

Explosion och storbrand på en oljedepå.

940804

MARS 1994_18

oklar

Omständigheterna kring olyckan är oklart återgivna i rapporten. Ett utsläpp av flyktiga kolväten, huvudsakligen lättbensin, uppstod vid bruk av olämpligt utformade ventiler. Huvudventilen till en tank med 100 ton var stängd. Då en annan (olämpligt utformad) ventil öppnades släppte ett stort gasmoln ut. Detta fattade eld och exploderade. branden hotade två tankar på sammanlagt 4000 ton. Branden släcktes efter 18 timmar av räddningstjänsten i samarbete med ett flertal brandkårer. I släckningsarbetet användes 40 000 ton vatten tillsammans med skum.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
flyktiga kolväten, bl.a. kloroform		

Skador:

Människor: En anställd omkom i explosionen. 7 brandmän behandlade för kemiska brännskador de fått efter kontakt med kontaminerat släckningsvatten.

Materiella: Omfattande skador på depån.

Miljö/ekologi: Inga effekter rapporterade.

Infrastruktur: Inga effekter rapporterade.

Erfarenheter redovisade (Ja/Nej): Ja

Mycket kortfattat anges förebyggande åtgärder.

Referenser ges: (1) Loss Prevention in the Process Industries FP Lees 1989; (2) Oil Industry Advisory Committee "Guidance on permits to work"; (3) Institute of Petroleum model codes of practice Nos 2 and 19; ((4) Fire precautions at Petroleum Refineries and Bulk Storage Installations and Marketing safety code).

Report Profile

Identification of Report:

country: FA ident key: 1994_018_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1994-08-04 start: 06:55:00

finish: 1994-08-05 finish: 00:55:00

Establishment:

name:

address:

industry: 2008 wholesale and retail storage and distribution (incl. LPG bottling & bulk distrib., more: F1!)

Chemicals (oil terminal)

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: 1994_018_01

Accident Types:

release: Yes explosion: Yes

water contamination: No other: No

fire: Yes

description:

Major incident - Senior operations controller killed during fire and explosion involving 1000 tonne storage vessel containing petroleum spirit. Resulting fire burned for 18 hours before being extinguished.

Substance(s) Directly Involved:

toxic: No explosive: No

ecotoxic: No other: No

flammable: Yes

description:

1) Petroleum spirit

2) Karosene

3) Chloroform

Immediate Sources of Accident:

storage: Yes transfer: Yes

process: No other: No

description:

Petroleum spirit escaped during operation of hamer blind in pump room causing vapour cloud. Ignited by source of ignition (possibly vehicle) nearby.

Suspected Causes:

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

human: Yes **other:** No

description:

Main valve from the storage tank was closed but low point valves left open so when operator attempted to close hamer blind (spade valve) high pressure escape of petroleum spirit produced large vapour cloud.

Immediate Effects:

material loss: Yes

human deaths: Yes

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

other: No

ecological harm: No

national heritage loss: No

description:

Operator killed followed by mayor fire brought under control by fire brigade only to increase intensity subsequently.

Emergency Measures taken:

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

external services: Yes **restoration:** No

sheltering: No **other:** No

evacuation: Yes

description:

10 fire appliances using pumps and foam equipment from Avon fire brigade along with British Aerospace foam generating vehicle (used for aircraft fires). Emergency on-site system for both GATX and the adjacent LPG plant belonging to BP insti... see Appendix Short Report / description of emergency measures taken

Immediate Lessons Learned:

prevention: Yes **other:** No

mitigation: No

description:

Immediate prohibition: notice on use of hamer valve unless there is means for detecting pressure and safely directing material into closed containers. There are issues here relating to other petroleum terminals elsewhere in the country who u... see Appendix Short Report / description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1994_018_01

1 Type of Accident

remarks: Fire involving release of petroleum spirit caused further damage to pipe seals and valve packing leading to further source of fuel.

2 Dangerous Substances

remarks: 100 tonne storage tanks connected to common lines by means of "Hamer" line

blinds. Head of liquid above blinds of 7 metres. Had valves not been found and closed during fire major loss of containment would have followed with possible major es... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: Hamer blind (spade valve) which requires flanges to be parted (system opened) was in use as process control (not for maintenance operations) unsafe system of work allowed blind to be operated without adequate line isolation.

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

Yes No No No No

wind speed (m/s): 2

direction (from): East

stability (Pasquill):

ambient temperature (°C): 12

remarks: Very still conditions allowed large vapour cloud to be generated when blind was opened with pressure on from 1000 tonne tank petrol. Cloud was at least 100m long.

5 Causes of Major Occurrence

main causes

technical / physical 5101 operation: vessel/container/containment-equipment failure

5310 organization: manufacture/construction (inadequate, inappropriate)

5311 organization: installation (inadequate, inappropriate)

- not applicable -

- not applicable -

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

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

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

5310 organization: manufacture/construction (inadequate, inappropriate)

5312 organization: isolation of equipment/system (none, inadequate, inappropriate)

remarks: Grossly inadequate systems of work for opening lines in order to insert spades - no permit required. Hamer blinds not suitable for this application unless as part of a system to ensure isolation.

