Gasutsläpp på en petrokemisk fabrik.

890409 MARS 1989_20

Olyckan inträffade i en anläggning för produktion av smörjolja. I recirkuleringssystemet för propan bildas asfalt och ospecifiecrade oljor som måste tömmas under varje skift. Tömningen sker via ett dräneringskärl, som sedan ofta blåses rent med heta oljor. Under normala betingelser förångades eventuellt propanöverskott. Under skiftet strax före olyckan upptäcktes att dräneringskärlet var igenpluggat. Efter ett misslyckat att åtgärda detta stängdes kärlet. Dränering av kärlet påbörjades, och efter två timmer släpptes en större mängd propan ut och drev 20-30 m bort. En ventil som borde varit stängd var blockerad av en mindre mängd asfalt. En operatör upptäckte gasmolnet samtidigt som varningssignalen för låg propannivå i systemet gick. Ventilen mellan recirkuleringssystemet och dräneringskärlet stängdes manuellt. Företagets katastrofplan hann träda i verket men gasen skingrades mycket snabbt.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
propan	74-98-06	9000 kg
asfalt	8052-42-4	okänt

Skador:

Människor:	Inga.
Materiella:	Inga.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	Inga.

Erfarenheter redovisade (Ja/Nej): Ja.

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA **ident key:** 1989_020_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1989-04-09 **start:** 06:00:00

finish: finish:

Establishment:

name:

address:

industry: 2002 petrochemical, refining, processing

Petroleum Refinery

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_020_01

Accident Types:

release: Yes **explosion:** No

water contamination: No **other:** No

fire: No

description:

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

Substance(s) Directly Involved:

toxic: No **explosive:** Yes

ecotoxic: No **other:** No

flammable: Yes

description:

- Propane (C.A.S. CODE: 74-98-06): amount involved = 9,000 kg.... see Appendix Short Report / description of substances involved

Immediate Sources of Accident:

storage: No **transfer:** No

process: Yes **other:** No

description:

The accident occurred in the propane de-asphalting unit of a plant manufacturing lubricating oil in a petroleum refinery. The accident occurred during the draining of asphalt and other residual oils from the propane recirculating system int... see Appendix Short Report / description of immediate sources

Suspected Causes:

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

human: No **other:** No

description:

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

Immediate Effects:

material loss: No

human deaths: No

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

other: Yes

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: No **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: No

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_020_01

1 Type of Accident

remarks: During the drainage of asphalt and other residual oils from the circulating system into a drain vessel (to allow any LPG present to evaporate), a large amount of propane escaped from it and drifted towards the centre of the manufacturing un... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment and the potential directly involved inventories of propane refer to the volumetric capacity of the accumulator under the hypotheses that the isolation of the line between the propane recyrculating system and the drai... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in the propane de-asphalting unit of a plant

manifacturing lubricating oil of a petroleum refinery (code 2002). The initiating event occurred during the draining of asphalt and other residual oils from the accumulator ... 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 5108 operation: blockage

- not applicable -

- not applicable -

- not applicable -

- not applicable -

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

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

- not applicable -

- not applicable -

- not applicable -

remarks: A solid plug of asphalt and/or ice was trapped in the propane drainage valve preventing its fully closure after the propane had been drained (code 5108). When propane was subsequently drained, the plug of asphalt was removed and propane rel... see Appendix Full Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident **country:** FA **ident key:** 1989_020_01

event:

major occurrence 1101 release: gas/vapour/mist/etc release to air

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

associated event - not applicable -

Dangerous substances

country: FA **ident key:** 1989_020_01

a) total establishment inventory

CAS number: **identity:** Residual Oils

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: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

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

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: 74-98-6 **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): 24

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 9 **potential quantity:** 24

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: 8052-42-4 **identity:** Asphalt

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: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

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

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_020_01

situation

industry

inititating event 2002 petrochemical, refining, processing

associated event - not applicable -

activity/unit

major occurrence 3104 process: physical operations (mixing, melting crystallizing, etc.)

inititating event 3104 process: physical operations (mixing, melting crystallizing, etc.)

associated event - not applicable -

component

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

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

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1989_020_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 propane's cloud drifted 20ˆ30 metres in southerly direction towards the cent... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 3500

immediate fatalities

subsequent fatalities

hospitalizing injuries

other serious injuries

health monitoring

remarks On whole site approximately 3500 people (15 on plant) were present when the acci... 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. Thi... 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 US$ ECU US$

material losses 1800

response, clean up, restoration

remarks No material losses occurred except the escaped propane (its cost has been estima... 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

- air transport No

significant public concern none local level national level

- off site populations Yes No No

- media interest No No No

- political interest No No No

remarks In the Original Report there is no evidence of significant effects outside the i... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1989_020_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:

- not applicable -

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1989_020_01 report

Appendix Short Report / description of accident types:

ACCIDENT CASE HISTORY DESCRIPTION:

During the manufacture of lubricating oil, there was a build up of asphalt and other residual oils in the propane recirculating system. They were drained at each shift from an accumulator vessel into a drain vessel, which was often flushed out with hot gasoil or flushing oil. The asphalt and residual oils were drained to the plant's surface drain and then to an interceptor pit; any propane present would evaporate. The accumulator vessel had a capacity of approximately 24 tonnes of propane at 50¯C and 21 bar. During the shift preceeding the accident, the drain line from the drain vessel was found to be plugged; after an unsuccessful attempt to remedy this, it was closed. Draining of the asphalt and other residual oils from the recirculating system into the drain vessel was started. After two hours later, a large amount of propane escaped from the drain vessel and drifted 20˜30 metres in southerly direction towards the centre of the manufacturing unit. An operator noticed a gas cloud and, at the same time, the propane low level alarm sounded in the main control room. The shift controller manually closed the valve between the propane recirculating system and the drain vessel. The on-site emergency services were called but on their arrival the gas cloud was already safely dispersed.

