Explosion på en ammoniakfabrik.

880609 MARS 1988_15

Då en reaktor för ammoniaksyntes skulle trycktestas inträffade en explosion. Trycktestningen gjordes var tionde år. Reaktorn var tillverkad 1929, och mätte 85 cm i diameter och var närmare 8 meter hög. Efter inledande tester rensades reaktorn med kvävgas. Då trycket vid huvudtestet nått 250 kg/cm2 inträffade explosionen. Byggnaden totalförstördes. Av de tre personer som befann i byggnaden då det small, omkom en och en chockades. Polisen och räddningstjänsten anlände kort efter olyckan. Fabriken stängdes medan utredning om olyckans orsaker pågick. Efter 5 dagar kunde produktionen återupptas. Olyckans orsak anges inte.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
vätgas	1333-74-0	okänt

Skador:

Människor:	En person omkom vid explosionen medan en annan chockades.
Materiella:	Fabriksbyggnaden totalförstördes.
Miljö/ekologi:	Inga effekter rapporterade.
Infrastruktur:	INga.

Erfarenheter redovisade (Ja/Nej): Nej

Report Profile

Identification of Report:

country: FA **ident key:** 1988_015_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1988-06-09 **start:** 21:20:00

finish: finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Organic Chemical (Urea Production by Ammonia Synthesis)

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:** 1988_015_01

Accident Types:

release: No **explosion:** Yes

water contamination: No **other:** No

fire: No

description:

The day of the accident, preparative works for the decennial pneumatic test on request of the U.S.L. 12 (previous pneumatic test was carried out in 1978) were started on one out of the seven reactors for ammonia synthesis. The reactor was p... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:

toxic: No **explosive:** Yes

ecotoxic: No **other:** No

flammable: Yes

description:

- Hydrogen (C.A.S. CODE: 1333-74-0, E.E.C. CODE: 001-001-00-9): amount involved = not known.... 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 an ammonia synthesis reactor of an organic chemical industry for the urea production by syntehsis of ammonia. The reactor which exploded (the $N^{-}2$) was one of the seven reactors used for the ammonia synthesis. When ... see Appendix Short Report / description of immediate sources

Suspected Causes:

plant or equipment: No **environmental:** No

human: No **other:** Yes

description:

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

Immediate Effects:

material loss: Yes

human deaths: Yes

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

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: No **other:** Yes

evacuation: No

description:

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

Immediate Lessons Learned:

prevention: No **other:** Yes

mitigation: No

description:

The ammonia production was interrupted and the whole factory was put under distress by the Authorities to

establish the causes of the explosion.

A Occurrence Full Report

country: FA **ident key:** 1988_015_01

1 Type of Accident

remarks: During a slow pressurization (20 minutes before the explosion occurred the

internal pressure was about 250 Kg/cm2 at a temperature of about 20ˆ30¯C)

with process gases (hydrogen and nitrogen) of an ammonia synthesis reactor

an explosion occ... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The process gases (hydrogen and nitrogen) were used to pressurize the

ammonia synthesis reactor for the decennial pneumatic test that had to be

carried out on the column. No data are available about the amount of

hydrogen and nitrogen invol... see Appendix Full Report A / dangerous

substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in an ammonia synthesis reactor (code 4002) of an

organic chemical industry (code 2001) for the urea production by syntehsis of ammonia. The reactor which exploded (the N¯ 2) was one of the seven reactors used for the ... 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: - not applicable -

5 Causes of Major Occurrence

main causes

technical / physical 5501 other: not identified

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

remarks: When the Original Report was prepared the causes for the explosion were still under investigation (code 5501). Some experts were evaluating the possibility that accident occurred due to an internal explosion (deflagration) in the reactor.

6 Discussion about the Occurrence

- not applicable -

Type of Accident **country:** FA **ident key:** 1988_015_01

event:

major occurrence 1301 explosion: pressure burst (rupture of pressure system)

initiating event 1301 explosion: pressure burst (rupture of pressure system)

associated event - not applicable -

Dangerous substances

country: FA **ident key:** 1988_015_01

a) total establishment inventory

CAS number: 7727-37-9 **identity:** Nitrogen

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: 1333-74-0 **identity:** Hydrogen

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

Source of Accident - Situation **country:** FA **ident key:** 1988_015_01

situation

industry

inititating event 2001 general chemicals manufacture

associated event - not applicable -

activity/unit

major occurrence 3999 other: other

inititating event 3999 other: other

associated event - not applicable -

component

major occurrence 4002 reaction vessel; pressurised

inititating event 4002 reaction vessel; pressurised

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1988_015_01

1 Area concerned

affected

extent of effects installation: Yes

establishment: Yes

off-site; local: No

off-site; regional: No

off-site; transboundary: No

illustration of effects - not applicable -

remarks The explosion destroyed the upper part of the column and metallic parts of the r... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 3

immediate fatalities 1

subsequent fatalities

hospitalizing injuries

other serious injuries

health monitoring

remarks 3 people were operating inside the plant when the explosion occurred: 1 of them ... 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 The explosion destroyed the upper part of the column and metallic parts of the r... 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 e... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1988_015_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 / 1988_015_01 report

Appendix Short Report / description of accident types:

The day of the accident, preparative works for the decennial pneumatic test on request of the U.S.L. 12 (previous pneumatic test was carried out in 1978) were started on one out of the seven reactors for ammonia synthesis. The reactor was put out of service and a slow pressurization with process gases (hydrogen and nitrogen) was carried out at ambient temperature. It was necessary to carry out many pneumatical cycles of pressurization and depressurization because of leaks from some flanges. After any cycle, the bolts of the flanges were tihghtened and a purging with nitrogen at 8 ate was carried out. Finally, a slow pressurization (20 minutes before the explosion occurred the internal pressure was about 250 Kg/cm2 at a temperature of about 20ˆ30¯C) with process gases was in progress at ambient temperature when, suddenly, an explosion occurred. 3 people were operating inside the plant when the explosion occurred: 1 of them was killed and a second one was in a state of shock. The explosion destroyed the upper part of the column and metallic parts of the reactor were thrown in a radius of many metres around it. It also caused the complete destruction of the building where the reactor was located. After the accident, on-site arrived the local fire brigade and the police. The ammonia production was interrupted and the whole factory was put under distress by the Authorities to establish the causes of the explosion. On June 14 the production in the other plants not involved in the explosion started again.

Appendix Short Report / description of substances involved:

- Hydrogen (C.A.S. CODE: 1333-74-0, E.E.C. CODE: 001-001-00-9): amount involved = not known.

- Nitrogen (C.A.S. CODE: 7727-37-9): amount involved = not known.

Appendix Short Report / description of immediate sources:

The accident occurred in an ammonia synthesis reactor of an organic chemical industry for the urea production by syntehsis of ammonia. The reactor which exploded (the N¯2) was one of the seven reactors used for the ammonia synthesis. When the accident occurred only the first reactor was not operating for the synthesis of ammonia whilst the others five were normally operating. The steel reactor (with a volumetric capacity of 8,000 litres and design pressure of 300 Kg/cm2) was constructed by Krupp in 1929. It was 7.7 metres high and had a diameter of 850 mm. It had regularly tested (tests in operation were held in 1978, 1979, 1980, 1981, 1983, 1984, 1985, 1987). The day of the accident, preparative works for the decennial pneumatic test on request of the U.S.L. 12 (previous pneumatic test was carried out in 1978) were started.

Appendix Short Report / description of suspected causes:

CAUSES:

When the Original Report was prepared the causes for the explosion were still under investigation. Some experts were evaluating the possibility that accident occurred due to an internal explosion (deflagration) in the reactor.

Appendix Short Report / description of immediate effects:

EFFECTS ON PEOPLE:

3 people were operating inside the plant when the explosion occurred: 1 of them was killed and a second one was in a state of shock.

MATERIAL LOSS:

The explosion destroyed the upper part of the column and metallic parts of the reactor were thrown in a radius of many metres around it. It also caused the complete destruction of the building where the reactor was located. No data are available about the cost of the material damages. The production of ammonia was interrupted but no data are available about trading losses.

Appendix Short Report / description of emergency measures taken:

INTERNAL TO THE ESTABLISHMENT:

After the accident, on-site arrived the local fire brigade and the police. The ammonia production was interrupted and the whole factory was put under distress by the Authorities to establish the causes of the explosion.

Appendix Full Report A / type of accident:

During a slow pressurization (20 minutes before the explosion occurred the internal pressure was about 250 Kg/cm2 at a temperature of about 20ˆ30¯C) with process gases (hydrogen and nitrogen) of an ammonia synthesis reactor an explosion occurred (code 1301). The explosion destroyed the upper part of the column and metallic parts of the reactor were thrown in a radius of many metres around it. It also caused the complete destruction of the building where the reactor was located.

Appendix Full Report A / dangerous substances:

The process gases (hydrogen and nitrogen) were used to pressurize the ammonia synthesis reactor for the decennial pneumatic test that had to be carried out on the column. No data are available about the amount of hydrogen and nitrogen involved in the explosion.

Appendix Full Report A / source of accident - remarks:

The accident occurred in an ammonia synthesis reactor (code 4002) of an organic chemical industry (code 2001) for the urea production by syntehsis of ammonia. The reactor which exploded (the N¯2) was one of the seven reactors used for the ammonia synthesis. When the accident occurred, only the first reactor was not operating for the synthesis of ammonia whilst the others five were normally operating. It was under preparative works for the decennial pneumatic test (code 3999).

Appendix Full Report B / area concerned - remarks:

The explosion destroyed the upper part of the column and metallic parts of the reactor were thrown in a radius of many metres around it. It also caused the complete destruction of the building where the reactor was located bit in the Original Report there is no evidence of significant effects outside the establishment.

Appendix Full Report B / people:

3 people were operating inside the plant when the explosion occurred: 1 of them was killed and a second one was in a state of shock.

Appendix Full Report B / ecological harm:

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

Appendix Full Report B / material loss:

The explosion destroyed the upper part of the column and metallic parts of the reactor were thrown in a radius of many metres around it. It also caused the complete destruction of the building where the reactor was located. No data are available about the cost of the material damages. The production of ammonia was interrupted but no data are available about trading losses.

Appendix Full Report B / disruption of community life:

In the Original Report there is no evidence of significant effects outside the establishment.