

Explosion och brand på en depå för kolväten (LPG).

960315 MARS 1996_01

Olyckan inträffade vid lossning av propan från en tankbil. Av ännu okänd anledning uppstod ett läckage av propan från en slang. Ett gasmoln drev in i anläggningen. Operatören som svarade för tappningen slog larm på fabriken, till räddningstjänsten och till järnvägen. Strax efter räddningstjänsten anlant antändes gasmolnet och en explosion uppstod följt av en brand. Tankbilens behållare punkterades och en liten eldboll bildades som orsakade en närstående fordon att explodera. Flera fordon påverkades av branden.

Inblandade ämnen och mängder

| | CAS Nr. | Mängd |
|--------|---------|---|
| propan | 74-98-6 | första explosion 35 m3 ytterligare ca 100 m3 |

Skador:

| | |
|----------------|---|
| Människor: | Inga. |
| Materiella: | Anläggningen skadades och flera fordon totalförstördes. |
| Miljö/ekologi: | Inga effekter rapporterade. |
| Infrastruktur: | Järnvägen varnades per telefon och uppmanades att stoppa all trafik förbi anläggningen. Detta visade sig vara helt överflödigt då en nationell strejk gjorde att alla tåg stod still. |

Erfarenheter redovisade (Ja/Nej): Ja

Mycket kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1996_001_01

reported under Seveso I directive as major accident reports: SHORT+FULL

Date of Major Occurrence: Time of Major Occurrence

start: 1996-03-15 start: 07:30:00

finish: 1996-03-15 finish: 16:00:00

Establishment:

name:

address:

industry: - not applicable -

Establishment for LPG storage, bottling and distribution (code 2008)

Seveso II status: not applicable: Yes art. 6 (notification): No

art. 7 (MAPP): No

art. 9 (safety report): No

Date of Report:

short: full:

Authority Reporting:

name:

address:

Authority Contact:

rep_cont_name:

rep_cont_phone:

rep_cont_fax:

Additional Comments:

a) - not applicable -

b) - not applicable -

c) - not applicable -

d) - not applicable -

e) - not applicable -

Short Report

country: FA **ident key:** 1996_001_01

Accident Types:

release: Yes **explosion:** Yes

water contamination: No **other:** No

fire: Yes

description:

The accident occurred when a workman of the company was unloading propane from a road-tank (~35 m3) to the fixed plant via a flexible tube. For reasons not yet clear, a considerable release of gas into the atmosphere occurred. A vapour clou... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: No **explosive:** Yes

ecotoxic: No **other:** No

flammable: Yes

description:

propane

Immediate Sources of Accident:

storage: No **transfer:** Yes

process: No **other:** No

description:

Release of propane during unloading operations from truck-vessel (35 m3) to the fixed installation through the flexible pipe. Ignition and explosion of the formed vapour cloud.

Suspected Causes:

plant or equipment: Yes **environmental:** No

human: Yes **other:** No

description:

Accidental release of propane, ignition and explosion of the vapour cloud due to not yet established causes

(the Procura della Repubblica of Treviso is still investigating.

Immediate Effects:

material loss: Yes

human deaths: Yes

human injuries: Yes **community disruption:** No

other: No

ecological harm: No

national heritage loss: No

description:

EFFECTS ON PEOPLE: 1 employee of the company (company caretaker) involved in the explosion together with the firemen died some days after in the hospital from serious injuries and burns. 2 employees of the company received burns to face and... see Appendix Short Report / description of immediate effects

Emergency Measures taken:

on-site systems: Yes **decontamination:** No

external services: Yes **restoration:** No

sheltering: No **other:** No

evacuation: Yes

description:

INTERNAL: Alarm given by the operator assigned to the unloading of the truck-vessel, which was source of accident.... see Appendix Short Report / description of emergency measures taken

Immediate Lessons Learned:

prevention: No **other:** Yes

mitigation: No

description:

After the establishment construction in 1963, many residences have been built around it without considering the risks. The consequences would have been more serious in case of BLEVE or UVCE, involving also the external side of the establish... see Appendix Short Report / description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1996_001_01

1 Type of Accident

remarks: Escape of propane from a full truck-vessel during unloading unloading through a valve sited in the base of the vessel and joined to the unloading pipe with a flexible tube. Formation of a propane cloud in the establishment associated with a... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: - not applicable -

3 Source of Accident

illustration: - not applicable -

remarks: ---

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

Yes No No No No

wind speed (m/s): 0

direction (from):

stability (Pasquill):

ambient temperature (°C): 4

remarks: from information locally available, there was absence of wind and no precipitation

5 Causes of Major Occurrence

main causes

technical / physical 5501 other: not identified

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational 5501 other: not identified

- not applicable -

- not applicable -

- not applicable -

- not applicable -

remarks: Probable causes of the release could be the following: human error of the operator

responsible for the vessel unloading or malfunction/rupture of the vessel unloading

devices. The fire of the cloud formed after the release was ignited by a ... see Appendix