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1994_018_01

event:

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

Dangerous substances

country: FA ident key: 1994_018_01

a) total establishment inventory

CAS number: identity: Sulphur Trioxide

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): 2000

use of substance as:

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

a) total establishment inventory

CAS number: identity: Sulphur Dioxide

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): 800

use of substance as:

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

a) total establishment inventory

CAS number: identity: Propylene

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): 165

use of substance as:

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

a) total establishment inventory

CAS number: identity: Hydrogen Fluoride

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): 1400

use of substance as:

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

a) total establishment inventory

CAS number: identity: Hydrogen

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): 2

use of substance as:

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

a) total establishment inventory

CAS number: ABOVE BOILING identity: Flammable Substances

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): 6005

use of substance as:

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 5 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: POINT < 21OC identity: Flammable Liquids With Flash

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): 14800

use of substance as:

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

a) total establishment inventory

CAS number: identity: Chlorine

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): 4300

use of substance as:

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

a) total establishment inventory

CAS number: identity: Bromine

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): 75

use of substance as:

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

Source of Accident - Situation country: FA ident key: 1994_018_01

situation

industry

initiating event - not applicable -

associated event - not applicable -

activity/unit

major occurrence 3301 transfer: pipeline/pipework transfer

initiating event 3301 transfer: pipeline/pipework transfer

associated event - not applicable -

component

major occurrence 4011 general pipework/flanges

initiating event 4011 general pipework/flanges

associated event - not applicable -

situation

industry

initiating event 2008 wholesale and retail storage and distribution (incl. LPG bottling & bulk distrib., more: F1!)

associated event 2008 wholesale and retail storage and distribution (incl. LPG bottling & bulk distrib., more: F1!)

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 - not applicable -

component

major occurrence 4010 valves/controls/monitoring devices/drain cocks

initiating event 4010 valves/controls/monitoring devices/drain cocks

associated event - not applicable -

B Consequences Full Report

country: FA ident key: 1994_018_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 major fire centred around the Hamer blind. Seals and gaskets were damaged in... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 22 50 30

immediate fatalities 1 0 0

subsequent fatalities 0 0 0

hospitalizing injuries 0 7 0

other serious injuries 0 0 0

health monitoring 0 0 0

remarks 7 firemen treated for skin burns from contact with run-off water contaminated wi... 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 Yes

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

preventing human access or activities)

- marine or fresh water habitat Yes

- areas of high conservation value or given special protection Suspected

remarks Large quantities of protein foam and 40000 tonnes of water used in fighting fire... see Appendix

Full Report B / ecological harm

4 National Heritage Loss

effects on:

- historical sites Suspected - historic monuments Suspected

- historic buildings Suspected - art treasures Suspected

remarks Industrial site.

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 These costs are not available.

6 Disruption of Community Life

establishment/plant evacuated disabled/unoccupiable destroyed

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

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

- **media interest** No No Yes

- **political interest** No No Yes

remarks Adjacent LPG installation 4000 tonnes was put at risk from fire.... see Appendix Full Report B /

7 Discussion of Consequences

Ecological Components involved

country: FA **ident key:** 1994_018_01

type: 6402 offshore: estuary

threatened: Yes **affected:** Yes

type: 6204 freshwater: river

threatened: Yes **affected:** Yes

C Response Full Report

country: FA **ident key:** 1994_018_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

Routine opening of closed cont... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

The use of SPADE valves for th... see Appendix Full Report C / lesson learned - mitigate

useful references:

(1) Loss Prevention in the Pr... see Appendix Full Report C / lesson learned - references

5 Discussion about Response

- not applicable -

Appendices for the FA / 1994_018_01 report**Appendix Short Report / description of emergency measures taken:**

10 fire appliances using pumps and foam equipment from Avon fire brigade along with British Aerospace foam generating vehicle (used for aircraft fires). Emergency on-site system for both GATX and the adjacent LPG plant belonging to BP instituted.

Appendix Short Report / description of immediate lessons learned:

Immediate prohibition notice on use of hamer valve unless there is means for detecting pressure and safely directing material into closed containers. There are issues here relating to other petroleum terminals elsewhere in the country who use this type of valve to close off lines.

Appendix Full Report A / dangerous substances:

100 tonne storage tanks connected to common lines by means of "Hamer" line blinds. Head of liquid above blinds of 7 metres. Had valves not been found and closed during fire major loss of containment would have followed with possible major escalation of fire.

Appendix Full Report B / area concerned - remarks:

The major fire centred around the Hamer blind. Seals and gaskets were damaged in the initial fire causing further leaks. Overhead pipework sagged in heat but was not reached.

Appendix Full Report B / people:

7 firemen treated for skin burns from contact with run-off water contaminated with petrol/chemicals in bund.

Appendix Full Report B / ecological harm:

Large quantities of protein foam and 40000 tonnes of water used in fighting fire. NRA permission obtained to allow contaminated run-off into river and sea.

Appendix Full Report B / disruption of community life:

Adjacent LPG installation 4000 tonnes was put at risk from fire.

Appendix Full Report C / lesson learned - prevent:

Routine opening of closed containment is unacceptable unless a strict operational procedure (written) is used. A much better system is the one now adopted (double block and bleed valves).

Appendix Full Report C / lesson learned - mitigate:

The use of SPADE valves for these types of operation should be discouraged.

Appendix Full Report C / lesson learned - references:

(1) Loss Prevention in the Process Industries FP Lees 1989; (2) Oil Industry Advisory Committee "Guidance on permits to work"; (3) Institute of Petroleum model codes of practice Nos 2 and 19; (((4) Fire precautions at Petroleum Refineries and Bulk Storage Installations and Marketing safety code)).