

Brand och kemikalieutsläpp på en kemikaliefabrik.

921105 MARS 1992_22

Olyckan inträffade på en fabrik för gummiproduktion. Klor och koltetraklorid användes som startmaterial i processen. En brand uppstod i en torktrumma där fuktigt material fördes in för torkning innan materialet vidare behandlades. Istället för att torka komponenterna vid en temperatur strax över 100°C kom torkningen att äga rum vid 165°C under 5 timmar. Torr komponent ansamlades i botten på torktrumman och självantändes så småningom, efter 5 timmar. Ett försök att släcka branden misslyckades och anläggningen nödstoppades. Förbränningen bildade en tjock, från rökpilm som innehöll ej angivna halter av väteklorid och koltetraklorid. Röken drev genom bostadsområden. Företaget hade endast testat komponenter med avsevärt annorlunda egenskaper än de som skulle torkas.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
allopren	9006-03-5	1 ton
väteklorid	7647-01-0	okänt
koltetraklorid	56-23-5	okänt

Skador:

Människor:	Utanför anläggningen sökte 9 personer läkarhjälp för irritation i näsa och hals, men släpptes efter en kort undersökning.
Materiella:	Omfattande brandskador på anläggningen.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	Allmänheten uppmanades att stanna inomhus med stängda dörrar och fönster till dess att röken skingrats. Vägnätet spärrades av i närheten av fabriken vilket ledde till störningar i rusningstrafiken.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1992_022_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1992-11-05 start: 06:00:00

finish: finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Organic Chemical (Chlorinated Rubber Manufacturing Plant)

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: 1992_022_01

Accident Types:

release: Yes explosion: No

water contamination: No other: No

fire: Yes

description:

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

Substance(s) Directly Involved:

toxic: Yes explosive: Yes

ecotoxic: No other: No

flammable: Yes

description:

- Allopren (C.A.S. CODE: 9006-03-5): amount involved = 1 tonnes.... 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 a chlorinated rubber manufacturing plant (using chlorine and carbon tetrachloride as starting materials) of an organic chemical industry. The component involved was a rotary dryer fed with hot air to dry solid produ... see Appendix Short Report / description of immediate sources

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:** Yes

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:** No

external services: Yes **restoration:** No

sheltering: Yes **other:** No

evacuation: No

description:

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

Immediate Lessons Learned:

prevention: Yes **other:** Yes

mitigation: Yes

description:

OFFICIAL ACTION:... see Appendix Short Report / description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1992_022_01

1 Type of Accident

remarks: During the start-up of a rotary dryer, large accumulations of solid materials inside it smouldered and then ignited (code 1999). The combustion of the solid materials released a thick acrid smoke plume containing hydrogen chloride gas (code... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment and the potential directly involved inventories of alloprene refer to the amount in the rotary dryer. No data are available about the amounts of carbon tetrachloride and hydrogen chloride involved in the accident.

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in an organic chemical industry (code 2001). The unit involved was a chlorinated rubber manufacturing plant using chlorine and carbon tetrachloride as starting materials (code 3102). The component involved was a rotary... see Appendix Full Report A / source of accident - remarks

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

Yes No No No No

wind speed (m/s):

direction (from): SW

stability (Pasquill):

ambient temperature (°C):

remarks: The wather was dry and clear. The wind's direction was from South West. Wind was slight.

5 Causes of Major Occurrence

main causes

technical / physical 5107 operation: unexpected reaction/phase-transition

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational 5307 organization: process analysis (inadequate, incorrect)

- not applicable -

- not applicable -

- not applicable -

- not applicable -

remarks: Accumulations of finished product within the dryer and the ducts at its base were subjected to a prolonged overheating (at about 165°C) for 5 hours. The thermal instability (code 5107) of these accumulations allowed their smouldering and th... see Appendix Full Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1992_022_01

event:

major occurrence 1999 other: other

initiating event - not applicable -

associated event - not applicable -

event:

major occurrence 1401 other: combustion products into air

initiating event 1999 other: other

associated event - not applicable -

Dangerous substances

country: FA ident key: 1992_022_01

a) total establishment inventory

CAS number: 7647-01-0 identity: Hydrogen Chloride

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: ABNORMAL 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: 56-23-5 identity: Carbon Tetrachloride

