, please provide the time the first medical team to arrive on-scene delegated the responsibility

2013-08-05

Hour

13

Minutes

10

20-6.3. Is the time given above exact or estimated? *

Estimated

20-7. What kind of medical personnel assumed the role of on-scene medical commander? *

ambulance personnel and anesthesiologist

Hour

13

Minutes

15

21-1. Additional medical staff who responded to the major incident was summoned by: *

- First medical team to arrive on-scene
- On-scene medical commander
- EMS coordinating centre

21-2. Medical pre-hospital resources used in the major incident response was coordinated by: *

- First medical team to arrive on-scene
- On-scene medical commander

21-3. Who was responsible for briefing medical staff of the situation during the pre-hospital major incident medical response? *	On-scene medical commander
22-1. Was communication achieved between medical personnel at the incident? *	Yes
22-1.1. Please state at which time communication between medical personnel at the incident was initiated	2013-08-05
Hour	13
Minutes	04
22-1.2. This communication was managed by: *	<ul style="list-style-type: none"> • First medical team to arrive on-scene • On-scene medical commander
22-2. Was communication achieved between the different task forces involved (police, fire fighters, health, political leaders etc)? *	Yes, between some of the task forces
22-2.1 Please state at which time communication between all of the task forces was initiated	2013-08-05
Hour	13
Minutes	10
22-2.3. Please specify between whom it was/was not achieved and between whom it should have been achieved *	not achieved between personnel on other side of tunnel and our side of tunnel. In particular police and fire brigade were difficult to reach in addition to ambulance personnel. Air Ambulance/HEMS physicians kept in touch via personal cellular phones, this was planned upon landing at the incident site. Other communications were not well functioning due to overload.
22-3. Was communication achieved between the scene and the EMS coordinating centre? *	Yes
22-3.1 Please state at which time communication between the scene and EMS coordinating centre was initiated	2013-08-05
Hour	13
Minutes	12
22-3.2. This communication was managed	<ul style="list-style-type: none"> • First medical team to arrive on-scene

by: * • On-scene medical commander

22-4. Was communication achieved between the scene and receiving hospital/s? * Yes

22-4.1 Please state at which time communication between the scene and receiving hospital/s was initiated 2013-08-05

Hour 13

Minutes 15

22-4.2. This communication was managed by: *

- First medical team to arrive on-scene
- On-scene medical commander

22-5. Was communication achieved between medical response personnel and the general public? * Unknown

23. Describe the structure of the medical incident command during the major incident *

senior Medical officer/HEMS physician on site was in command of operations together with police and fire commanders. Additional paramedic functioned as coordinator.

24-1. Was VHF radio used for communication during the major incident response? * Yes

24-1.1. Were there any failures with the VHF radio communication during the incident response? * Yes

24-1.2. Please specify VHF radio failure * random connections, overload, different systems

24-2. Was Tetra radio used for communication during the incident response? * No

24-3. Were other type of radios used for communication during the incident response? * Unknown

24-4. Were mobile phones used for communication during the incident response? * Yes

24-4.1. Were there any mobile phone failures during the incident response? * Yes

24-4.2. Please specify mobile phone failure overload at some stages

* 24-5. Was land line telephone used for communication during the incident response? *	Unknown
24-6. Was communication to the public (such as television, social media) used during the incident response? *	Yes
24-6.1. Please specify mode of communication *	facebook and twitter used by victims at the site
24-6.2. Were there any failures to communication means specified in 24-6.1? *	Unknown
24-7. Were other means of communication used during the incident response? *	No
25. Please state communication systems in use on a daily basis *	<ul style="list-style-type: none"> • VHF radio • Mobile phone
26-1. Incident time *	2013-08-05
Hour *	12
Minutes *	09
26-1.1. Is the time given above exact or estimated? *	Estimated
26-2. Emergency Medical Service (EMS) notification *	2013-08-05
Hour *	12
Minutes *	11
26-2.1. Is the time given above exact or estimated? *	Exact
26-3. First EMS arrival *	2013-08-05
Hour *	12
Minutes *	58
26-3.1. Is the time given above exact or estimated? *	Exact
26-4. Major incident declared *	2013-08-05
Hour *	13
Minutes *	15

