

## Explosion på en anläggning för avfallsförbränning.

930209 MARS 1993\_02

En tank på 300 m<sup>3</sup> som innehöll 170 m<sup>3</sup> lösningsmedel antändes då 1 kg brandfarliga kolväten exploderade. Explosionen inträffade i en omrörare till följd av överhettning. Överhettningen i sin tur uppstod på grund av ett utslitet kullager i omröraren. Räddningstjänsten hade släckt branden efter en timme.

### Inblandade ämnen och mängder

	CAS Nr.	Mängd
brandfarlig vätska (explosion)		1 kg
brandfarlig vätska (brand)		170 m <sup>3</sup>

### Skador:

Människor: 4 anställda skadades i branden. Ytterligare 1 person fick första hjälpen. Alla 5 fördes till sjukhus.

Materiella: Omfattande skador på anläggningen.

Miljö/ekologi: Inga effekter rapporterade.

Infrastruktur: Inga.

### Erfarenheter redovisade (Ja/Nej):

Kortfattat anges förebyggande åtgärder.

## Report Profile

### Identification of Report:

country: FA ident key: 1993\_002\_01

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

### Date of Major Occurrence: Time of Major Occurrence

start: 1993-02-09 start: 07:00:00

finish: finish:

### Establishment:

name:

address:

industry: - not applicable -

Plant for partial and complete elimination of solid and liquid materials through combustion

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:** 1993\_002\_01**Accident Types:****release:** No **explosion:** Yes**water contamination:** No **other:** No**fire:** Yes**description:**

The cover of the tank near to the explosion rised. Subsequently a part of the tank content burned.... see

Appendix Short Report / description of accident types

**Substance(s) Directly Involved:****toxic:** No **explosive:** No**ecotoxic:** No **other:** No**flammable:** Yes**description:**

Explosion: 1 kg highly flammable liquid

Fire: 170 m3 flammable solvent

**Immediate Sources of Accident:****storage:** Yes **transfer:** No**process:** No **other:** No**description:**

The accident took place in a 300 m3 above-ground storage tank containing 170 m3 used solvents. An explosion took place and the pressure generated hereby lifted up the tank cover and the content of the tank caught fire and burned partly.

**Suspected Causes:****plant or equipment:** Yes **environmental:** No**human:** Yes **other:** No**description:**

The cause of the ignition of the gas was excessive heating of the stirring bearing of the agitator, caused by

a premature worn bearing.

### **Immediate Effects:**

**material loss:** Yes

**human deaths:** No

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

**other:** No

**ecological harm:** No

**national heritage loss:** No

#### **description:**

Due to the ignition of approximately 1 kg of highly flammable liquid (in gas phase) a deflagration occurred in an aboveground (300 m3) storage tank, which contained 170 m3 of solvent. The gas-phase was in the tank due to the previous presen... 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:** Yes

**evacuation:** No

#### **description:**

- The safety systems were left on duty to render possible the quick initiation of the safety interventions.... see Appendix Short Report / description of emergency measures taken

### **Immediate Lessons Learned:**

**prevention:** Yes **other:** No

**mitigation:** No

#### **description:**

Similar plants systems were examined.

Construction changes were made on the agitator of a similar tank, and on other plants under construction.

## **A Occurrence Full Report**

**country:** FA **ident key:** 1993\_002\_01

### **1 Type of Accident**

**remarks:** The tank had previously contained highly flammable liquid, where the remains had evaporated and this gas phase was ignited by the excessive heat from a worn bearing whereby it exploded, and the contents of the tank caught fire.

### **2 Dangerous Substances**

**remarks:** The gas phase over the stored flammable solvent contained 1 kg of highly flammable liquid from previous content of tank.

