

Explosion och storbrand på en oljedepå.

851221 MARS 1985_12

Tidigt på morgonen i Neapels hamnområde inträffade en mycket kraftig gasexplosion. Olyckan inträffade under lossning från ett fartyg då man förlorade kontrollen över några ventiler. En tank flödade över och de frigjorda ångorna antändes. Explosionen hördes på Capri 35 km bort på andra sidan Neapelbukten. Explosionen följdes av en brand där lågorna slog upp till hundra meters höjd. Ett 25-tal tankar med lättare petroleumprodukter av olika slag var inblandade i explosionen och branden. Räddningstjänsten anlände inom kort med sex brandbekämpningslag. Närvarande var även företagets interna brandkår, hamnens egen brandkår och ditkallad manskap från andra delar av provinsen. Förstärkningar om 200 man tillkallades dagen därpå. Man använde vatten för att kyla tankar som ännu inte exploderat. Trots detta uppstod ett flertal eldbollar då tankar kollapsade i elden. Branden släcktes så småningom med hjälp av skum.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
petroleumprodukter av olika slag		ca 23 ton
förbränningsprodukter		okänt

Skador:

Människor:	Två människor på depåområdet omkom. Ytterligare två i ett hus som förstördes av explosionen omkom. Ett hundratal människor skadades och fick föras till sjukhus då de träffades av fallande föremål, eller under då de skadade sig under den panikartade flykt som inträffade i staden (Neapel).
Materiella:	Förutom omfattande skador på depån och dess byggnader totalförstördes byggnader inom en radie på flera hundra meter. Skador noterades på totalt 220 bostadshus, 12 större byggnader och 448 andra byggnader. Allvarliga skador på såväl närliggande väg som järnväg.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	Förutom de skador som nämns ovan på bebyggelse och vägnät, spärrades stora delar av området kring depån av. Fartygstrafiken dirigerades om.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1985_012_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1985-12-21 start: 05:00:00

finish: finish:

Establishment:

name:

address:

industry: 2002 petrochemical, refining, processing

Storage Activities (Coastal Storage Depot for Petroleum Products)

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: 1985_012_01

Accident Types:

release: Yes explosion: Yes

water contamination: No other: No

fire: Yes

description:

ACCIDENT CASE HISTORY DESCRIPTION:... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: Yes explosive: Yes

ecotoxic: No other: No

flammable: Yes

description:

- Petroleum Products (gasoline, gasoil, fuel oil): amount involved in the fire = about 23,000 Kg. No data are

available about the amount of petroleum gases involved in the unconfined vapour cloud explosion.... see

Appendix Short Report / description of substances involved

Immediate Sources of Accident:

storage: Yes transfer: Yes

process: No other: No

description:

The accident occurred during ship unloading operations in the AGIP coastal storage depot for petroleum products (gasoline, diesel, gasoil, fuel oil). The component involved in the release of flammable liquid was tank N° 17. The explosion of... see Appendix Short Report / description of immediate sources

Suspected Causes:

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

human: Yes **other:** No

description:

INITIATING EVENT AND CONSEQUENCES:... see Appendix Short Report / description of suspected causes

Immediate Effects:

material loss: Yes

human deaths: Yes

human injuries: Yes **community disruption:** Yes

other: No

ecological harm: No

national heritage loss: No

description:

EFFECTS ON PEOPLE:... 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:** Yes

evacuation: No

description:

INTERNAL TO THE ESTABLISHMENT:... see Appendix Short Report / description of emergency measures taken

Immediate Lessons Learned:

prevention: No **other:** No

mitigation: Yes

description:

MEASURES TO MITIGATE THE EFFECTS OF THE ACCIDENT:... see Appendix Short Report / description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1985_012_01

1 Type of Accident

remarks: During ship unloading operations, an overfilling of a tank and the overflow of liquid from it (code 1102) occurred. The released flammable liquid evaporated (code 1101) and the vapours were ignited resulting in a violent unconfined vapour c... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment and the potential directly involved inventories of petroleum products (gasoline, gasoil, fuel oil) refer to the amount involved in the accident. No data are available about the amount of petroleum products initially ... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred during ship unloading operations (code 3304) in the AGIP coastal storage depot (codes 2002 and 3202) for petroleum products (gasoline, diesel, gasoil, fuel oil). The component involved in the release of flammable liqui... see Appendix Full Report A / source of accident -
remarks

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

No No No No No

wind speed (m/s):

direction (from):

stability (Pasquill):

ambient temperature (°C):

remarks: - not applicable -

5 Causes of Major Occurrence

main causes

technical / physical - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational 5303 organization: organized procedures (none, inadequate, inappropriate, unclear)