Full Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1996_001_01

event:

major occurrence 1307 explosion: VCE (vapour cloud explosion; supersonic wave front)

initiating event 1101 release: gas/vapour/mist/etc release to air

associated event 1205 fire: fireball (burning mass rising in air, often after BLEVE)

Dangerous substances

country: FA ident key: 1996_001_01

a) total establishment inventory

CAS number: <CAS CODE>74- identity: Propane

name from Seveso I Directive: - not applicable -

name from Seveso II Directive: - not applicable -

category from Seveso II: - not applicable -

other hazards (1): - not applicable -

other hazards (2): - not applicable -

maximum quantity (tonnes): 550

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 20 **potential quantity:** 20

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 **indir_pot_quant:** -1

a) total establishment inventory

CAS number: identity: Propane/butane

name from Seveso I Directive: - not applicable -

name from Seveso II Directive: - not applicable -

category from Seveso II: - not applicable -

other hazards (1): - not applicable -

other hazards (2): - not applicable -

maximum quantity (tonnes): 412

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: No

actual quantity: -1 **potential quantity:** -1

c) substance belongs to relevant inventory indirectly involved: No

actual quantity: -1 **indir_pot_quant:** -1

B Consequences Full Report

country: FA **ident key:** 1996_001_01

1 Area concerned

affected

extent of effects installation: Yes

establishment: Yes

off-site; local: Yes

off-site; regional: No

off-site; transboundary: No

illustration of effects - not applicable -

remarks Traffic interruption in the entrance road to the establishment and in the railwa... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 250

immediate fatalities 1

subsequent fatalities 1

hospitalizing injuries 2 10

other serious injuries

health monitoring

remarks At the moment of the on-the spot investigation there was no evidence of new exte... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- residential area (covered by toxic cloud) not applicable
- common wild flora/fauna (death or elimination) not applicable
- rare or protected flora/fauna (death or elimination) not applicable
- water catchment areas and supplies for consumption or recreation not applicable
- land (with known potential for long term ecological harm or not applicable

preventing human access or activities)

- marine or fresh water habitat not applicable
- areas of high conservation value or given special protection not applicable

remarks No evidence of damage to the environment.

4 National Heritage Loss

effects on:

- historical sites not applicable - historic monuments not applicable
- historic buildings not applicable - art treasures not applicable

remarks not pertinent

5 Material Loss

establishment losses off site losses

costs (direct costs to operator) (social costs)

in ECU ECU

material losses

response, clean up, restoration

remarks The cost is actually not quantifiable. Anyway an estimate has to be given in ord... see Appendix

Full Report B / material loss

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

- nearby residences/hotels Yes No No
- nearby factories/offices/small shops Yes No No
- schools, hospitals, institutions Yes No No
- other places of public assembly Yes No No

interruption of utilities etc. no / yes duration

- gas No

- **electricity** No

- **water** No

- **sewage treatment works** No

- **telecommunications** No

- **main roads** No

- **railways** No

- **waterways** No

- **air transport** No

significant public concern none local level national level

- **off site populations** No Yes No

- **media interest** No No Yes

- **political interest** No No No

remarks Interest of media at national level only for the day of the accident and the day... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1996_001_01

1 Emergency Measures

taken - on site - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

- **off site** - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

still - on site - not applicable - - not applicable -

required

- not applicable - - not applicable -

- not applicable - - not applicable -

- **off site** - not applicable - - not applicable -

- not applicable - - not applicable -

- not applicable - - not applicable -

continuing contamination or danger

-**on site** not applicable

-**off site** not applicable

remarks - not applicable -

2 Seveso II Duties

pre-accident evaluation

Article item not due yet not done done/submitted evaluated

6 notification No No No No

7 policy (MAPP) No No No No

9 safety report No No No No

9, 10, 11 update No No No No

11 internal plan No No No No

11 external plan No No No No

13 informing public No No No No

9, 12 siting policy No No No No

post-accident evaluation

Seveso II duty was actual were actual compared with actual

contingency consequences consequences, the

addressed? addressed? predicted extent was?

Article item

7 policy (MAPP) not applicable not applicable not applicable

9 current safety report not applicable not applicable not applicable

11 internal plan not applicable not applicable not applicable

11 external plan not applicable not applicable not applicable

13 informing public not applicable not applicable not applicable

9, 12 siting policy not applicable not applicable not applicable

evaluation of safety organisation

organisational element element existed did element relate to actual circumstances of

yes / no no / partly / yes adequate?

- written policy objectives No

- specified management No

structure

- specified responsibilities No

- specified working procedures No

- specified procedures for No

assessment/auditing of

management system

- specified procedures for No

review and update of

management policy

- specified general training No

procedures

- specified emergency No

training procedures

evaluation of ecological impact control

organisational element element existed did element relate to actual circumstances of

yes / no no / partly / yes adequate?

