

# Gasutsläpp från en destilleringsanläggning i organisk kemisk industri.

900615 MARS 1990\_21

Olyckan inträffade på en fabrik för produktion av bromfenylacetat. Klockan 8:00 påbörjade operatören en azeotropdestillation av en vatten-toluenblandning. På grund av ofullständigt genomfört reparationsarbete några dagar tidigare kom toluenångorna att släppas ut i lokalen där ett flertal processer pågick. Ångorna antändes dock inte. Larmet gick och byggnaden utrymdes. Operatörerna stängde av destillationen och kylde ned apparaturen. Toluenångorna skingrades i luften.

## Inblandade ämnen och mängder

	CAS Nr.	Mängd
toluen	108-88-3	2500 kg

## Skador:

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

## Erfarenheter redovisade (Ja/Nej): Ja

Mycket kortfattat anges förebyggande åtgärder.

## Report Profile

### Identification of Report:

country: FA ident key: 1990\_021\_01

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

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

start: 1990-06-15 start: 08:00:00

finish: finish:

### Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Organic Chemical (Manufacture of Agrochemicals, Pharmaceuticals, Fine Chemicals)

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:** 1990\_021\_01

**Accident Types:**

**release:** Yes **explosion:** No

**water contamination:** No **other:** No

**fire:** No

**description:**

The accident occurred in a plant producing bromophenylacetate (BPA). At about 8:00am a process operator commenced an azeotropic distillation (according to the work instructions) of toluene contaminated with water contained in a drowning ves... see Appendix Short Report / description of accident types

**Substance(s) Directly Involved:**

**toxic:** No **explosive:** Yes

**ecotoxic:** No **other:** No

**flammable:** Yes

**description:**

- Toluene (C.A.S. CODE: 108-88-3, E.E.C. CODE: 601-021-00-3): amount involved = 2,500 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 during normal operation in a process plant used to produce bromophenylacetate (BPA) of an organic chemical industry manufacturing agrochemicals, pharmaceuticals and fine chemicals. The unit where the accident occurred ... 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:** No

**human deaths:** No

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

**other:** Yes

**ecological harm:** No

**national heritage loss:** No

### **description:**

Since the toluene vapours were vented, through a 10.2 cm vapour line, into a process building no toluene release occurred in the environment and no effects occurred outside the establishment.

## Emergency Measures taken:

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

**external services:** No **restoration:** No

**sheltering:** No **other:** No

**evacuation:** Yes

### **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:** 1990\_021\_01

## 1 Type of Accident

**remarks:** A toluene vapours release occurred inside a building (code 1101) connected, by means of a vapour line, with a drowing vessel used also to recover (by distillation) toluene. In that building were performed a number of processes and various ... see Appendix Full Report A / type of accident

## 2 Dangerous Substances

**remarks:** The total establishment and the potential directly involved inventories of toluene have been calculated as follows: 2.5 tonnes in the drowing vessel, 25`50 tonnes inside and 75 onnes outside the building. From the Original Report is not ful... see Appendix Full Report A / dangerous substances

## 3 Source of Accident

**illustration:** - not applicable -

**remarks:** The accident occurred in an organic chemical industry manufacturing

agrochemicals, pharmaceuticals and fine chemicals (code 2001). The plant where the toluene vapours release occurred was used to produce bromophenylacetate (BPA) and the uni... 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:** The toluene vapours release occurred inside a process building. Therefore, the meteorological conditions are not pertinent.

#### 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)

5401 person: operator error

- not applicable -

- not applicable -

**remarks:** A condenser was removed from the plant without precautionary measures being taken to ensure it was safe. The permit to work system was in operation but this was not followed properly by the operator (code 5401), probably due to insufficient... see Appendix Full Report A / causes of major occurrence

#### 6 Discussion about the Occurrence

- not applicable -

**Type of Accident** country: FA ident key: 1990\_021\_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: 1990\_021\_01

**a) total establishment inventory**

CAS number: 108-88-3 identity: Toluene

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): 127,5

use of substance as: STARTING MATERIAL

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 2,5 potential quantity: 127,5

c) substance belongs to relevant inventory indirectly involved: No

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

Source of Accident - Situation country: FA ident key: 1990\_021\_01

## situation

### industry

initiating event 2001 general chemicals manufacture

associated event - not applicable -

### activity/unit

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

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

associated event - not applicable -

### component

major occurrence 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

initiating event 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

associated event - not applicable -

## B Consequences Full Report

country: FA ident key: 1990\_021\_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 toluene vapours were vented, through a 10,2 cm vapour line, into a process b... see Appendix

Full Report B / area concerned - remarks

## 2 People

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

**total at risk** 20

**immediate fatalities**

**subsequent fatalities**

**hospitalizing injuries**

**other serious injuries**

**health monitoring**

**remarks** 20 people working in the process building when the accident occurred. They were ... 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.... 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 material losses occurred except the released toluene.... 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 p... see Appendix

## 7 Discussion of Consequences

# C Response Full Report

country: FA ident key: 1990\_021\_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 / 1990\_021\_01 report

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

The accident occurred in a plant producing bromophenylacetate (BPA). At about 8:00am a process operator commenced an azeotropic distillation (according to the work instructions) of toluene contaminated with water contained in a drowning vessel.