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: STARTING MATERIAL

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: 9006-03-5 identity: Alloprene

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:** 1992_022_01

situation

industry

initiating event 2001 general chemicals manufacture

associated event - not applicable -

activity/unit

major occurrence 3102 process: chemical continuous reaction

initiating event 3102 process: chemical continuous reaction

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:** 1992_022_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 Outside the establishment, nine people were hospitalized for minor nose and thro... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 3

immediate fatalities

subsequent fatalities

hospitalizing injuries

other serious injuries 9

health monitoring

remarks Outside the establishment, nine people were hospitalized for minor nose and thro... 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 data are available about the cost of the extensive damages to the rotary drye... 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** No Yes No

- **media interest** No No No

- **political interest** No No No

remarks Due to the off-site emergency plan activation, local population in path of the s... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1992_022_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

The particular dryer involved ... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

After the accident, it was est... see Appendix Full Report C / lesson learned - mitigate

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1992_022_01 report

Appendix Short Report / description of accident types:

ACCIDENT CASE HISTORY DESCRIPTION:

At the plant start-up, the temperature control of the hot air feeding system was by-passed and air at a temperature of about 165°C was fed at the base of the rotary dryer. Large accumulations of dry material inside the dryer smouldered and then ignited. Attempts to extinguish the fire failed and therefore the operators shut-down the plant as soon as possible. The combustion released a thick acrid smoke plume containing hydrogen chloride and carbon tetrachloride. The plume drifted off-site across the residential areas.

Appendix Short Report / description of substances involved:

- Allopren (C.A.S. CODE: 9006-03-5): amount involved = 1 tonnes.

- Hydrogen Chloride (C.A.S. CODE: 7647-01-0, E.E.C. CODE: 017-002-00-2): amount involved = not known.

- Carbon Tetrachloride (C.A.S. CODE: 56-23-5): amount involved = not known.

Appendix Short Report / description of immediate sources:

The accident occurred in a chlorinated rubber manufacturing plant (using chlorine and carbon tetrachloride as starting materials) of an organic chemical industry. The component involved was a rotary dryer fed with hot air to dry solid product before milling. Damp material was fed into top of dryer, fed with hot air via heat exchanger and ducting system. The hot air inlets were at top and base of dryer with air exhaust in the middle of it. Basic recording system fitted normal operating temperature at lower inlet to be 118°C with exhaust air at 95°C. Dryer was operating with slight negative pressure because exhaust fan always exceeded input fan. On the day of the accident, the plant start-up temperature control to the hot air feed system was by-passed. The industry is located in rural setting on the edge of a town, as shown on two maps attached to the Original Report. Housing bounds two sides of the site.

Appendix Short Report / description of suspected causes:

CAUSES:

Accumulations of finished product within the dryer and the ducts at its base were subjected to a prolonged overheating (at about 165°C) for 5 hours. The thermal instability of these accumulations allowed their smouldering and then their ignition. Previous tests made by the company were based on finished products which had substantially different thermal stability characteristics.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

Outside the establishment, nine people were hospitalized for minor nose and throat irritation. All were released shortly after their arrival at the hospital. The fire brigade reported some minor chemical attack on their equipments, possibly as a result of exposure to carbon tetrachloride.

MATERIAL LOSS:

No data are available about the cost of the extensive damages to the rotary dryer caused by the fire.

COMMUNITY DISRUPTION:

The local population in path of smoke plume was advised to stay indoors (the plume path is shown on two maps attached to the Original Report). The roads adjacent to the site were closed by the police causing major disruption at rush-hour.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

The operators attempted to extinguish the fire inside the rotary dryer but they failed and therefore the plant was shut-down. The on-site emergency plan for a chlorine release was activated and chlorine feeding was automatically shut-off to the chlorinators in the same building.