Appendix Short Report / description of substances involved:

- Propane (C.A.S. CODE: 74-98-06): amount involved = 9,000 kg.

- Asphalt (C.A.S. CODE: 8052-42-4): amount involved = not known.

- Residual Oils: amount involved = not known.

Appendix Short Report / description of immediate sources:

The accident occurred in the propane de-asphalting unit of a plant manufacturing lubricating oil in a petroleum refinery. The accident occurred during the draining of asphalt and other residual oils from the propane recirculating system into the drain vessel. The propane recirculation system was operating at 50¯C and 21 bar. On a map attached to the Original Report is shown the location of the plant and the source of leakage.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

The drain valve was inadvertently left partially open due to a solid plug of asphalt that was inhibiting its full closure (the valve was supposed to be closed). When propane was drained, the plug was removed (owing to propane pressure in the recirculating system) and 9 tonnes of propane were released to the atmosphere.

CAUSES:

A solid plug of asphalt and/or ice was trapped in the propane drainage valve preventing its fully closure after the propane had been drained. When propane was subsequently drained, the plug of asphalt was removed and 9 tonnes of propane were released to the atmosphere. The plant has not been designed with a double valve system on the drain line and the operating instructions did not adequately deal with procedures to be followed in the event of a blockage.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

15 people were on the plant and approximately 3500 people on whole site when the accident occurred but no-one was injured.

OTHER:

No material losses occurred except the escaped propane (its cost has been estimated in about 1,800 dollars).

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

The gas cloud was detected by operator at same time as low level alarm for the propane recirculating system sounded in the main control room. The shift controller manually closed the valve between the propane recirculating system and the drain vessel. The on-site emergency services were called but on their arrival the gas cloud was already safely dispersed and no further emergency actions were required.

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- an additional spring loaded valve has been installed in the drain lines to close automatically when a blockage clears;

2- operating instructions updated to include a requirement that the drain vessel and its drain line should be flushed through with gasoil after each draining operation so as to prevent accumulation of solid asphalt;

3- the drain system redesigned so that asphalt can be drained from the vessel via a closed system, thereby removing the potential risk of a release to the atmosphere.

Appendix Full Report A / type of accident:

During the drainage of asphalt and other residual oils from the circulating system into a drain vessel (to allow any LPG present to evaporate), a large amount of propane escaped from it and drifted towards the centre of the manufacturing unit. The gas cloud dispersed safely without igniting.

Appendix Full Report A / dangerous substances:

The total establishment and the potential directly involved inventories of propane refer to the volumetric capacity of the accumulator under the hypotheses that the isolation of the line between the propane recyrculating system and the drain vessel should not be possible. No data are available about the amount of asphalt and residual oils involved in the accident.

Appendix Full Report A / source of accident - remarks:

The accident occurred in the propane de-asphalting unit of a plant manifacturing lubricating oil of a petroleum refinery (code 2002). The initiating event occurred during the draining of asphalt and other residual oils from the accumulator vessel (code 3104) of the circulating system into the drain vessel. The recirculation system operated at 50¯C and 21 bar. The major occurrence occurred in the the drain vessel (code 4003) used to collect asphalt and other residual oils.

Appendix Full Report A / causes of major occurrence:

A solid plug of asphalt and/or ice was trapped in the propane drainage valve preventing its fully closure after the propane had been drained (code 5108). When propane was subsequently drained, the plug of asphalt was removed and propane released to the atmosphere through the drain vessel. The plant had not been designed with a double valve system on the drain valve (code 5308). The operating instructions did not adequately deal with the procedures to be followed in case of blockage (code 5303).

Appendix Full Report B / area concerned - remarks:

The propane's cloud drifted 20ˆ30 metres in southerly direction towards the centre of the manufacturing unit. The concentration of propane in the cloud prior to dispersion is not known. In the Original Report there is no evidence of effects outside the installation. On a map attached to the Original Report is shown the position of the plant where the release occurred and the leak point.

Appendix Full Report B / people:

On whole site approximately 3500 people (15 on plant) were present when the accident occurred but no one was injured.

Appendix Full Report B / ecological harm:

In the Original Report there is no evidence of significant ecological harms. This is due to the low ecotoxic risk of propane.

Appendix Full Report B / material loss:

No material losses occurred except the escaped propane (its cost has been estimated in about 1,800 dollars).

Appendix Full Report B / disruption of community life:

In the Original Report there is no evidence of significant effects outside the installation.

Appendix Full Report C / lesson learned - prevent:

After the accident, the following measures were established:

1- an additional spring loaded valve has been installed in the drain lines to close automatically when a blockage clears;

2- operating instructions updated to include a requirement that the drain vessel and its drain line should be flushed through with gasoil after each draining operation so as to prevent accumulation of solid asphalt;

3- the drain system redesigned so that asphalt can be drained from the vessel via a closed system, thereby removing the potential risk of a release to the atmosphere.