

Klorgasutsläpp på en PVC-fabrik i organisk kemisk industri.

860220 MARS 1986_13

I samband med en mindre brand släpptes ett par hundra kg klorgas ut i atmosfären. Klordetektorerna på fabriken utlöste gaslarmet och operatörer med andningsutrustning isolerade läckan och stängde av tillflödet. Klorhalterna i luften utanför fabriksområdet kontrollerades kontinuerligt.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
klor	7782-50-5	350 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: 1986_013_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1986-02-20 start: 13:00:00

finish: finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Organic Chemical (PVC and Polyurethane Production, Chlorine Electrolysis)

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: 1986_013_01

Accident Types:

release: Yes explosion: No

water contamination: No other: No

fire: Yes

description:

ENVIRONMENT AND ATMOSPHERICAL CONDITIONS:... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: Yes explosive: No

ecotoxic: No other: No

flammable: No

description:

Chlorine (C.A.S. CODE: 7782-50-5, E.E.C. CODE: 017-001-00-7): amount involved = 350 kg.

Immediate Sources of Accident:

storage: Yes transfer: No

process: Yes other: No

description:

The accident occurred in an organic chemical industry manufacturing PVC from ethylene using chlorine (produced from the electrolysis of brine) and also polyurethane using phosgene. The component involved was the padding line from bulk chlor... see Appendix Short Report / description of immediate sources

Suspected Causes:

plant or equipment: No environmental: No

human: Yes other: No

description:

CAUSES:... see Appendix Short Report / description of suspected causes

Immediate Effects:

material loss: Yes

human deaths: No

human injuries: No community disruption: No

other: No

ecological harm: No

national heritage loss: No

description:

MATERIAL LOSS:... 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: Yes

description:

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

Immediate Lessons Learned:

prevention: Yes **other:** Yes

mitigation: No

description:

The damaged pipework was replaced with another one with the same characteristics.... see Appendix Short Report

/ description of immediate lessons learned

A Occurrence Full Report

country: FA **ident key:** 1986_013_01

1 Type of Accident

remarks: An iron-chlorine fire developed during stress relieving by heat treatment

at 400°C of a tanker padding line. As a result of the iron-chlorine fire

(code 1999), the pipeline was destroyed and a few hundreds kilograms of

chlorine were releas... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment inventory of chlorine refers to the storage system

at the phosgene manufacturing plant, consisting of two storage vessels (195

tonnes each). The potential inventory directly involved of chlorine refers

to the volumet... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in an organic chemical industry (code 2002)

manufacturing PVC from ethylene using chlorine (produced by the electrolysis

of brine) and also polyurethane using phosgene. The component involved was

the padding line (code... 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): 2

direction (from): ENE-ESE

stability (Pasquill):

ambient temperature (°C):

remarks: The wind direction was variable between East-North-East and East-South-East. The wind velocity was about 5 mph (2.2 m/sec). It was a sunny day.

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)

5401 person: operator error

- not applicable -

- not applicable -

- not applicable -

remarks: The release of chlorine occurred because of the damage of the padding line by an iron-chlorine fire developed during stress relieving by heat treatment. The accident was due to the confusion in issuing to work-permit. The issuer thought th... see Appendix Full Report A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1986_013_01

event:

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

initiating event 1999 other: other

associated event - not applicable -

Dangerous substances

country: FA ident key: 1986_013_01

a) total establishment inventory

CAS number: 7782-50-5 **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): 390

use of substance as: ON-SITE INTERMEDIATE

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 0,35 **potential quantity:** 195

c) substance belongs to relevant inventory indirectly involved: No

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

Source of Accident - Situation **country:** FA **ident key:** 1986_013_01

situation

industry

initiating event 2001 general chemicals manufacture

associated event - not applicable -

activity/unit

major occurrence 3304 transfer: loading/unloading activities (transfer interfaces)

initiating event 3304 transfer: loading/unloading activities (transfer interfaces)

associated event - not applicable -

component

major occurrence 4011 general pipework/flanges

initiating event 4011 general pipework/flanges

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1986_013_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 A chlorine concentration in air of 0.3 ppm, measured during the off-site environ... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 1500

immediate fatalities

subsequent fatalities

hospitalizing injuries

other serious injuries

health monitoring

remarks No people were injured during the accident.

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 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 piece (about 12" long) of the 2" pip... 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 Outside the establishment a chlorine concentration in air of about 0.3 ppm was d... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA ident key: 1986_013_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 review ... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

The damaged pipework was repla... see Appendix Full Report C / lesson learned - mitigate

useful references:

- not applicable -

5 Discussion about Response

- not applicable -

Appendices for the FA / 1986_013_01 report

Appendix Short Report / description of accident types:

ENVIRONMENT AND ATMOSPHERICAL CONDITIONS:

The wind direction was variable between East-North-East and East-South-East. The wind velocity was about 5 mph (2.2 m/sec). It was a sunny day.