5304 organization: training/instruction (none, inadequate, inappropriate)

5307 organization: process analysis (inadequate, incorrect)

5308 organization: design of plant/equipment/system (inadequate, inappropriate)

5401 person: operator error

remarks: The release of the flammable/explosive liquid from tank N° 17 during loading operations was caused by the loose of control of the gate valves position by the two operators in charge of the operation (codes 5401, 5303 and 5304). It resulted ... see Appendix Full Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1985_012_01

event:

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

event:

major occurrence 1202 fire: pool fire (burning pool of liquid, contained or uncontained)

initiating event 1102 release: fluid release to ground

associated event - not applicable -

event:

major occurrence 1102 release: fluid release to ground

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

associated event 1401 other: combustion products into air

Dangerous substances

country: FA **ident key:** 1985_012_01

a) total establishment inventory

CAS number: identity: Petroleum Products

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): 23000

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 23000 **potential quantity:** 23000

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: identity: Combustion Products

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): -1

use of substance as: ABNORMAL PRODUCT

b) substance belongs to relevant inventory directly involved: No

actual quantity: -1 potential quantity: -1

e) substance belongs to relevant inventory indirectly involved: Yes

actual quantity: -1 indir_pot_quant: -1

Source of Accident - Situation country: FA ident key: 1985_012_01

situation

industry

initiating event - not applicable -

associated event - not applicable -

activity/unit

major occurrence - not applicable -

initiating event 3304 transfer: loading/unloading activities (transfer interfaces)

associated event - not applicable -

component

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

situation

industry

initiating event 2002 petrochemical, refining, processing

associated event 2002 petrochemical, refining, processing

activity/unit

major occurrence 3202 storage: distribution-associated (not on-site of manufacture)

initiating event 3202 storage: distribution-associated (not on-site of manufacture)

associated event 3202 storage: distribution-associated (not on-site of manufacture)

component

major occurrence 4003 container; non-pressurised (hopper, tank, drum, bag, etc.)

initiating event 4003 container; non-pressurised (hopper, tank, drum, bag, etc.)

associated event 4003 container; non-pressurised (hopper, tank, drum, bag, etc.)

B Consequences Full Report

country: FA ident key: 1985_012_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 The accident caused great damages to the depot and to its structures. Outside th... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk

immediate fatalities 2 2

subsequent fatalities

hospitalizing injuries 100

other serious injuries

health monitoring

remarks 2 people inside the depot (in charge of the unloading operations) and 2 people l... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- **residential area (covered by toxic cloud)** Suspected

- **common wild flora/fauna (death or elimination)** Suspected

- **rare or protected flora/fauna (death or elimination)** Suspected

- **water catchment areas and supplies for consumption or recreation** Suspected

- **land (with known potential for long term ecological harm or** Suspected

preventing human access or activities)

- **marine or fresh water habitat** Suspected

- **areas of high conservation value or given special protection** Suspected

remarks In the Original Report there is no evidence of significant ecological harms beca... see Appendix

Full Report B / ecological harm

4 National Heritage Loss

effects on:

- **historical sites** not applicable - **historic monuments** not applicable

- **historic buildings** not applicable - **art treasures** not applicable

remarks No data available.

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 accident caused great damages to the depot and to its structures. Outside th... see Appendix

Full Report B / material loss

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

- **nearby residences/hotels** No No Yes

- **nearby factories/offices/small shops** No No Yes

- **schools, hospitals, institutions** No No Yes

- **other places of public assembly** No No Yes

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 No Yes

- **media interest** No No No

- **political interest** No No No

remarks The accident caused great damages to the depot and to its structures. Outside th... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1985_012_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

- not applicable -

measures to mitigate consequences:

Due to the successive collapse... see Appendix Full Report C / lesson learned - mitigate

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1985_012_01 report

Appendix Short Report / description of accident types:

ACCIDENT CASE HISTORY DESCRIPTION:

On December 21(Saturday), at 5:10 a.m in the AGIP coastal depot of Naples a very violent explosion (an unconfined vapour cloud explosion [U.V.C.E.]) followed by a fire occurred. The fire involved 25 tanks containing mainly light petroleum products. The sound of the explosion was heard at a great distance from the depot (up to Capri) and witnesses noticed the shock-wave up to Vico Equense. The explosion flame reached a length of hundreds metres. The explosion caused:

- 1- the complete destruction of some buildings and damages to some industrial and civil premises in a radius of various hundred metres from the depot;
- 2- the death of 4 people (two workers of the AGIP company inside the depot and two people living outside the depot, in a building beyond the Sperone channel;
- 3- the injuring of many people hit by debris or fallen during the escape following the accident (the explosion caused a great panic in the population in a large area of the city);

4- a large fire in the area of the SIF depot;

5- serious damages to the road connecting the city of Naples (street "Arnaldo Lucci") to the high-way Napoli-Salerno;

6- damages to the rail-way "Circumvesuviana".

