

Gasexplosion på en fabrik för produktion av blyoxider.

840305 MARS 1984_03

En bristning i ett membran till en tryckregulator ledde till att butan spreds in i en transformatorstation där gasen antändes och exploderade. Brandlarmet utlöstes och anläggningen utrymdes.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
butan	106-97-8	20 kg

Skador:

Människor:	Inga.
Materiella:	Anläggningen och närliggande byggnader skadades.
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: 1984_003_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 1984-03-05 start:

finish: finish:

Establishment:

name:

address:

industry: 2001 general chemicals manufacture

Inorganic Chemical (Surface Coating & Dyes [Lead Oxide Production 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: 1984_003_01

Accident Types:

release: Yes 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: No explosive: Yes

ecotoxic: No other: No

flammable: Yes

description:

- Butane (C.A.S. CODE: 106-97-8): amount involved = 20 Kg.

Immediate Sources of Accident:

storage: No transfer: No

process: No other: Yes

description:

The accident occurred in an inorganic chemical industry manufacturing lead oxide used for surface coating and dyes. The explosion occurred in the transformer station but the butane's leakage happened in the heating room of the plant.

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: No community disruption: No

other: No

ecological harm: No

national heritage loss: No

description:

MATERIAL LOSS:

The explosion caused large damages to the plant and the nearby buildings but no data are available about the cost of the material losses.

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:

An internal alarm was given: the gas inlet to the heating room was shut-down and the cable shaft was sealed.

The plant was evacuated.

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:** 1984_003_01

1 Type of Accident

remarks: A leakage of butane (rupture of a membrane of a pressure regulator) occurred in the heating room of the plant (code 1101). Through the cable shaft, the explosive butane cloud entered the transformer station and was ignited, resulting in an ... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The total establishment and the potential directly involved inventories of butane refer to the amount involved in the unconfined vapour gas explosion.

3 Source of Accident

illustration: - not applicable -

remarks: The accident occurred in an inorganic chemical industry manufacturing lead oxide used for surface coating and dyes (code 2001). The explosion occurred in the transformer station (codes 3106 and 4008) but the butane's leakage happened in 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 5102 operation: component/machinery failure/malfunction

- not applicable -

- not applicable -

- not applicable -

- not applicable -

human / organizational - not applicable -

- not applicable -

- not applicable -

- not applicable -

- not applicable -

remarks: The leakage of butane was caused by the rupture of a pressure regulator membrane (code 5102).

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1984_003_01

event:

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

initiating event 1101 release: gas/vapour/mist/etc release to air

associated event - not applicable -

event:

major occurrence 1305 explosion: dust explosion

initiating event 1305 explosion: dust explosion

associated event - not applicable -

Dangerous substances

country: FA ident key: 1984_003_01

a) total establishment inventory

CAS number: 106-97-8 **identity:** Butane

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): 0,02

use of substance as: STARTING MATERIAL

b) substance belongs to relevant inventory directly involved: Yes

actual quantity: 0,02 **potential quantity:** 0,02

c) substance belongs to relevant inventory indirectly involved: No

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

a) total establishment inventory

CAS number: 7440-66-6 **identity:** Zinc Powder

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:** 1984_003_01

situation

industry

initiating event 2001 general chemicals manufacture

associated event - not applicable -

activity/unit

major occurrence 3106 process: power generation (burning fuel, etc.)

initiating event 3106 process: power generation (burning fuel, etc.)

associated event - not applicable -

component

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

initiating event 4010 valves/controls/monitoring devices/drain cocks

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

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

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1984_003_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 In the Original Report there is no evidence of significant effects outside the e... 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 large damages to the plant and the nearby buildings but no ... 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: 1984_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 follow... 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 / 1984_003_01 report

Appendix Short Report / description of accident types:

ACCIDENT CASE HISTORY DESCRIPTION:

A leakage of butane (rupture of a membrane of a pressure regulator) occurred in the heating room of the plant. Through the cable shaft, the explosive butane cloud entered the transformer station and was ignited, resulting in an unconfined gas cloud explosion. An internal alarm was given: the gas inlet to the heating room was shut-down and the cable shaft was sealed. The plant was evacuated.

Appendix Short Report / description of suspected causes:

INITIATING EVENT AND CONSEQUENCES:

Leakage of butane in the heating room of the plant and immission of the explosive gas cloud into the nearby transformer station through the cable shaft. The butane cloud was then ignited resulting in an unconfined gas cloud explosion.

CAUSES:

The leakage of butane was caused by the rupture of a pressure regulator membrane.

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- substitution of the regulation unit;
- 2- installation of a gas alarm system with automatic plant shut-down when 25% of the lower explosion limit is reached;
- 3- annual inspection of the whole plant by external experts.

Appendix Full Report A / type of accident:

A leakage of butane (rupture of a membrane of a pressure regulator) occurred in the heating room of the plant (code 1101). Through the cable shaft, the explosive butane cloud entered the transformer station and was ignited, resulting in an unconfined gas cloud explosion (code 1307).

Appendix Full Report A / source of accident - remarks:

The accident occurred in an inorganic chemical industry manufacturing lead oxide used for surface coating and dyes (code 2001). The explosion occurred in the transformer station (codes 3106 and 4008) but the butane's leakage happened in the heating room of the plant. The leakage of butane occurred due to the rupture of a pressure regulator membrane (code 4010).

Appendix Full Report B / area concerned - remarks:

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

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 large damages to the plant and the nearby buildings but no data are available about the cost of the material losses.

Appendix Full Report B / disruption of community life:

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

Appendix Full Report C / lesson learned - prevent:

After the accident, the following measures were established:

- 1- substitution of the regulation unit;
- 2- installation of a gas alarm system with automatic plant shut-down when 25% of the lower explosion limit is reached;
- 3- annual inspection of the whole plant by external experts.