

Explosion och brand på en fabrik för produktion av färgpigment.

971202

En explosion inträffade i en byggnad där blandning och spädningsoperationer ägde rum. Två anställda var i färd med att tillsätta nitrocellulosa till ett 4 m³ stor reaktor med etylacetat då explosionen inträffade. Explosionens orsaker har inte klargjorts, men den ägde rum utanför reaktionskärlet. Den misstänkta orsaken är att brandfarliga ångor, troligen etylacetat, koncentrerats i det hörn av lokalen där reaktorn var placerad. Detta kan i sin tur eventuellt orsakats av dålig ventilation, eller av läckage genom en fläns i reaktorkärlet. Tändkällan är okänd. De två operatörerna som var inbegripna i laddningsoperationen skadades, men inte lika allvarligt som två andra i närheten. En flamma slog ut och brände en truckförare allvarligt. En person på ett närliggande laboratorium skadades då tryckvågen raserade en vägg över denne.

Katastrofplanen aktiverades sekunder efter explosionen. Företaget mobiliserade ett brandbekämpningslag om 25 man. De lyckades släcka de små bränder som uppstått efter explosionen inom några minuter. Det automatiska sprinklersystemet aktiverades också. Efter 15 minuter då den första brandbilen från räddningstjänsten anlände hade bränderna redan släckts. Ytterligare tre brandbilar från tre andra orter anlände efter hand. Först på plats var polisen med 60 man. Efter en timme anlände ett räddningslag med polishundar för att söka i de raserade byggnaderna efter överlevande. Utrymningsplanen sattes omedelbart i verket. Anläggningens 267 arbetare utrymdes. Den första ambulansen anlände 25 minuter efter olyckan. Ytterligare fyra ambulanser med utrustning för behandling av brännskador anlände 10 minuter senare. De skadade hade först ut ur byggnaden av företagets katastroflag, men första hjälpen lämnades till ambulanspersonalen.

Inblandade ämnen och mängder

	CAS Nr.	Mängd
diverse lösningsmedel, totalt 23 st olika, främst etylacetat och etanol.		
etylacetat	141-78-6	ca 3 ton
nitrocellulosa	9004-70-0	ca 1000-1200 kg
etanol	925-93-9	okänt

Skador:

Människor: 13 personer skadades. Av dessa kunde fem lämna sjukhuset nästa dag. Sex av dem fick en prognos om en eller två månaders behandling. De resterande två personerna skadades allvarligare; en av dem fick tredje gradens brännskador på 70% av kroppen, den andra hade skadats då en vägg rasade över denne, vilket orsakat skador på huvud och ett flertal frakturer, förutom leverskador.

Materiella: Byggnaderna skadades svårt, medan apparatur skadades lindrigt.

Miljö/ekologi: Inga effekter rapporterade.

Infrastruktur: Inga effekter.

Erfarenheter redovisade (Ja/Nej): Ja

Kortfattat anges förebyggande åtgärder

Report Profile

Identification of Report:

country: FA ident key: 1800_306_01

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

Date of Major Occurrence: Time of Major Occurrence

start: 02/12/1997 start: 11:25:00

finish: 02/12/1997 finish: 15:00:00

Establishment:**name:****address:****industry:** 2018 paper manufacture, printing, publishing

production of inks and paints

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_306_01**Accident Types:****release:** No **explosion:** Yes**water contamination:** No **other:** No**fire:** No**description:**

An explosion followed by small fires occurred inside a hall (hangar, industrial building) of the establishment, in which mixing and dilution operations were carried out. The explosion occurred while two workers were concluding (finishing) t... see Appendix Short Report / description of accident types

Substance(s) Directly Involved:**toxic:** No **explosive:** No**ecotoxic:** No **other:** No**flammable:** Yes**description:**

ethylacetate, flammable liquid, CAS 141-78-8

nitrocellulose, 12% nitrated and wetted (desensitised with dibutyl phthalate 18%), flammable solid, CAS 9004-70-0

Immediate Sources of Accident:

storage: No **transfer:** No

process: Yes **other:** No

description:

mixing - the accident may have occurred not inside the mixer, but instead above, as the signs left by the accident on the equipment and structure seem to indicate. The mixer is placed in a corner of the hall (hangar) No. 13 against the sep... see Appendix Short Report / description of immediate sources

Suspected Causes:

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

human: Yes **other:** No

description:

The accident may have originated from the ignition of vapours probably released from the hatch and accumulated (concentrated) in the corner of the hall due to insufficient internal ventilation. The release may have also occurred through the... 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: No

national heritage loss: No

description:

13 persons were injured of which 5 not seriously which were dismissed from hospital the next day, 6 of the other 8 received a prognosis between 30 and 60 days, the other two a reserved prognosis. One of the seriously injured received 3rd (t... 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:** No

evacuation: Yes

description:

The emergency response action started a few seconds after the explosion. A team of fire fighters composed by 25 elements (men) was immediately activated, and, with the help of a special vehicle equipped with a manually controllable and mon... see Appendix Short Report / description of emergency measures taken

Immediate Lessons Learned:

prevention: Yes **other:** No

mitigation: No

description:

Installation (adoption) of systems for the detection of flammable vapours inside building (structures) in which working operations with highly flammable liquids.

A Occurrence Full Report

country: FA ident key: 1800_306_01

1 Type of Accident

remarks: The dynamic of the accident is still unclear.... see Appendix Full Report A / type of accident

2 Dangerous Substances

remarks: The information presently available does not permit to evaluate effectively the amount of ethyl acetate which has evaporated. In the second column are inserted the amounts effectively present in the mixer, but which has not been involved in... see Appendix Full Report A / dangerous substances

3 Source of Accident

illustration: Please specify the attached materials illustrating the location of the establishment, relevant installation(s) and relevant surrounding geographical features.

remarks: the BASF establishment produces inks and varnishes. The hall (hangar) No. 13,m where the accident occurred, is dedicated to the intermediate mixing operations of the products, before the addition of colouring pigments and the treatment in p... see Appendix Full Report A / source of accident - remarks

4 Meteorological Conditions

precipitation none: fog: rain: hail: snow:

No No Yes No No

wind speed (m/s):

direction (from):

stability (Pasquill):

ambient temperature (°C):

remarks: When the accident occurred there was a high humidity content in the air due to a light and persistent rain.

5 Causes of Major Occurrence

main causes

technical / physical - not applicable -

human / organizational - not applicable -

remarks: the causes have still to be determined

6 Discussion about the Occurrence

- not applicable -

Type of Accident country: FA ident key: 1800_306_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 -

Dangerous substances

country: FA ident key: 1800_306_01

a) total establishment inventory

CAS number: identity: solvents (23 in total, comprised ethyl acetate, ethanol)

name from Seveso I Directive: - not applicable -

name from Seveso II Directive: - not applicable -

category from Seveso II: flammable liquids

other hazards (1): - not applicable -

other hazards (2): - not applicable -

maximum quantity (tonnes): 700

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: Yes

actual quantity: -1 indir_pot_quant: -1

a) total establishment inventory

CAS number: identity: Pigments

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: Yes

actual quantity: -1 indir_pot_quant: -1

a) total establishment inventory

CAS number: 90004-70-0 identity: nitrocellulose (desensitised with dibutyl phthalate at 18%)

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: Yes

actual quantity: -1 indir_pot_quant: -1

a) total establishment inventory

CAS number: 141-78-6 identity: ethyl acetate

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: 2

c) substance belongs to relevant inventory indirectly involved: Yes

actual quantity: 0 indir_pot_quant: 30

Source of Accident - Situation country: FA ident key: 1800_306_01

situation

industry

initiating event 2018 paper manufacture, printing, publishing

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 - not applicable -

initiating event 4007 machinery/equipment (pump, filter, column separator, mixer, etc.)

associated event - not applicable -

B Consequences Full Report

country: FA **ident key:** 1800_306_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 please specify the attached materials illustrating the geographical extent

of th... see Appendix Full Report B / area concerned - illustration of

effects

remarks The explosion, with characteristics of a deflagration, has caused: the partial c... see Appendix

Full Report B / area concerned - remarks

2 People

establishment popul. emergency personnel off-site population

total at risk 20 0 0

immediate fatalities 0 0 0

subsequent fatalities 0 0 0

hospitalizing injuries 13 0 0

other serious injuries 0 0 0

health monitoring 0 0 0

remarks 13 persons were injured of which 5 not seriously which were dismissed from hospi... see Appendix

Full Report B / people

3 Ecological Harm

pollution/contamination/damage of:

- residential area (covered by toxic cloud) No

- common wild flora/fauna (death or elimination) No

- rare or protected flora/fauna (death or elimination) No

- water catchment areas and supplies for consumption or recreation No

- land (with known potential for long term ecological harm or No

preventing human access or activities)