The fire that followed the explosion was characterized by high burning and energy rates of the combustion. There was risk of explosion of fixed roof tanks and propagation of the fire to the nearby areas (where there were others tanks) and to nearby critical industrial premises (Feltrinelli). Also, there was a risk of burned products flowing into the Sperone channel (with consequent damages to the activities in the harbour) and serious risks to the public health. Due to the successive collapse of some storage tanks engulfed in the fire, some fire-balls occurred and the flammable liquid contained was released into the dikes. It was a good choice to send foam (though more expensive) instead of water in the dikes to reduce the effects of the collapse of tanks. In this way the whole amount of available water was used to cool the tanks and the risk of dikes overfilling and, therefore, of the spreading of fire to other areas was avoided.

Appendix Short Report / description of substances involved:

- Petroleum Products (gasoline, gasoil, fuel oil): amount involved in the fire = about 23,000 Kg. No data are available about the amount of petroleum gases involved in the unconfined vapour cloud explosion.

- Combustion Products (which originated a toxic cloud): composition and amount involved = not known.

Appendix Short Report / description of immediate sources:

The accident occurred during ship unloading operations in the AGIP coastal storage depot for petroleum products (gasoline, diesel, gasoil, fuel oil). The component involved in the release of flammable liquid was tank N° 17. The explosion of the unconfined vapour cloud explosion (U.V.C.E.) involved others 25 tanks (in the SIF area) containing mainly light petroleum products. The AGIP depot was in an area with a high density of population, close to civil buildings.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

During ship unloading operations, a leak of flammable/explosive liquid from tank N° 17 occurred. The vapours were ignited resulting in a violent explosion which involved 25 tanks (SIF area) containing flammable substances. The explosion was followed by a fire that involved the SIF area.

CAUSES:

The release of the flammable/explosive liquid from tank N° 17 during loading operations was caused by the loose of control of the gate valves position by the two operators in charge of the operation. It caused the overfilling of the tank and the liquid overflowing from it. The released vapours formed a cloud that was ignited in an adjacent area, causing a violent unconfined vapour cloud explosion (U.V.C.E.).

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

2 people inside the depot (in charge of the unloading operations) and 2 people living in a destroyed building outside the depot were killed by the explosion. Many people (about 100) were injured (and hospitalized) because they were hit by debris or fallen during the escape following the accident (the explosion caused a great panic in the population in a large area of the city).

MATERIAL LOSS AND COMMUNITY DISRUPTION:

The accident caused great damages to the depot and to its structures. Also caused:

1- the complete destruction of some buildings and damages to some industrial and civil premises in a radius of various hundred metres from the depot (about 220 civil buildings, 12 large buildings and 448 industrial or artigianal units were damaged);

2- serious damages to the road connecting the city of Naples (street "Arnaldo Lucci") to the high-way Napoli-Salerno;

3- damages to the rail-way "Circumvesuviana".

MAP OF THE ACCIDENT AREA AND MAX. DENSITY OF POPULATION:

The depot was in an area with a high density of population, close to civil buildings.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

To fight the fire for avoiding its propagation to the nearest tank N° 101 full of diesel oil and the ignition of the other tanks in case of their rupture and outcoming of flammable liquid, immediately after the explosion arrived on the scene:

- 6 fire fighting teams,

- the fire fighting team of the refinery;

- the fire fighting team of harbour;

- fire fighting teams from the other provinces of Campania.

The day after, since the fire was still huge, others 180 firemen, 15 officers and many fire fighting means were called.

Due to the successive collapse of some storage tanks engulfed in the fire, some fire-balls occurred and the flammable liquid contained was released into the dikes. It was a good choice to send foam (though more expensive) instead of water in the dikes to reduce the effects of the collapse of tanks. In this way the whole amount of available water was used to cool the tanks and the risk of dikes overfilling and, therefore, of the spreading of fire to other areas was avoided.

EXTERNAL TO THE ESTABLISHMENT:

1- a large area around the depot had been declared off limits and it was prohibited the entrance of the personnel;

2- ships had been moved away from the harbour.

