

Explosion och brand på fartyg vid lastning i oljehamn.

890706 MARS 1989_11

Olyckan inträffade då ett motorfartyg skulle lasta bensin vid en oljedepå. Några minuter efter klockan 18 avbröts lastningsoperationerna för ett nödvändigt reparationsarbete. Tjugo minuter senare inträffade en kraftig explosion ombord, följt av en brand. Raffinaderiets brandlarm gick omedelbart. Fyra av fartygets manskap räddades undan och fördes till sjukhus. Det huvudsakliga skälet till olyckan var en allvarlig läcka som bildats till följd av en skadad fläns i en koppling. Varför denna skada uppstått är okänt. Fartyget lossades från sina förtöjningar och samtliga slangar kopplades loss. Med hjälp av två bogserbåtar drogs fartyget ut från land där kustbevakningen tog över brandbekämpningen. Fartyget hölls 1,5 km från land. Efter ca 6 timmar, vid midnatt, föreföll branden vara under kontroll. Emellertid nådde elden bränsletankarna tidigt nästa morgon. Branden tog förnyad fart allteftersom den ena efter den andra av tankarna exploderade. Vid middagstid var branden helt utom kontroll. All sjöfart i hamnen spärrades av och man koncentrerade sig på att förhindra att branden spred sig till andra fartyg. 48 timmar efter den första explosionen sjönk fartyget.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
bensin (gasoline)	8006-61-9	700 000 kg

Skador:

Människor:	4 personer skadades vid explosionen och fick föras till sjukhus. 4 brandmän skadades under släckningsarbetet.
Materiella:	Fartyget gick till botten.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	Hamnområdet spärrades av.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1989_011_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1989-07-06 start: 18:35:00

finish: 1989-07-08 finish:

Establishment:

name:

address:

industry: 2002 petrochemical, refining, processing

Petroleum Refinery (The ship was loading Premium Gasoline at the Refinery Pier)

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:** 1989_011_01

Accident Types:

release: Yes **explosion:** Yes

water contamination: No **other:** No

fire: Yes

description:

The motorship "Saint Nickolaos" was loading gasoline at the Hellenic Aspropyrgos Refinery pier. At 18:10 the ship's responsible mechanic requested a halt in the loading in order to proceed with necessary repairs. 20 minutes after the interr... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: No **explosive:** Yes

ecotoxic: Yes **other:** No

flammable: Yes

description:

- Gasoline (C.A.S. CODE: 8006-61-9): amount involved = 700,000 kg.

Immediate Sources of Accident:

storage: No **transfer:** Yes

process: No **other:** No

description:

The accident occurred during the loading of gasoline onto the motorship "Saint Nickolaos" at the refinery pier. The motorship "Saint Nickolaos" had a loading capacity of about 1800 tonnes.

Suspected Causes:

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

human: No **other:** No

description:

CAUSES:... see Appendix Short Report / description of suspected causes

Immediate Effects:

material loss: Yes

human deaths: No

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

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:** Yes

external services: Yes **restoration:** No

sheltering: No **other:** No

evacuation: No

description:

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

Immediate Lessons Learned:

prevention: Yes **other:** No

mitigation: Yes

description:

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:... see Appendix Short Report / description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1989_011_01

1 Type of Accident

remarks: Due to a serious leak of gasoline (codes 1101 and 1102) in the machinery

shop of the ship "Saint Nickolaos", a strong explosion (code 1307) occurred

in that room, followed by a fire (1202). After some hours, the fire spread

from the ship ma... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment inventory and the potential inventory directly

involved of gasoline refer to the whole loading capacity of "Saint

Nickolaos" ship.

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred during the loading of Premium Gasoline onto the

motorship "Saint Nickolaos" at the refinery pier. An explosion, followed by a fire, occurred in the machinery shop (code 4999) of the ship (code 4012). Then, the fire spr... 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 5102 operation: component/machinery failure/malfunction

5501 other: not identified

- not applicable -

- not applicable -

- not applicable -

human / organizational - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

remarks: The leak of gasoline in the ship machinery shop occurred from damaged flange connections

(code 5102). The causes of the damages to flange connections have not identified (code

5501). The ignition source that caused the explosion in the ship... see Appendix Full

Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1989_011_01

event:

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

event:

major occurrence 1201 fire: conflagration (a general engulfment fire)

initiating event 1102 release: fluid release to ground

associated event - not applicable -

event:

major occurrence 1103 release: fluid release to water

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

associated event - not applicable -

Dangerous substances

country: FA **ident key:** 1989_011_01

a) total establishment inventory

CAS number: 8006-61-9 **identity:** Gasoline

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): 1800

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 700 **potential quantity:** 1800

c) substance belongs to relevant inventory indirectly involved: No

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

Source of Accident - Situation **country:** FA **ident key:** 1989_011_01

situation

industry

initiating event - not applicable -

associated event - not applicable -

activity/unit

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

component

major occurrence 4012 other transfer equipment/apparatus/vehicle

initiating event 4999 other

associated event - not applicable -

situation

industry

initiating event 2002 petrochemical, refining, processing

associated event - not applicable -

activity/unit

major occurrence 3304 transfer: loading/unloading activities (transfer interfaces)

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

associated event - not applicable -

component

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

initiating event 4012 other transfer equipment/apparatus/vehicle

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1989_011_01

1 Area concerned

affected

extent of effects installation: Yes

establishment: No

off-site; local: No

off-site; regional: No

off-site; transboundary: No

illustration of effects - not applicable -

remarks The fire did not spread to the refinery loading installations because the ship w... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 40 30

immediate fatalities

subsequent fatalities

hospitalizing injuries 4 4

other serious injuries

health monitoring

remarks About 70 people were involved in the accident: 40 people owing to the ship's cr... 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 ecological harms because, in orde... 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 No data are available about the cost of the 700 tonnes of gasoline lost during t... see Appendix

Full Report B / material loss

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

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

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

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

- **other places of public assembly** No 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 About 2 days

- **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 access to the Eleusina Gulf was closed by the Navy Guarding Services.... see Appendix Full Re

7 Discussion of Consequences

C Response Full Report

country: FA ident key: 1989_011_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

After the accident, the follow... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

After the accident, the follow... see Appendix Full Report C / lesson learned - mitigate

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1989_011_01 report

Appendix Short Report / description of accident types:

The motorship "Saint Nickolaos" was loading gasoline at the Hellenic Aspropyrgos Refinery pier. At 18:10 the ship's responsible mechanic requested a halt in the loading in order to proceed with necessary repairs. 20 minutes after the interruption, a strong explosion occurred in the ship machinery shop, followed by a fire. Immediately the refinery fire alarm was activated and the refinery fire-fighting crew reached the fire area in a couple of minutes. 4 injured members of the ship's crew were carried out to the pier and from there to the nearest hospital. The fire fighting operation started with the local monitors covering with foam the outside part of the ship and the machinery shop. Meanwhile the ship was disconnected from the loading hoses (spouders) and from the tied ropes and, by means of two tags, transferred away from the pier. The fire fighting activities were undertaken by the Navy Guarding Services using special fire fighting tags (water foam). Finally, the burning ship was transferred at about 1.5 km away from the pier installation and six hours later the fire was under control. Meanwhile, the Navy Guarding Services were connected with fire fighting crews from the Special National Fire Fighting Services. However, the next morning the fire, from the machinery shop, reached the first tank and spread, with repeated explosions, to the other tanks of the ship. At noon of the day after, the situation appeared to be out of control. Four firemen were injured. The ship was bent and the fire was extending from leaking gasoline 50 m around. Navigation in the gulf was interrupted and fire fighters tried to the fire from spreading to the other anchored ships. They tried to avoid environmental pollution by using a 400 metres long boom. On Saturday afternoon (July 8, 1989), about 48 hours after the first explosion, the tanker "Saint Nickolaos" sank.

Appendix Short Report / description of suspected causes:

CAUSES:

The main cause was a serious leak of gasoline in the ship machinery shop from damaged flange connections. The causes of the damages to flange connections have not identified. The ignition source that caused the explosion has not fully identified (probably a switch-off operation in a not explosion-proof electrical panel). When the Original Report was prepared, the National Fire Fighting Service and the Navy Guarding Services were carrying out the investigation.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

About 70 people were involved in the accident. 4 people were injured by the explosion and were hospitalized. 4 firemen were injured during the fire-fighting operations.

MATERIAL LOSS:

No data are available about the cost of the 700 tonnes of gasoline lost during the accident and of the motorship "Saint Nickolaos" that, 48 hours after the first explosion, sank.

ECOLOGICAL HARM:

The environmental pollution of the Eleusina Gulf was avoided by using a 400 metres long boom around the burning ship.

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

The accident took place at the refinery pier and only some members of the ship's crew and some refinery operators were at the scene of the accident.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

The Hellenic Aspropyrgos refinery fire fighting crew and the technical personnel were activated and all the fire-trucks were ready for local protection and covering the rest loading ships at the pier. 4 injured members of the ship's crew were carried out to the pier and from there to the nearest hospital. The fire fighting operation started with the local monitors covering with foam the outside part of the ship and the machinery shop. Meanwhile the ship was disconnected from the loading hoses (spouders) and from the tied ropes and, by means of two tags, transferred away from the pier.