### **3 Source of Accident**

**illustration:** - not applicable -

**remarks:** - not applicable -

## 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:** Irrelevant

## 5 Causes of Major Occurrence

**main causes**

**technical / physical** 5102 operation: component/machinery failure/malfunction

5104 operation: corrosion/fatigue

- not applicable -

- not applicable -

- not applicable -

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

5314 organization: testing/inspecting/recording (none, inadequate, inappropriate)

- not applicable -

- not applicable -

- not applicable -

**remarks:** The bearing of the agitator became worn out prematurely. This was not discovered before the accident.

## 6 Discussion about the Occurrence

- not applicable -

**Type of Accident** country: FA ident key: 1993\_002\_01

**event:**

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

**initiating event** - not applicable -

**associated event** - not applicable -

**event:**

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

**initiating event** 1202 fire: pool fire (burning pool of liquid, contained or uncontained)

**associated event** 1202 fire: pool fire (burning pool of liquid, contained or uncontained)

## Dangerous substances

country: FA ident key: 1993\_002\_01

**a) total establishment inventory**

**CAS number: identity:** Used Flammable Solvents

**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):** 150

**use of substance as:** NORMAL FINISHED PRODUCT

**b) substance belongs to relevant inventory directly involved:** Yes

**actual quantity:** 150 **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:** Highly Flammable Liquids

**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):** 0,001

**use of substance as:** NORMAL FINISHED PRODUCT

**b) substance belongs to relevant inventory directly involved:** Yes

**actual quantity:** 0,001 **potential quantity:** -1

**c) substance belongs to relevant inventory indirectly involved:** No

**actual quantity:** -1 **indir\_pot\_quant:** -1

## **B Consequences Full Report**

**country:** FA **ident key:** 1993\_002\_01

### **1 Area concerned**

**affected**

**extent of effects installation:** Yes

**establishment:** not applicable

**off-site; local:** No

**off-site; regional:** No

**off-site; transboundary:** No

**illustration of effects** - not applicable -

**remarks** - not applicable -

### **2 People**

**establishment popul. emergency personnel off-site population**

**total at risk**

**immediate fatalities**

**subsequent fatalities**

**hospitalizing injuries** 1

**other serious injuries** 4

**health monitoring**

**remarks** 1 person received immediate first aid. 4 suffered minor burns. All five were tak... 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 preventing human access or activities)** Suspected
- **marine or fresh water habitat** Suspected
- **areas of high conservation value or given special protection** Suspected

**remarks** No environmental consequences were detected.

### **4 National Heritage Loss**

**effects on:**

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

**remarks** - not applicable -

### **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** - not applicable -

### **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** No No No

- **media interest** No No No

- **political interest** No No No

**remarks** - not applicable -

## 7 Discussion of Consequences

- not applicable -

# C Response Full Report

**country:** FA **ident key:** 1993\_002\_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:

- not applicable -

useful references:

- not applicable -

### 5 Discussion about Response

- not applicable -

## Appendices for the FA / 1993\_002\_01 report

#### Appendix Short Report / description of accident types:

The cover of the tank near to the explosion rised. Subsequently a part of the tank content burned.

Due to the explosion an employee had to receive first aid treatment; four company workers suffered injuries due to the fire; the material damage (machines and buildings) amount to 1 Million of DM; no environmental damage.

#### Appendix Short Report / description of immediate effects:

Due to the ignition of approximately 1 kg of highly flammable liquid (in gas phase) a deflagration occurred in an aboveground (300 m3) storage tank, which contained 170 m3 of solvent. The gas-phase was in the tank due to the previous presence of highly flammable liquid. 1 person received immediate first aid. 4 suffered minor burns. All five were taken to hospital. Material damage to plant and buildings amounting to 1 million DM.

There was no environmental damage.

#### Appendix Short Report / description of emergency measures taken:

- The safety systems were left on duty to render possible the quick initiation of the safety interventions.

- After one hour the fire brigade could the fire extinguish. Through the complete backing of the water for fire fighting in a backing basin in the service-zone

#### Appendix Full Report B / people:

1 person received immediate first aid. 4 suffered minor burns. All five were taken to hospital.