26-4.1. Is the time given above exact or estimated? *	Estimated
26-5. Medical command established *	2013-08-05
Hour *	13
Minutes *	02
26-5.1. Is the time given above exact or estimated? *	Exact
26-6. Time of first meeting between police / fire / medical command *	2013-08-05
Hour *	13
Minutes *	05
26-6.1. Is the time given above exact or estimated? *	Exact
26-7. First patient evacuated by EMS (time of leaving incident scene) *	2013-08-05
Hour *	13
Minutes *	35
26-7.1. Is the time given above exact or estimated? *	Exact
26-8. Last patient evacuated by EMS (time of leaving incident scene) *	2013-08-05
Hour *	15
Minutes *	10
26-8.1. Is the time given above exact or estimated? *	Exact
26-9. First patient arriving in hospital *	2013-08-05
Hour *	14
Minutes *	15
26-9.1. Is the time given above exact or estimated? *	Exact
26-10. Last patient arriving in hospital *	2013-08-05
Hour *	16
Minutes *	00
26-10.1. Is the time given above exact or estimated? *	Estimated

27-1. Were there any delays in the timings mentioned in question 26? *	Yes
27-1.1. Please describe delays in timings	due to 2 different incident sites, one at each side of the tunnel, there was delayed evacuation from one side. The first helicopter crew transported the first 2 patients to the closest hospital, after they left more victims appeared from the tunnel opening now without HEMS available for further evacuation.
28-1. Were lay persons with no field care education present? *	Yes
28-1.1. Please state number of persons/personnel *	50
28-1.2. Is the number given above exact or estimated? *	Estimated
28-2. Were non-EMS personnel with basic life support (BLS) competency present? *	Yes
28-2.1. Please state number of persons/personnel *	10
28-2.2. Is the number given above exact or estimated? *	Estimated
28-3. Were EMS professionals who were not physicians, but with BLS competency present? *	Yes
28-3.1. Please state number of persons/personnel *	6
28-3.2. Is the number given above exact or estimated? *	Estimated
28-4. Were EMS professionals who were not physicians, but with Advanced Life Support (ALS) competency present? *	Yes
28-4.1. Please state number of persons/personnel *	2
28-4.2. Is the number given above exact or estimated? *	Exact
28-5. Were on-scene physicians with ALS competency present? *	Yes
28-5.1. Please state number of persons/personnel *	1
28-5.2. Is the number given above exact or estimated? *	Exact
28-6. Were other type of personnel/persons present at the incident scene? *	Yes

28-6.1. Please specify other *	first responders (who were not on call), medical students and military personnel.
28-6.2. Please state number of persons/personnel *	4
28-6.3. Is the number given above exact or estimated? *	Estimated
29-1. EMS transport: Where there any EMS vehicles present at scene during the early EMS response to the incident? *	Yes
29-1.1. If possible, please specify the approximate numbers of EMS vehicles available at the incident scene. Returning EMS vehicles are to be counted only once. Please provide time of arrival for the first EMS vehicle.	8
Date	2013-08-05
Hour	12
Minutes	59
29-2. EMS transport: Where there any EMS helicopters present at scene during the early EMS response to the incident? *	Yes
29-2.1. If possible, please specify the approximate numbers of EMS helicopters available at the incident scene. Returning EMS helicopters are to be counted only once. Please provide time of arrival for the first EMS helicopter.	3
Date	2013-08-05
Hour	13
Minutes	04
29-3. EMS transport: Where there any EMS boats present at scene during the early EMS response to the incident? *	No
29-4. EMS transport: Where there other EMS transportation units present at scene during the early EMS response to the incident? *	Unknown
29-5. Civilian transport: Where there any civilian vehicles present at scene during the early EMS response to the incident? *	Yes
29-5.1. If possible, please specify the approximate numbers of civilian vehicles	60 or more

available at the incident scene. Returning civilian vehicles are to be counted only once. Please provide time of arrival for the first civilian vehicle.

29-6. Civilian transport: Where there any civilian helicopters present at scene during the early EMS response to the incident? *

No

29-7. Civilian transport: Where there any civilian boats present at scene during the early EMS response to the incident? *

No

29-8. Civilian transport: Where there other civilian transportation units present at scene during the early EMS response to the incident? *

Yes

29-8.1. Please specify type of other civilian transport *

bus and taxi

29-8.2. If possible, please specify the approximate numbers of other civilian transportation units available at the incident scene. Returning civilian transportation units are to be counted only once. Please provide time of arrival for the first other civilian transportation unit.