EXTERNAL TO THE ESTABLISHMENT:

The special forces from the National Fire Fighting Services came to support the fire fighting efforts close to the pier and later with tags in the open sea. The ship was disconnected from the loading hoses and moved away from the pier (the fire did not spread to the refinery loading installations) in order to put out the fire without its spreading to the other anchored ships. Navigation in the gulf was interrupted and no other ships were allowed to enter the Eleusina Gulf. The environmental pollution was avoided by using a 400 metres long boom around the burning ship.

Appendix Short Report / description of immediate lessons learned:

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:

After the accident, the following measures were established:

- 1- the upgrading of the refinery pier fire fighting systems (including the installation of new automatic remote control monitors on local towers) is ready for application;
- 2- the crew of ships and especially tankers must be well trained in fire prevention.

MEASURES TO ALLEVIATE THE EFFECTS OF THE ACCIDENT:

After the accident, the following measures were established:

- 1- the crew of ships and especially tankers must be well trained in fire fighting;
- 2- the fire fighting means for this type of tankers must be improved and they must be in a sufficient number both on the deck and in the other special areas of the ships;
- 3- the fire fighting tags must be equipped with large quantities of a foam compound.

Appendix Full Report A / type of accident:

Due to a serious leak of gasoline (codes 1101 and 1102) in the machinery shop of the ship "Saint Nickolaos", a strong explosion (code 1307) occurred in that room, followed by a fire (1202). After some hours, the fire spread from the ship machinery shop to the first tank and, with repeated explosions, to the other tanks of the ship. The fire then extended 50 metres around the motorship (code 1201) due to the leak of gasoline onto the water (code 1103).

Appendix Full Report A / source of accident - remarks:

The accident occurred during the loading of Premium Gasoline onto the motorship "Saint Nickolaos" at the refinery pier. An explosion, followed by a fire, occurred in the machinery shop (code 4999) of the ship (code 4012). Then, the fire spread to the tanks of the ship (code 4003) containing the loaded gasoline. The motorship "Saint Nickolaos" had a whole loading capacity of about 1,800 tonnes.

Appendix Full Report A / causes of major occurrence:

The leak of gasoline in the ship machinery shop occurred from damaged flange connections (code 5102). The causes of the damages to flange connections have not identified (code 5501). The ignition source that caused the explosion in the ship machinery shop is not fully known, but probably was a switch-off operation in a not explosion-proof electrical panel. In any case, the National Fire Fighting Service and the Navy Guarding Services undertook the investigation.

Appendix Full Report B / area concerned - remarks:

The fire did not spread to the refinery loading installations because the ship was quickly disconnected from the loading hoses and moved away from the pier at about 1.5 km. The area was blocked and no other ships were permitted to enter the Eleusina Gulf. The environmental pollution was avoided by using a 400 metres long boom around the burning ship.

Appendix Full Report B / people:

About 70 people were involved in the accident: 40 people owing to the ship's crew and to the pier's crew, 30 people of the emergency services. 4 members of the ship's crew were injured by the explosion and were carried out to the hospital. 4 firemen were injured during the fire fighting operations (from the Original Report is not fully clear if firemen were hospitalized or not).

Appendix Full Report B / ecological harm:

In the Original Report there is no evidence of ecological harms because, in order to prevent an environmental pollution of the area caused by the gasoline that was escaping from the burning ship, a 400 metres long boom was put around it.

Appendix Full Report B / material loss:

No data are available about the cost of the 700 tonnes of gasoline lost during the accident and of the "Saint Nickolaos" motorship.

Appendix Full Report B / disruption of community life:

The access to the Eleusina Gulf was closed by the Navy Guarding Services.

Appendix Full Report C / lesson learned - prevent:

After the accident, the following measures were established:

- 1- the upgrading of the refinery pier fire fighting systems (including the installation of new automatic remote control monitors on local towers) is ready for application;
- 2- the crew of ships and especially tankers must be well trained in fire prevention.

Appendix Full Report C / lesson learned - mitigate:

After the accident, the following measures were established:

After the accident, the following measures were established:

- 1- the crew of ships and especially tankers must be well trained in fire fighting;
- 2- the fire fighting means for this type of tankers must be improved and they must be in a sufficient number both on the deck and in the other special areas of the ships;
- 3- the fire fighting tags must be equipped with large quantities of a foam compound.