

Klorutsläpp på en klor-alkalifabrik till följd av ett rörbrott

810806 MARS 1800_189_01

Olyckan inträffade vid rutinmässig drift av klor-alkali-elektrolys. Rörledningen mellan en kondensator och en klortank brast på grund av korrosion. Räddningsverket använde sig av vattengardiner för att begränsa gasmolnets spridning. Efter olyckstillfället beslöts att så väl inspektion av rörledning som preventivt utbyte av rörkomponenter skulle ske oftare.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
klor	7782-50-5	500-1000 kg

Skador:

Människor: En anställd blev skadad av klorgasen.
Materiella: Skador på anläggningen.
Miljö/ekologi: Klorutsläppet påverkade kringliggande vegetation.
Infrastruktur: Befolkningen i närområdet varnades.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1800_189_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 06/08/1981 start:

finish: 06/08/1981 finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Chlorine-Alkali 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: 1800_189_01

Accident Types:

release: Yes explosion: No

water contamination: No other: No

fire: No

description:

SAFETY SYSTEMS OR OPERATORS INTERVENTION:... 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 = 500*1,000 Kg.

Immediate Sources of Accident:

storage: No transfer: No

process: Yes other: No

description:

The accident occurred during normal operation in a chlorine-alkali electrolysis and the component involved was the piping between the condenser and the chlorine collecting tank.

Suspected Causes:

plant or equipment: Yes environmental: No

human: No other: No

description:

INITIATING EVENT AND CONSEQUENCES:... 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: Yes

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: No **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:** No

mitigation: Yes

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:** 1800_189_01

1 Type of Accident

remarks: The piping connecting the condenser and the chlorine collecting tank leaked owing to internal corrosion and a chlorine release occurred into the environment (code 1101).

2 Dangerous Substances

remarks: The total establishment and the potential directly involved inventories of chlorine refer to the amount released during the accident (about 500*1,000 Kg). From the Original Report it is not fully clear if chlorine is a finished product or a... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred during normal operation in a chlorine-alkali electrolysis (codes 2001 and 3104) and the component involved was the piping (code 4011) between the condenser and the chlorine collecting tank.

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: - not applicable -

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

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

- not applicable -

- not applicable -

- not applicable -

remarks: The leakage of the piping (code 5102) was caused by an undetected internal corrosion (code 5104) due to both insufficient maintenance/testing/inspection procedures (code 5303) and inadequate pipeline design (code 5308).

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1800_189_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: 1800_189_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): 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: 1800_189_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 4011 general pipework/flanges

initiating event 4011 general pipework/flanges

associated event - not applicable -

B Consequences Full Report

country: FA ident key: 1800_189_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 chlorine release damaged the surrounding vegetation (coniferae trees) and th... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk -1 0 0

immediate fatalities 0 0 0

subsequent fatalities 0 0 0

hospitalizing injuries 1 0 0

other serious injuries 0 0 0

health monitoring 0 0 0

remarks Inside the establishment 1 person was injured by the toxic release.... 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) not applicable
- 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 The chlorine release damaged the surrounding vegetation (coniferae trees) but fr... 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 DM ECU DM

material losses -1 -1 0 0

response, clean up, restoration -1 -1 0 0

remarks The chlorine release caused damages to the plant but no data are available about... 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 The population external to the establishment was alerted.... see Appendix Full Report B / disrupt

7 Discussion of Consequences

Ecological Components involved

country: FA ident key: 1800_189_01

type: 6108 inland: woodland; predominantly or totally natural

threatened: not applicable affected: not applicable

type: 6107 inland: woodland; predominantly or totally plantation

threatened: not applicable affected: not applicable

C Response Full Report

country: FA ident key: 1800_189_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:

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

useful references:

not given

5 Discussion about Response

- not applicable -

Appendices for the FA / 1800_189_01 report

Appendix Short Report / description of accident types:

SAFETY SYSTEMS OR OPERATORS INTERVENTION:

Isolation of failed pipeline. Water deluge was put on by the fire brigade .

ACCIDENT CASE HISTORY DESCRIPTION:

The piping connecting the condenser and the chlorine collecting tank leaked owing to internal corrosion. The failed pipeline was isolated and a water deluge was put on by the fire brigade. The population external to the establishment was alerted.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

A leakage in a pipeline caused the release of chlorine.

CAUSES:

The leakage of the piping was caused by an undetected internal corrosion due to both insufficient maintenance/testing/inspection procedures and inadequate pipeline design.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

Inside the establishment, 1 person was injured by the toxic release.

MATERIAL LOSS:

The chlorine release caused damages to the plant.

ECOLOGICAL HARM:

The chlorine release damaged the surrounding vegetation (coniferae trees).

COMMUNITY DISRUPTION:

The population external to the establishment was alerted.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

The internal alarm was sounded. The failed pipeline was isolated and a water deluge was used by the fire brigade.

EXTERNAL TO THE ESTABLISHMENT:

The population external to the establishment was alerted.

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- preventive replacement of the pipeline every 8 years instead of the previously planned 10 years;
- 2- on-site testing of pipings by means of non-destructive techniques (ultrasounds) every 2 years instead of every 3-4 years.

MEASURES TO MITIGATE THE EFFECTS OF THE ACCIDENT:

After the accident, it was established to install remotely operated quick-action isolation valves.

Appendix Full Report A / dangerous substances:

The total establishment and the potential directly involved inventories of chlorine refer to the amount released during the accident (about 500-1,000 Kg). From the Original Report it is not fully clear if chlorine is a finished product or an on-site intermediate.

Appendix Full Report B / area concerned - remarks:

The chlorine release damaged the surrounding vegetation (coniferae trees) and the population external to the establishment was alerted.

Appendix Full Report B / people:

Inside the establishment 1 person was injured by the toxic release.

Appendix Full Report B / ecological harm:

The chlorine release damaged the surrounding vegetation (coniferae trees) but from the Original Report it is not fully clear if they were natural or planted trees.

Appendix Full Report B / material loss:

The chlorine release caused damages to the plant but no data are available about the cost of these material losses.

Appendix Full Report B / disruption of community life:

The population external to the establishment was alerted.

Appendix Full Report C / lesson learned - prevent:

After the accident, the following measures were established:

- 1- preventive replacement of the pipeline every 8 years instead of the previously planned 10 years;
- 2- on-site testing of pipings by means of non-destructive techniques (ultrasounds) every 2 years instead of every 3-4 years.

Appendix Full Report C / lesson learned - mitigate:

After the accident, it was established to install remotely operated quick-action isolation valves.