4

29-9. Other emergency services: Where there any other emergency vehicles present at scene during the early EMS response to the incident? *

Yes

29-9.1. If possible, please specify the approximate numbers of other emergency vehicles available at the incident scene. Returning other emergency vehicles are to be counted only once. Please provide time of arrival for the first other emergency vehicle.

2

29-10. Other emergency services: Where there any other emergency helicopters present at scene during the early EMS response to the incident? *

Yes

29-10.1. If possible, please specify the approximate numbers of other emergency helicopters available at the incident scene. Returning other emergency helicopters are to be counted only once. Please provide time of arrival for the first other emergency helicopter.

1

29-11. Other emergency services: Where there any other emergency boats present

No

at scene during the early EMS response to the incident? *

29-12. Other emergency services: Where there any other means of transport present at scene during the early EMS response to the incident? *

Yes

29-12.1. Please specify other type of other emergency service transport *

Quad bikes from the fire dept.

29-12.1. If possible, please specify the approximate numbers of other means of transport available at the incident scene. Returning other means of transport are to be counted only once. Please provide time of arrival for the first other means of transport.

1

30-1. Was there any equipment available on-scene to provide care for patients exposed to hazardous materials? *

Yes

30-1.1. Please specify equipment *

water for cleaning and cooling

30-1.2. If possible, please indicate the time point when equipment was ready for use at the scene

2013-08-05

Hour

13

Minutes

05

30-2. Was there any search and rescue equipment available on-scene? *

Yes

30-2.1. Please specify equipment *

lights, head lamps, light marker for triage purposes,

30-3. Was there any alpine/rescue equipment available on-scene? *

No

30-4. Was equipment from the coast guard available on-scene? *

No

30-5. Were support vehicles available on-scene? *

Yes

30-5.1. Please specify equipment *

civil defense was present after 2 hrs with tents, heating, light and food

30-5.2. If possible, please indicate the time point when equipment was ready for use at the scene

2013-08-05

Hour

14

Minutes

30

30-6. Was other type of equipment

Yes

available on-scene enabling EMS to do their job? *

30-6.1. Please specify equipment * water bottles, blankets and extra oxygen

30-6.2. If possible, please indicate the time point when equipment was ready for use at the scene 2013-08-05

Hour 13

Minutes 26

31. Number of hospitals receiving patients * 3

32-1.1. Distance from incident scene where pre-hospital medical response was initiated to hospital I by air line in kilometers * 31-50

32-1.2. Type of hospital I * Local hospital without trauma specialty

32-1.3. Were patients conveyed to this hospital by EMS? * Yes

32-1.3.1. Were six or more patients conveyed to this hospital by EMS? * Yes

32-1.3.2. Numbers of patients conveyed to this hospital by EMS * 20

32-1.4. Were patients conveyed to this hospital by non-EMS? * No

32-1.5. Were patients conveyed in the first hour after the incident? * No

32-1.6. Were patients conveyed between 1 and 2 hours after the incident? * Yes

32-1.6.1. Were six or more patients conveyed between 1 and 2 hours after the incident? * Yes

32-1.6.2. Number of patients conveyed between 1 and 2 hours after the incident * 8

32-1.7. Were patients conveyed between 2 and 3 hours after the incident? * Yes

32-1.7.1. Were six or more patients conveyed between 2 and 3 hours after the incident? * Yes

32-1.7.2. Number of patients conveyed between 2 and 3 hours after the incident * 12