- ecological status review No

before incident

- potential ecological No

consequences assessment

- ecological impact review No

after incident

- ecological restoration No

procedures

- subsequent review of No

restoration success

remarks - not applicable -

3 Official Action Taken

legal action

- not applicable -

other official action

- not applicable -

4 Lessons Learned

measures to prevent recurrence

Realize in the future, in harm... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

See previous point.

useful references:

see previous points

5 Discussion about Response

- not applicable -

Appendices for the FA / 1996_001_01 report

Appendix Short Report / description of accident types:

The accident occurred when a workman of the company was unloading propane from a road-tank (~35 m³) to the fixed plant via a flexible tube. For reasons not yet clear, a considerable release of gas into the atmosphere occurred. A vapour cloud was consequently generated, which invaded the plant. Being not able to stop the release, the man gave the alarm following the procedures, to the firemen, the national railway (whose tracks run close to the establishment) etc. After the arrival of the firemen, just when initiating their action, a first explosion took place, followed by a fire. The fire involved the two firemen teams, the truck-vessel driver and the employee who had given the alarm. The truck vessel was cracked in the above side (a hole of about 500 mm) with release of a big amount of propane and formation of a little fireball. The fire's heat-radiation caused the explosion of a nearby truck-vessel containing only few litres of LPG. A fragment of this vessel (1500 mm long) was found at a distance of 500 m, after it had provoked the crash down of the roof of a room close to a one-family house. Other fragments were spread around at minor distances. The fire, besides destroying the two motor-pumps of the fire-fighting team, affected 2 other truck vessels containing 12 and 35 m³ of propane and an empty truck vessel (12 m³) and 2 railway-vessels of propane (70 m³ capacity) waiting for unloading.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE: 1 employee of the company (company caretaker) involved in the explosion together with the firemen died some days after in the hospital from serious injuries and burns. 2 employees of the company received burns to face and hands and were recovered to the hospital. 10 firemen received more or less serious burns and were hospitalized.

MATERIAL DAMAGE: Partial collapse of the office-building of the establishment, break of aerial pipes connected to the fixed installations, damages to the bottling plant and unloading equipment. Damages to outside due to the spread of fragments of the partially empty exploded vessel. Other external damages (glass break etc.) to be assessed.

Appendix Short Report / description of emergency measures taken:

INTERNAL: Alarm given by the operator assigned to the unloading of the truck-vessel, which was source of accident.

EXTERNAL: actions by personnel of the establishment to stop the traffic on the road to the establishment. Telephone call to the nearby railway station in order to stop the

trains in circulation (this was a superfluous action since no train was circulating at that time due to a national strike). Request of evacuation of nearby houses by external authorities in a radius of 400m around the establishment. The persons evacuated (up to the following morning) were about 250.

Appendix Short Report / description of immediate lessons learned:

After the establishment construction in 1963, many residences have been built around it without considering the risks. The consequences would have been more serious in case of BLEVE or UVCE, involving also the external side of the establishment (as foreseen in the safety report). Such circumstances should be avoided in the future by applying the directives of the so called "SEVESO II" on the land use planning in case of a plant with the risk of major accidents.

Appendix Full Report A / type of accident:

Escape of propane from a full truck-vessel during unloading through a valve sited in the base of the vessel and joined to the unloading pipe with a flexible tube. Formation of a propane cloud in the establishment associated with an explosion. Intense fire, rupture of the upper part of the vessel, being source of the accident. Explosion of a partially empty truck-vessel with spreading of fragments outside the establishment.

Appendix Full Report A / causes of major occurrence:

Probable causes of the release could be the following: human error of the operator responsible for the vessel unloading or malfunction/rupture of the vessel unloading devices. The fire of the cloud formed after the release was ignited by a source which is still under investigation by the "Procura della Repubblica" of Treviso. Explosion of the 12m³ half-empty vessel with scattering of fragments, initiated by the heat-radiation of the fire.

Appendix Full Report B / area concerned - remarks:

Traffic interruption in the entrance road to the establishment and in the railway for the time necessary for the arrival of the emergency vehicles, the aid to the affected persons and for the accident duration. The accident affected mainly the internal side of the establishment (persons and materials); anyway consequences (only for materials) are present also externally due to the propagation of fragments hurled around by the explosion of the 12 m³ vessel.

Appendix Full Report B / people:

At the moment of the on-the spot investigation there was no evidence of new external people hospitalized or needing medical control.

Appendix Full Report B / material loss:

The cost is actually not quantifiable. Anyway an estimate has to be given in order to determine the costs related to the external damages and to the persons affected.

Appendix Full Report B / disruption of community life:

Interest of media at national level only for the day of the accident and the day after. Locally the interest is still live due to direct involvement.

Appendix Full Report C / lesson learned - prevent:

Realize in the future, in harmony with the "SEVESO II" directive and adequate planning policy of land use not allowing residential expansion near the high risk plants. Making more serious the obligations of the hazardous plants' operators in matter of safety and personnel training at every level of responsibility. In preparing emergency plans, internal or external, the consequences of any possible major accident should be taken into consideration independently from their more or less high probability obtained by the analysis of the safety report.