Utsläpp av kväveoxider från en salpetersyrafabrik.

890607 MARS 1989_03

Ett blixtnedslag orsakade ett spänningsfall i strömförsörjningen till fabrikens kontrollenhet. Detta ledde i sin tur till att salpetersyrafabriken stängdes ned. På grund av otillräcklig tryckutjämning under upprepadeuppstartsförsök uppstod ett backflöde av kväveoxider som släpptes ut via en luftkompressor. Kväveoxiderna släpptes ut i fabriklsutrymmet men kunde skingras tämligen snart.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
kväveoxider		30 kg
dikväveoxid	10024-97-2	
kväveoxid	10102-43-9	
kvävedioxid	10102-44-0	

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:** 1989_003_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1989-06-07 **start:**

finish: finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Inorganic Chemical (Nitric Acid 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:** 1989_003_01

Accident Types:

release: Yes **explosion:** No

water contamination: No **other:** No

fire: No

description:

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

Substance(s) Directly Involved:

toxic: Yes **explosive:** No

ecotoxic: No **other:** No

flammable: No

description:

- Nitrogen Oxides (C.A.S. CODE: 10024-97-2 [N2O], C.A.S. CODE: 10102-43-9 [NO], C.A.S. CODE: 10102-44-0 [NO2]): amount involved = about 30 kg (about 16 m3 of gas were released during the accident).

Immediate Sources of Accident:

storage: No **transfer:** No

process: Yes **other:** No

description:

The accident occurred in the nitric acid plant of an inorganic chemical industry. The component involved was the control unit of the nitric acid plant during normal operation.

Suspected Causes:

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

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:

OTHER:

No material losses occurred except the gas released during the accident.

Emergency Measures taken:

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

external services: No **restoration:** No

sheltering: No **other:** Yes

evacuation: No

description:

In the Original Report no information are available about the on-site emergency measures carried out during

the accident.

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:** 1989_003_01

1 Type of Accident

remarks: A lightning stroke caused a voltage fluctuation in the power supply of the

control unit of the nitric acid plant which, in turn, led to the shut down

of the plant. Because of incomplete depressurization of the unit during

repeated start-up ... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment and the potential directly involved inventories of

nitrogen oxides (nitrogen oxide [N2O], nitrogen monoxide [NO] and nitrogen

dioxide [NO2]) refer to the amount released in the atmosphere (about 16 m3

of gas). No dat... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred during normal operation in the nitric acid plant (code

3102) of an inorganic chemical industry (code 2001). The nitrogen oxides

release into the environment occurred through the secondary air compressor

(code 4008).

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 5201 environment: natural event (weather, temperature, earthquake, etc.)

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational 5303 organization: organized procedures (none, inadequate, inappropriate,

unclear)

5307 organization: process analysis (inadequate, incorrect)

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

inappropriate)

5401 person: operator error

- not applicable -

remarks: The plant shut-down was caused by a lightning (code 5201) that stroke in the vicinity of

the control unit of the nitric acid plant but the nitrogen oxides release occurred because

of: 1- incomplete depressurization of the unit during repeat... see Appendix Full Report

A / causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident **country:** FA **ident key:** 1989_003_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:** 1989_003_01

a) total establishment inventory

CAS number: 10024-97-2 **identity:** Nitrogen Oxide

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): 0,033

use of substance as: NORMAL FINISHED PRODUCT

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 0,033 **potential quantity:** 0,033

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: 10102-43-9 **identity:** Nitrogen Monoxide

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): 0,033

use of substance as: ON-SITE INTERMEDIATE

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 0,033 **potential quantity:** 0,033

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: 10102-44-0 **identity:** Nitrogen Dioxide

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): 0,033

use of substance as: ON-SITE INTERMEDIATE

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 0,033 **potential quantity:** 0,033

c) substance belongs to relevant inventory indirectly involved: No

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

Source of Accident - Situation **country:** FA **ident key:** 1989_003_01

situation

industry

inititating event 2001 general chemicals manufacture

associated event - not applicable -

activity/unit

major occurrence 3102 process: chemical continuous reaction

inititating event 3102 process: chemical continuous reaction

associated event - not applicable -

component

major occurrence 4008 power source (engine, compressor, etc.)

inititating event 4008 power source (engine, compressor, etc.)

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1989_003_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 In the Original Report there is no evidence of significant effects outside the n... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk

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 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 gas released during the accident.... 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 n... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1989_003_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 it was deci... 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 / 1989_003_01 report

Appendix Short Report / description of accident types:

ACCIDENT CASE HISTORY DESCRIPTION:

A lightning stroke caused a voltage fluctuation in the power supply of the control unit of the nitric acid plant which, in turn, led to the shut down of the plant. Because of incomplete depressurization of the unit during repeated start-up trials, a back flow of process gas containing nitrogen oxides occurred in the suction line of the secondary air compressor, resulting in nitrogen oxide emission within the plant at ground level.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

A lightning stroke in the vicinity of the control unit of the nitric acid plant, causing a voltage fluctuations in the area which, in turn, led to the shut-down of the plant.

CAUSES:

The plant shut-down was caused by a lightning that stroke in the vicinity of the control unit of the nitric acid plant but the nitrogen oxides release occurred because of:

1- incomplete depressurization of the unit during repeated start-up trials (due to operator error and insufficient operating procedures),

2- a back flow of process gas containing nitrogen oxides occurred in the suction line of the secondary air compressor as there was no means installed to prevent it (due to insufficient plant design and process analysis).

Appendix Short Report / description of immediate lessons learned:

MEASURES TO PREVENT ANY RECURRENCE OF SIMILAR ACCIDENTS:

After the accident it was decided to fit a one-way valve to the suction line of the compressor to prevent unintentional back flow of the process gas to the environment.

Appendix Full Report A / type of accident:

A lightning stroke caused a voltage fluctuation in the power supply of the control unit of the nitric acid plant which, in turn, led to the shut down of the plant. Because of incomplete depressurization of the unit during repeated start-up trials, a back flow of process gas containing nitrogen oxides occurred in the suction line of the secondary air compressor, resulting in nitrogen oxide emission within the plant at ground level (code 1101).

Appendix Full Report A / dangerous substances:

The total establishment and the potential directly involved inventories of nitrogen oxides (nitrogen oxide [N2O], nitrogen monoxide [NO] and nitrogen dioxide [NO2]) refer to the amount released in the atmosphere (about 16 m3 of gas). No data are available about the single amounts of released nitrogen oxides.

Appendix Full Report A / causes of major occurrence:

The plant shut-down was caused by a lightning (code 5201) that stroke in the vicinity of the control unit of the nitric acid plant but the nitrogen oxides release occurred because of: 1- incomplete depressurization of the unit during repeated start-up trials (codes 5303 and 5401); 2- a back flow of process gas occurred in the suction line of the secondary air compressor as there was no means installed to prevent it (due to insufficient plant design and process analysis [codes 5307 and 5308]).

Appendix Full Report B / area concerned - remarks:

In the Original Report there is no evidence of significant effects outside the nitric acid plant.

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 gas released during the accident.

Appendix Full Report B / disruption of community life:

In the Original Report there is no evidence of significant effects outside the nitric acid plant.

Appendix Full Report C / lesson learned - prevent:

After the accident it was decided to fit a one-way valve to the suction line of the compressor to prevent unintentional back flow of the process gas to the environment.