32-1.8. Were patients conveyed between 3 and 4 hours after the incident? * No

32-1.9. Were patients conveyed after 4 hours or more following the incident? *	No
32-1.10. Does a pre-existing patient distribution plan exist? *	Unknown
32-1.11. Please explain any pre-existing patient distribution plan/s and give any comments on decision making, delays etc. *	3 hospitals, but only 2 reachable from one side of tunnel, other hospital on the other side, decision that all not seriously injured to the 2 nearest local hosp primarily
32-2.1. Distance from incident scene where pre-hospital medical response was initiated to hospital II by air line in kilometers *	11-30
32-2.2. Type of hospital II *	Local hospital without trauma specialty
32-2.3. Were patients conveyed to this hospital by EMS? *	Yes
32-2.3.1. Were six or more patients conveyed to this hospital by EMS? *	Yes
32-2.3.2. Numbers of patients conveyed to this hospital by EMS *	42
32-2.4. Were patients conveyed to this hospital by non-EMS? *	Yes
32-2.4.1. Were six or more patients conveyed to this hospital by non-EMS? *	Yes
32-2.4.2. Numbers of patients conveyed to this hospital by non-EMS *	10
32-2.5. Were patients conveyed in the first hour after the incident? *	No
32-2.6. Were patients conveyed between 1 and 2 hours after the incident? *	Yes
32-2.6.1. Were six or more patients conveyed between 1 and 2 hours after the incident? *	No
32-2.7. Were patients conveyed between 2 and 3 hours after the incident? *	Yes
32-2.7.1. Were six or more patients conveyed between 2 and 3 hours after the incident? *	Yes
32-2.7.2. Number of patients conveyed between 2 and 3 hours after the incident *	20
32-2.8. Were patients conveyed between 3 and 4 hours after the incident? *	Yes

32-2.8.1. Were six or more patients conveyed between 3 and 4 hours after the incident? *	Yes
32-2.8.2. Number of patients conveyed between 3 and 4 hours after the incident *	18
32-2.9. Were patients conveyed after 4 hours or more following the incident? *	No
32-2.10. Pre-existing patient distribution plan *	Unknown
32-2.11. Please explain any pre-existing patient distribution plan/s and give any comments on decision making, delays etc. *	delays due to overcrowded emergency department, few triage plans in action, even though major incident plans existed. In this incident it was primarily the smaller hospitals that were involved.
32-3.1. Distance from incident scene where pre-hospital medical response was initiated to hospital III by air line in kilometers *	101-200
32-3.2. Type of hospital III *	Major hospital with trauma specialty
32-3.3. Were patients conveyed to this hospital by EMS? *	Yes
32-3.3.1. Were six or more patients conveyed to this hospital by EMS? *	Yes
32-3.3.2. Numbers of patients conveyed to this hospital by EMS *	18
32-3.4. Were patients conveyed to this hospital by non-EMS? *	No
32-3.5. Were patients conveyed in the first hour after the incident? *	No
32-3.6. Were patients conveyed between 1 and 2 hours after the incident? *	No
32-3.6.2. Number of patients conveyed between 1 and 2 hours after the incident *	Unknown
32-3.7. Were patients conveyed between 2 and 3 hours after the incident? *	Yes
32-3.7.1. Were six or more patients conveyed between 2 and 3 hours after the incident? *	Yes
32-3.7.2. Number of patients conveyed between 2 and 3 hours after the incident *	6
32-3.8. Were patients conveyed between 3 and 4 hours after the incident? *	Yes
32-3.8.1. Were six or more patients	Yes

conveyed between 3 and 4 hours after the incident? *

32-3.8.2. Number of patients conveyed between 3 and 4 hours after the incident *

8

32-3.9. Were patients conveyed after 4 hours or more following the incident? *

Yes

32-3.9.1. Were six or more patients conveyed after 4 hours or more following the incident? *

No

32-3.10. Pre-existing patient distribution plan *

Yes

32-3.11. Please explain any pre-existing patient distribution plan/s and give any comments on decision making, delays etc. *

trauma hospital mass casualty plan

Patient characteristics

33-1. Were more people than those who were directly affected at risk from incident (e.g number of passengers on a train/ship)? *

Yes

33-1.1. Pertaining to question 33-1; were there more than six people at risk from the incident? *

Yes

33-1.2. What was the estimated number of people at risk from the incident? *

50

33-1.3. Please explain how the above number of population at risk was reached *

Heavy smoke pollution

34-1. Gender: Were any males affected? *

Yes

34-1.1. Were six or more males affected? *

Yes

34-1.2. Number of males affected *

Unknown

34-1.3. Is the number given above exact or estimated? *

Estimated

34-2. Gender: Were any females affected? *

Yes

34-2.1. Were six or more females affected? *

Yes

34-2.2. Number of females affected * Unknown

34-2.3. Is the number given above exact or estimated? * Estimated

34-3. Were there any unidentified/missing victims? * Yes

34-3.1. Were six or more victims unidentified/missing? * No

35-1. Were there any neonates (0-30 days) requiring attention of EMS? * No

35-2. Were there any infants (1 month-2 years) requiring attention of EMS? * No

35-3. Were there any young children (2-6 years) requiring attention of EMS? * Yes