However, three days earlier the main condenser had been removed for maintenance without previously checking the contents of the vessel and cutting off the utilities (steam, electricity supplies). The vapour line had not been isolated. The operator applied steam to the jacket of the vessel and, after about 15 minutes, it reached a temperature of 80-85 °C. A significant amount of toluene vapours was seen to vent from the 10.2 cm vapour line into the building where a number of processes were performed and various hazardous materials were stored. Flammable vapours did not find a source of ignition. The operators turned off the heating and applied cooling. The site alarm was sounded and the process building was temporarily evacuated.

#### Appendix Short Report / description of substances involved:

- Toluene (C.A.S. CODE: 108-88-3, E.E.C. CODE: 601-021-00-3): amount involved = 2,500 kg.

The other substances stored inside and close to the process building (phenol, bromine, sodium cyanide, etc.) were not directly involved in the accident.

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

The accident occurred during normal operation in a process plant used to produce bromophenylacetate (BPA) of an organic chemical industry manufacturing agrochemicals, pharmaceuticals and fine chemicals. The unit where the accident occurred was used to collect and azeotropically distillate a toluene/water mixture. The component involved was the drowning vessel used to collect and distillate toluene. The unit was located in a process building where a number of processes were performed and various hazardous materials (toluene, bromine, sodium cyanide, phenol, etc.) were stored. The location of the factory is shown on a map attached to the Original Report. The factory is located on the edge of city and there are housings and industrial sites within 400 m.

### **Appendix Short Report / description of suspected causes:**

INITIATING EVENT AND CONSEQUENCES:

The distillation of the toluene/water mixture took place with the main condenser removed from the plant for maintenance. The drowning vessel was containing 2,500 litres toluene/water. The toluene vapours were vented into process building through the vapour line.

CAUSES:

The condenser was removed from the plant without precautionary measures being taken to ensure it was safe. The permit to work system was in operation but was not followed properly by the operator, probably due to the insufficient training. Besides, the procedures for maintenance and work permit were insufficient.

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

INTERNAL TO THE ESTABLISHMENT:

The site alarm was sounded and the operators turned off the heat source for the steam and applied cooling to the drowning vessel. The process building where the toluene vapours release occurred was evacuated until it was safe.

### **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- all relevant staff have been interviewed to ensure they are making the correct isolations when signing permits;
- 2- the permit to work system is to be assessed, particularly in respect of its operation and the training provided to those who operate it.

### **Appendix Full Report A / type of accident:**

A toluene vapours release occurred inside a building (code 1101) connected, by means of a vapour line, with a drowning vessel used also to recover (by distillation) toluene. In that building were performed a number of processes and various hazardous materials (toluene, bromine, sodium cyanide, phenols, etc.) were stored. As no toluene release occurred in the environment, no effects were detected outside the establishment.

### **Appendix Full Report A / dangerous substances:**

The total establishment and the potential directly involved inventories of toluene have been calculated as follows: 2.5 tonnes in the drowning vessel, 25\*50 tonnes inside and 75 tonnes outside the building. From the Original Report is not fully clear if toluene is used as starting material or is a finished product.

### **Appendix Full Report A / source of accident - remarks:**

The accident occurred in an organic chemical industry manufacturing agrochemicals, pharmaceuticals and fine chemicals (code 2001). The plant where the toluene vapours release occurred was used to produce bromophenylacetate (BPA) and the unit involved was used to collect (and, subsequently, to recover by distillation) toluene contaminated with water (code 3104). The component involved was the drowning vessel used to collect and distillate the toluene contaminated with water (code 4007).

### **Appendix Full Report A / causes of major occurrence:**

A condenser was removed from the plant without precautionary measures being taken to ensure it was safe. The permit to work system was in operation but this was not followed properly by the operator (code 5401), probably due to insufficient training (code 5304). However, the procedures for maintenance and work permit were insufficient (code 5303).

### **Appendix Full Report B / area concerned - remarks:**

The toluene vapours were vented, through a 10,2 cm vapour line, into a process building and, therefore, no vapours release outside the building occurred.

### **Appendix Full Report B / people:**

20 people working in the process building when the accident occurred. They were immediately evacuated until the site was safe. No one were injured during the accident.

### **Appendix Full Report B / ecological harm:**

In the Original Report there is no evidence of significant ecological harms.

### **Appendix Full Report B / material loss:**

No material losses occurred except the released toluene.

### **Appendix Full Report B / disruption of community life:**

In the Original Report there is no evidence of significant effects outside the process building where the vapours release occurred.

### **Appendix Full Report C / lesson learned - prevent:**

After the accident, the following measures were established:

- 1- all relevant staff were interviewed to ensure that they are making the correct isolations when signing permits;

2- the permit to work system is to be assessed, particularly in respect of this operation and the training provided to those who operate it.