An iron-chlorine fire developed during stress relieving by heat treatment at 400°C of a tanker padding line. As a result of the iron-chlorine fire, the pipeline was destroyed and a few hundreds kilograms of chlorine were released to the atmosphere.

The chlorine detection system warned operators who put on self-contained breathing apparatuses and isolated the storage tank using remotely operated shut-off valves.

Appendix Short Report / description of immediate sources:

The accident occurred in an organic chemical industry manufacturing PVC from ethylene using chlorine (produced from the electrolysis of brine) and also polyurethane using phosgene. The component involved was the padding line from bulk chlorine storage tank to the road tanker unloading point. The chlorine storage system of the phosgene manufacturing plant included 2 storage tanks (195 tonnes each) padded with chlorine vapours to facilitate the transfer. The location of the factory is shown on a map attached to the Original Report.

Appendix Short Report / description of suspected causes:

CAUSES:

The release of chlorine occurred because of the damage of the padding line from chlorine bulk storage tank to road tanker unloading. The line was damaged by an iron-chlorine fire developed during the stress relieving by heat treatment at 400°C. The accident is mainly attributed to the confusion in the issue of permit to work. The issuer thought that another pipeline was to be heat-treated, whereas the countersigner assumed that isolations instituted earlier for pipeline replacement were still in place.

Appendix Short Report / description of immediate effects:

MATERIAL LOSS:

A piece (12" long) of the 2" pipeline from the bulk chlorine storage tank to the road tanker unloading point was destroyed by the iron-chloride fire.

MAP OF THE ACCIDENT AREA AND MAX DENSITY OF POPULATION:

A chlorine concentration of 0.3 ppm in air was detected at 500 metres to the West from the establishment (on a map attached to the Original Report is shown the wind direction when the accident occurred). The maximum number of people in the area was about 1,500.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

The chlorine detection system warned the operators who put on self-contained breathing apparatuses and isolated the storage tank using remotely operated shut-off valves. The adjacent manufacturing plant was evacuated. To control the dispersion of the toxic cloud water curtain were used.

EXTERNAL TO THE ESTABLISHMENT:

The chlorine concentration in air outside the factory's boundaries was monitored. A chlorine concentration of 0.3 ppm was detected at 500 m to the West.

Appendix Short Report / description of immediate lessons learned:

The damaged pipework was replaced with another one with the same characteristics.

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:

After the accident the review of the system of work permits was established.

Appendix Full Report A / type of accident:

An iron-chlorine fire developed during stress relieving by heat treatment at 400°C of a tanker padding line. As a result of the iron-chlorine fire (code 1999), the pipeline was destroyed and a few hundreds kilograms of chlorine were released to the atmosphere (code 1101).

Appendix Full Report A / dangerous substances:

The total establishment inventory of chlorine refers to the storage system at the phosgene manufacturing plant, consisting of two storage vessels (195 tonnes each). The potential inventory directly involved of chlorine refers to the volumetric capacity of one of the storage vessel .

Appendix Full Report A / source of accident - remarks:

The accident occurred in an organic chemical industry (code 2002) manufacturing PVC from ethylene using chlorine (produced by the electrolysis of brine) and also polyurethane using phosgene. The component involved was the padding line (code 4011) from the bulk chlorine storage tank to the road tanker unloading point (code 3304). The location of the establishment is shown on a map attached to the Original Report.

Appendix Full Report A / causes of major occurrence:

The release of chlorine occurred because of the damage of the padding line by an iron-chlorine fire developed during stress relieving by heat treatment. The accident was due to the confusion in issuing to work-permit. The issuer thought that another pipeline was to be heat-treated, whereas the co-signer assumed that isolations instituted earlier for pipeline replacement were still in place (code 5401). The system of work-permit was, in any case, inadequate (code 5303).

Appendix Full Report B / area concerned - remarks:

A chlorine concentration in air of 0.3 ppm, measured during the off-site environmental monitoring, was detected at 500 metres to the West. The direction of wind when the accident occurred is shown on a map attached to the Original Report. The maximum number of people in the area was about 1,500.

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 piece (about 12" long) of the 2" pipeline destroyed by the iron-chlorine fire.

Appendix Full Report B / disruption of community life:

Outside the establishment a chlorine concentration in air of about 0.3 ppm was detected at 500 metres from the source leak.

Appendix Full Report C / lesson learned - prevent:

After the accident the review of the system of work-permits was established because the existing procedures were insufficient.

Appendix Full Report C / lesson learned - mitigate:

The damaged pipework was replaced with another one with the same characteristics.