35-3.1. Were six or more young children requiring attention of EMS? * No

35-4. Were there any children (6-12 years) requiring attention of EMS? * Yes

35-4.1. Were six or more children requiring attention of EMS? * No

35-5. Were there any adolescent (12-18 years) requiring attention of EMS? * Yes

35-5.1. Were six or more adolescent requiring attention of EMS? * No

36-1. Were there any dead on-scene/ dead before any medical care was provided? * No

37-1. Were there any dead before arrival at hospital (initial treatment started, but dead before transport to hospital)? * No

38-1. Were there any dead upon arrival at hospital? * No

39-1. Were there any deaths of those admitted to the hospital within 30 days of the event? * Unknown

39-2. Is data collection of thirty day mortality of those admitted to hospital considered complete? * No

40. Was a pre-hospital triage system used? * Yes

40-1. Who performed the pre-hospital on-scene triage? *
● Physician

- EMS personnel

40-2. Which triage system was used? *	modified clinical triage, SATS (South african triage system)
41-1. Were there any patients in category red = immediate? *	Yes
41-1.1. Were there six or more patients in category red? *	No
41-2. Were there any patients in category yellow = urgent? *	Yes
41-2.1. Were there six or more patients in category yellow? *	Yes
41-2.2. Number of patients in category yellow *	8
41-2.3. Is the number given above exact or estimated? *	Estimated
41-2.4. Please provide the data source from which these numbers originate *	pat records
41-3. Were there any patients in category green = minor/delayed? *	Yes
41-3.1. Were there six or more patients in category green? *	Yes
41-3.2. Number of patients in category green *	44
41-3.3. Is the number given above exact or estimated? *	Exact
41-3.4. Please provide the data source from which these numbers originate *	patient records
41-4. Were there any patients in category black = deceased? *	No
41-5. Were there any patients in other categories than those mentioned above? *	No
42-1. Were there patients with minor injuries? Here defines as: patients attended by EMS or medical staff at a primary health care facility, but not admitted to hospital *	Yes
42-1.1. Were there six or more patients with minor injuries? *	No
43. Was there any over-or undertriage? *	Unknown

44-1. Did more than six patients seek care at a hospital? *	No
44-2. Was the total number of patients admitted to hospital six or more? *	Yes
44-2.1. What was the total number of patients admitted to hospital? *	66
44-2.2. Is the number given above exact or estimated? *	Exact
44-2.3. Please provide the data source from which these numbers originate *	patient records
44-3. Were six or more of the admitted patients discharged within 24 hours? *	Yes
44-3.1. How many of the admitted patients were discharged within 24 hours? *	44
44-3.2. Is the number given above exact or estimated? *	Exact
44-3.3. Please provide the data source from which these numbers originate *	patient records
45-1. Did any patients sustain blunt trauma? *	Yes
45-1.1. Did six or more patients sustain blunt trauma? *	No
45-2. Did any patients sustain penetrating trauma? *	No
45-3. Did any patients sustain burns? *	Yes
45-3.1. Did six or more patients sustain burns? *	No
45-4. Did any patients sustain drowning? *	No
45-5. Did any patients sustain asphyxiation? *	No
45-6. Did any patients sustain hypothermia? *	Yes
45-6.1. Did six or more patients sustain hypothermia? *	Yes
45-6.2. Number of patients with hypothermia *	8
45-6.3. Is the number given above exact or estimated? *	Estimated
45-6.4. Please provide the data source from	triage at incident and triage notes along with patient

which these numbers originate *	records from hospitals
45-7. Did any patients sustain intoxication/poisoning? *	Yes
45-7.1. Did six or more patients sustain intoxication/poisoning? *	Yes
45-7.2. Number of patients with intoxication/poisoning *	24
45-7.3. Is the number given above exact or estimated? *	Estimated
45-7.4. Please provide the data source from which these numbers originate *	incident reports and patient records
45-8. Did any patients sustain infectious disease? *	Unknown
45-9. Did any patients sustain acute psychiatric symptoms? *	Yes
45-9.1. Did six or more patients sustain acute psychiatric symptoms? *	Yes
45-9.2. Number of patients with acute psychiatric symptoms *	Unknown
45-9.3. Is the number given above exact or estimated? *	Estimated
45-9.4. Please provide the data source from which these numbers originate *	incident reports after the fire, summary of patient records from hospitals,
45-10. Did any patients sustain nuclear or radiological injury? *	No
45-11. Did any patients sustain biological injury? *	No
45-12. Did any patients sustain chemical injury? *	No
45-13. Did any patients sustain other type of injury? *	Unknown
46-1. Were any patients admitted to critical care area? *	Yes
46-1.1. Were six or more patients admitted to critical care area? *	Yes
46-1.2. Number of patients admitted to critical care area *	10
46-1.3. Is the number given above exact or estimated? *	Estimated

