

Explosion på en fabrik i stålindustrin.

910417 MARS 1991_03

En experimentkörning hade just avslutats och anläggningen stängdes av strax innan olyckan inträffade. Nedstängningen följde inte de föreskrivna procedurerna. Då normal drift skulle startas upp antändes gas i ett elektrofilter och en explosion uppstod. Gasen hade läckt till elektrofiltret under den felaktiga nedstängningen. Explosionen ledde till en kortslutning, vilket i sin tur ledde till en andra explosion i en gaskylare. Gaskylarens lock sprängdes bort.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
koldioxid	630-08-0	okänt

Skador:

Människor: Inga.

Materiella: Anläggningen fick omfattande skador. Fönster krossades utanför fabriksområdet 50 m bort.

Miljö/ekologi: Inga effekter rapporterade.

Infrastruktur: Inga.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder.

Report Profile

Identification of Report:

country: FA ident key: 1991_003_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1991-04-17 start:

finish: finish:

Establishment:

name:

address:

industry: 2011 metal refining and processing (includes foundries, electrochemical refining, plating, etc.)

Metal (Steel Production)

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:** 1991_003_01**Accident Types:****release:** No **explosion:** Yes**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:** Yes**ecotoxic:** No **other:** No**flammable:** Yes**description:**

- Carbon Oxide (C.A.S. CODE: 630-08-0): amount involved = not known.

Immediate Sources of Accident:**storage:** No **transfer:** No**process:** Yes **other:** No**description:**

The accident occurred after an experimental run in a metallurgical industry for the steel production. The system involved included the gas cooler and the wet electrofilter.

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:** Yes

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: No **decontamination:** No

external services: No **restoration:** No

sheltering: No **other:** No

evacuation: No

description:

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:** 1991_003_01

1 Type of Accident

remarks: An experimental run to exclude the flammable part of the convert gas had

just been finished, and the unit was shut down but following a faulty

procedure (the turn-off was carried out in a wrong order). The unit was then

used for normal oper... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: No data are available about the amount of carbon monoxide involved in the

accident.

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred after an expemerintal run in a metal industry for the

steel production (code 2011). The system involved included the gas cooler

and the wet electrofilter (codes 3104, 4007 and 4009).

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 - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

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

5304 organization: training/instruction (none, inadequate, inappropriate)

5307 organization: process analysis (inadequate, incorrect)

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

5401 person: operator error

remarks: The immediate cause has been identified as faulty operation in the shut-down procedure of the experimental run (codes 5401, 5303 and 5304). The shut-down of the unit did not occur

in the right order and, due to the lack of an interlocking d... see Appendix Full Report A

/ causes of major occurrence

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1991_003_01

event:

major occurrence 1307 explosion: VCE (vapour cloud explosion; supersonic wave front)

initiating event 1307 explosion: VCE (vapour cloud explosion; supersonic wave front)

associated event - not applicable -

Dangerous substances

country: FA ident key: 1991_003_01

a) total establishment inventory

CAS number: 630-08-0 **identity:** Carbon 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): -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:** 1991_003_01

situation

industry

initiating event - not applicable -

associated event - not applicable -

activity/unit

major occurrence - not applicable -

initiating event - not applicable -

associated event - not applicable -

component

major occurrence 4009 heat exchanger (boiler, refrigerator, heating coils, etc.)

initiating event 4009 heat exchanger (boiler, refrigerator, heating coils, etc.)

associated event - not applicable -

situation

industry

initiating event 2011 metal refining and processing (includes foundries, electrochemical refining, plating, etc.)

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 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:** 1991_003_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 explosion caused the windows breakage up to 50 metres from the installation.... 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 The explosion caused extensive damages to the plant and, outside the establishme... 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 explosion caused the windows breakage up to 50 metres from the installation.... see Appendix

7 Discussion of Consequences

C Response Full Report

country: FA **ident key:** 1991_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 the followi... 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 / 1991_003_01 report

Appendix Short Report / description of accident types:

ACCIDENT CASE HISTORY DESCRIPTION:

An experimental run to exclude the flammable part of the convert gas had just been finished and the unit was shut down but following a faulty procedure (the turn-off was carried out in a wrong order). The unit was then used for normal operation and had just been started when an ignition in the electrofilter caused an explosion. This caused a short circuit of the wire connecting gas cooler and E-filter and the upper part of the gas cooler was torn off by the explosion.

Appendix Short Report / description of suspected causes:

CAUSES:

The immediate cause has been identified as faulty operation in the shut-down procedure of the experimental run. The shut-down of the unit did not occur in the right order and, due to the lack of an interlocking device, vacuum occurred when the unit was start-up. Air was sucked in through the waterlock- underpressure safety device to the gas cooler and the wet electrofilter, resulting in an explosion.

Appendix Short Report / description of immediate effects:

MATERIAL LOSS:

The explosion caused extensive damages to the plant and, outside the establishment, the windows breakage up to 50 metres from the installation. No data are available about the cost of the material damages.

COMMUNITY DISRUPTION:

The explosion caused the windows breakage up to 50 metres from the installation.

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- insurance against faulty operation through interlocking device;
- 2- to improve the techniques for measurement and control to avoid formation of low pressure.

Appendix Full Report A / type of accident:

An experimental run to exclude the flammable part of the convert gas had just been finished, and the unit was shut down but following a faulty procedure (the turn-off was carried out in a wrong order). The unit was then used for normal operation and had just been started when an ignition in the electrofilter caused an explosion (code 1307).

Appendix Full Report A / causes of major occurrence:

The immediate cause has been identified as faulty operation in the shut-down procedure of the experimental run (codes 5401, 5303 and 5304). The shut-down of the unit did not occur in the right order and, due to the lack of an interlocking device (codes 5307 and 5308), vacuum occurred when the unit was start-up. Air was sucked in through the waterlock- underpressure safety device to the gas cooler and the wet electrofilter, resulting in an explosion.

Appendix Full Report B / area concerned - remarks:

The explosion caused the windows breakage up to 50 metres from the installation.

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 caused extensive damages to the plant and, outside the establishment, the windows breakage up to 50 metres from the installation. No data are available about the cost of the material damages.

Appendix Full Report B / disruption of community life:

The explosion caused the windows breakage up to 50 metres from the installation.

Appendix Full Report C / lesson learned - prevent:

After the accident the following measures were established:

- 1- insurance against faulty operation through interlocking device;
- 2- to improve the techniques for measurement and control to avoid formation of low pressure.