EXTERNAL TO THE ESTABLISHMENT:

The off-site emergency plan for a chlorine release was instigated resulting in a major emergency response by emergency services. The local population in path of smoke plume was advised to stay indoors. The roads adjacent to the site were closed by the police causing major disruption at rush-hour.

Appendix Short Report / description of immediate lessons learned:

OFFICIAL ACTION:

A prohibition Notice was served by Health and Safety Executive under Health and Safety at work etc. Act 1974, Section 2. The Notice required the company to demonstrate that the operations in using the alloprene dryers were safe before to bring them back into use. At the end of 1993, the plant has been permanently closed to comply with Montreal Protocol.

MEASURES TO PREVENT RECURRENCE:

The particular dryer involved in the accident was of I.C.I.'s own design (it is thought that I.C.I. are the only owners of such plant). The general lessons learned by I.C.I. are to be notified internally; also amendments to HAZOP procedures are proposed to include as assessment of ignition temperature not only of pure product but also of contaminated or partially decomposed products.

MEASURES TO MITIGATE CONSEQUENCES:

After the accident, it was established to carry-out internal enquiries to determine technical causes and assess the efficacy of some on-site and off-site emergency arrangements. Also the company established to liaise with emergency services and county emergency planning department to assess and amend off-site emergency arrangements, particularly for non-CIMAH incidents.

Appendix Full Report A / type of accident:

During the start-up of a rotary dryer, large accumulations of solid materials inside it smouldered and then ignited (code 1999). The combustion of the solid materials released a thick acrid smoke plume containing hydrogen chloride gas (code 1401). The plume drifted off-site across the residential areas.

Appendix Full Report A / source of accident - remarks:

The accident occurred in an organic chemical industry (code 2001). The unit involved was a chlorinated rubber manufacturing plant using chlorine and carbon tetrachloride as starting materials (code 3102). The component involved was a rotary dryer fed with hot air to dry products before milling (code 4007). The establishment is located in rural setting on the edge of a town (its location is shown on two maps attached to the Original Report). Housing bounds two sides of the site.

Appendix Full Report A / causes of major occurrence:

Accumulations of finished product within the dryer and the ducts at its base were subjected to a prolonged overheating (at about 165°C) for 5 hours. The thermal instability (code 5107) of these accumulations allowed their smouldering and then their ignition. Previous tests made by the company were based on finished products which had substantially different thermal stability characteristics (codes 5307).

Appendix Full Report B / area concerned - remarks:

Outside the establishment, nine people were hospitalized for minor nose and throat irritation. All were released shortly after their arrival at the hospital. The extents and the path of the gas cloud is shown on two maps attached to the Original Report. On these two maps the isopleths related to 1 and 10 ppm hydrogen chloride concentrations in air are shown.

Appendix Full Report B / people:

Outside the establishment, nine people were hospitalized for minor nose and throat irritation. All were released shortly after their arrival at the hospital. The fire brigade reported some minor chemical attack on their equipments, possibly as a result of exposure to carbon tetrachloride.

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 data are available about the cost of the extensive damages to the rotary dryer caused by the fire.

Appendix Full Report B / disruption of community life:

Due to the off-site emergency plan activation, local population in path of the smoke plume was advised to stay indoors and the roads adjacent to the site were closed by the police, causing major disruption a rush-hour.

Appendix Full Report C / lesson learned - prevent:

The particular dryer involved in the accident was of I.C.I.'s own design (it is thought that I.C.I. are the only owners of such plant). The general lessons learned by I.C.I. are to be notified internally; also amendments to HAZOP procedures are proposed to include as assessment of ignition temperature not only of pure product but also of contaminated or partially decomposed products.

Appendix Full Report C / lesson learned - mitigate:

After the accident, it was established to carry-out internal enquiries to determine technical causes and assess the efficacy of some on-site and off-site emergency arrangements. Also the company established to liaise with emergency services and county emergency planning department to assess and amend off-site emergency arrangements, particularly for non-CIMAH incidents.