46-1.4. Please explain how you define critical care *	need of intensive care or admitted to the intensive care unit and in need of respiratory support
46-1.5. Please provide the data source from which these numbers originate *	patient records from hospital and incident report

Key lessons

47. During the pre-hospital emergency medical response to this major incident, were there any particular problems that may be improved in future major incidents? *	Yes
47-1. In what area/s did the problem/s occur? *	<ul style="list-style-type: none"> • Issues related to pre-incident situation in the country/region • Issues related to EMS situation before the major incident • Nature of the incident itself • The EMS response • Characteristics of the patients
47-1.1. Pre-incident data: What was the problem encountered? *	no national triage system used on every day basis. Resources are sparsely located as well as long transportation time. Difficult evacuation due to nature of incident itself. Optimal safety measures not working, risky tunnel, plan in case of fire not well known.
47-1.2. Pre-incident data: How did responders attempt to address the problem? *	a modified triage system was used, rescuers tried to improvise,. Fire department changed plans during the rescue efforts.
47-1.3. Pre-incident data: How would you recommend addressing / avoiding a similar problem at a future major incident? *	implementing a national triage system used on every day basis. Implement more safety systems/equipment to use in case of fire. Establish warning system after fire has started for others driving into tunnel.
47-2.1. EMS background: What was the problem encountered? *	Limited resources and educational background, long distances to nearest ambulance
47-2.2. EMS background: How did responders attempt to address the problem? *	Everyone did as best they could
47-2.3. EMS background: How would you recommend addressing / avoiding a similar problem at a future major incident? *	more mandatory practice and national standards and systems
47-3.1. Incident characteristics: What was	Two sites and only access to one. Two different

the problem encountered? *

municipalities, two different dispatch centers and two different police/fire departments.

47-3.2. Incident characteristics: How did responders attempt to address the problem? *

communication with the other side accomplished initially and thereby better overview of incident. Difficulties with patient overview after HEMS left. Police and fire departments from two different districts on each side of the incident and reporting to two different dispatch centers made communication and overview challenging. Tried to use mobile phones, this was partially successful.

47-3.3. Incident characteristics: How would you recommend addressing / avoiding a similar problem at a future major incident? *

not avoidable unless larger municipalities and fewer dispatch centers. New communication system might be able to operate larger amounts of major incident personnel, but limited network inside tunnels.

47-4.1. EMS response: What was the problem encountered? *

limited information, radio system not adequate

47-4.2. EMS response: How did responders attempt to address the problem? *

mobile communication with response on other side of tunnel

47-4.3. EMS response: How would you recommend addressing / avoiding a similar problem at a future major incident? *

radio communication system that works in every valley

47-5.1. Patient characteristics: What was the problem encountered? *

many inhalational injuries, possible increasing breathing problems, lots of unknown gases

47-5.2. Patient characteristics: How did responders attempt to address the problem? *

treated only the worst, no obvious indication who were at risk

47-5.3. Patient characteristics: How would you recommend addressing / avoiding a similar problem at a future major incident? *

enough oxygen and treatment equipment available

48. During the pre-hospital emergency medical response to this major incident, were there any particular successes that may enhance the response to future major incidents? *

Yes

48-1. In what area/s did the success/es occur? *

- Nature of the incident itself
- The EMS response

48-3.1. Incident characteristics: What element of the response went particularly well? *

Lucky that no one died. All patients were taken care of despite little resources due to slow patient release from tunnel. Substances that burned were not too toxic.

48-3.2. Incident characteristics: What

Advanced warning system when fire in tunnel,

recommendations would you make for the response to future major incident responses? *

appropriate ventilation systems

48-4.1. EMS response: What element of the response went particularly well? *

enough transport and medical staff, due to volunteers and immediate response

48-4.2. EMS response: What recommendations would make for the response to future major incidents? *

use of volunteers with or without medical training/education