Appendix Short Report / description of immediate lessons learned:

MEASURES TO MITIGATE THE EFFECTS OF THE ACCIDENT:

Due to the successive collapse of some storage tanks engulfed in the fire, some fire-balls occurred and the flammable liquid contained was released into the dikes. It was a good choice to send foam (though more expensive) instead of water in the dikes to reduce the effects of the collapse of tanks. In this way the whole amount of available water was used to cool the tanks and the risk of dikes overflowing and, therefore, of the spreading of fire to other areas was avoided.

Appendix Full Report A / type of accident:

During ship unloading operations, an overflowing of a tank and the overflow of liquid from it (code 1102) occurred. The released flammable liquid evaporated (code 1101) and the vapours were ignited resulting in a violent unconfined vapour cloud explosion (code 1307) that damaged other tanks containing light petroleum products. The explosion was then followed by fire (codes 1202 and 1205) due to flammable liquid release (code 1102). Combustion products were released into air (code 1401).

Appendix Full Report A / dangerous substances:

The total establishment and the potential directly involved inventories of petroleum products (gasoline, gasoil, fuel oil) refer to the amount involved in the accident. No data are available about the amount of petroleum products initially released from the tank and of the vapours that evaporating formed the unconfined cloud that exploded. No data are available also about the combustion products released during the fire.

Appendix Full Report A / source of accident - remarks:

The accident occurred during ship unloading operations (code 3304) in the AGIP coastal storage depot (codes 2002 and 3202) for petroleum products (gasoline, diesel, gasoil, fuel oil). The component involved in the release of flammable liquid was tank N° 17 (code 4003). The explosion (U.V.C.E.) involved others 25 tanks (contained in the SIF area) containing mainly light petroleum products (code 4003). The AGIP depot was in an area with a high density of population, close to civil buildings.

Appendix Full Report A / causes of major occurrence:

The release of the flammable/explosive liquid from tank N° 17 during loading operations was caused by the loose of control of the gate valves position by the two operators in charge of the operation (codes 5401, 5303 and 5304). It resulted in the overflowing on the tank that was not detected (codes 5307 and 5308). The released vapours formed a cloud that was ignited in an adjacent area, causing a violent unconfined vapour cloud explosion (U.V.C.E.).

Appendix Full Report B / area concerned - remarks:

The accident caused great damages to the depot and to its structures. Outside the depot, it caused the complete destruction of some buildings and damages to some industrial and civil premises in a radius of various hundred metres; serious damages to the road connecting the city of Naples (street "Arnaldo Lucci") to the high-way Napoli-Salerno and damages to the rail-way "Circumvesuviana". A large area around the depot had been declared off limits. Ships had been moved away from the harbour.

Appendix Full Report B / people:

2 people inside the depot (in charge of the unloading operations) and 2 people living in a destroyed building outside the depot were killed by the explosion. Many people (about 100) were injured (and hospitalized) because they were hit by debris or fallen during the escape following the accident (the explosion caused a great panic in the population in a large area of the city).

Appendix Full Report B / ecological harm:

In the Original Report there is no evidence of significant ecological harms because, though there was a risk of burned products flowing into the Sperone Channel (with consequent damages to the activities in the harbour), nothing happened.

Appendix Full Report B / material loss:

The accident caused great damages to the depot and to its structures. Outside the depot, it caused the complete destruction of some buildings and damages to some industrial and civil premises in a radius of various hundred metres (about 220 civil buildings, 12 large buildings and 448 industrial or artigianal units were damaged); serious damages to the road connecting the city of Naples (street "Arnaldo Lucci") to the high-way Napoli-Salerno and damages to the rail-way "Circumvesuviana".

Appendix Full Report B / disruption of community life:

The accident caused great damages to the depot and to its structures. Outside the depot, it caused the complete destruction of some buildings and damages to some industrial and civil premises in a radius of various hundred metres; serious damages to the road connecting the city of Naples (street "Arnaldo Lucci") to the high-way Napoli-Salerno and damages to the rail-way "Circumvesuviana". A large area around the depot had been declared off limits. Ships had been moved away from the harbour.

Appendix Full Report C / lesson learned - mitigate:

Due to the successive collapse of some storage tanks engulfed in the fire, some fire-balls occurred and the flammable liquid contained was released into the dikes. It was a good choice to send foam (though more expensive) instead of water in the dikes to reduce the effects of the collapse of tanks. In this way the whole amount of available water was used to cool the tanks and the risk of dikes overflowing and, therefore, of the spreading of fire to other areas was avoided.