- marine or fresh water habitat No

- areas of high conservation value or given special protection No

remarks the fire extinguishing water was collected in the used water recovery tanks of t... see Appendix

Full Report B / ecological harm

4 National Heritage Loss

effects on:

- **historical sites** None - **historic monuments** None

- **historic buildings** None - **art treasures** None

remarks no national heritage sites are present in that area... see Appendix Full Report B / national

heritage loss

5 Material Loss

establishment losses off site losses

costs (direct costs to operator) (social costs)

in ECU LIT ECU LIT

material losses -1 -1 0 0

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

remarks damages to equipment has still to be evaluated. Relevant damages to the structure... 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 No Yes

- **media interest** No No Yes

- **political interest** No Yes No

remarks There has been no interruption of services outside the establishment. The accide... see Appendix

Ecological Components involved

country: FA ident key: 1800_306_01

type: 6102 inland: urban development

threatened: Yes affected: No

C Response Full Report

country: FA ident key: 1800_306_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

The installation (adoption) of... see Appendix Full Report C / lesson learned - prevent

measures to mitigate consequences:

no information is given

useful references:

no information is given

5 Discussion about Response

- not applicable -

Appendices for the FA / 1800_306_01 report

Appendix Short Report / description of accident types:

An explosion followed by small fires occurred inside a hall (hangar, industrial building) of the establishment, in which mixing and dilution operations were carried out. The explosion occurred while two workers were concluding (finishing) the loading (filling, charging) with nitrocellulose scales of a mixer (dissolver) of 4 m³ containing ethyl acetate. The nitrocellulose was stored in barrels (kegs) and was poured in the hopper of a worm feeder equipped with a shielded (explosion protected) motor. Small fires developed following the ignition of flammable materials (rags, ink tanks, resins, pigments) present in the hall (hangar). The few barrels (kegs) near the mixer which had still to be charged did not catch fire. The two operators (workers) were injured, but not as seriously as a worker a few metres from the hall (hangar) who was carrying out transport operations of barrels (kegs) with a lift truck (3rd degree burns), he has been hit by the flash. Another worker who was working in a laboratory adjacent to the hall (hangar) when the explosion occurred was seriously injured by a separating wall which fell down due to the pressure wave.

The causes of the accident have not yet been identified, the starting point has also not been determined. Nevertheless it is plausible to assume that the explosion occurred externally of the mixer, due to the fact that the lid of the mixer stayed in its place (original position). The explosion should have had the characteristics of a deflagration. The loading (filling, charging) with nitrocellulose is performed by inserting feed-line (supply line) through a hatch located on the mixer lid. Eye witnesses have stated that they have seen a flash (fire) develop more or less at the same time of (concurrently to) the blast (explosion). The flash (fire) has fully hit the worker on the lift truck, severely burning him. The equipment (appliances) inside the hall (building) do not show evident damages.

Appendix Short Report / description of immediate sources:

mixing - the accident may have occurred not inside the mixer, but instead above, as the signs left by the accident on the equipment and structure seem to indicate. The mixer is placed in a corner of the hall (hangar) No. 13 against the separating wall of the BASF installation and an underground storage facility of combustible gas of SNAM. No domino effects were registered.

Appendix Short Report / description of suspected causes:

The accident may have originated from the ignition of vapours probably released from the hatch and accumulated (concentrated) in the corner of the hall due to insufficient internal ventilation. The release may have also occurred through the flanging of the lid. The mixers are ignition shielded with a nitrogen atmosphere with a light over-pressure. Small probes (detectors) inside the mixer connected to an alarm monitor (detect) the Oxygen (O₂) concentration. The alarm is calibrated at 3% oxygen content and another at 0,5 bar. (atmospheres). There has been no alarm before the explosion, nor, according to the persons present at that time, has there been any persistent smell due to the presence of ethyl acetate.

The ignition source is unknown.

Both workers charged with the filling operation affirm to have followed standard procedures. One of the workers had been engaged since a few months.

Appendix Short Report / description of immediate effects:

13 persons were injured of which 5 not seriously which were dismissed from hospital the next day, 6 of the other 8 received a prognosis between 30 and 60 days, the other two a reserved prognosis. One of the seriously injured received 3rd (third) degree burns on 70% of the body whereas the other one suffered from a head injury, multiple fractures and a liver injury.

The explosion, with characteristics of a deflagration, has caused: the partial collapse (break-down) of the perimeter wall of the establishment, which was located at 1.5 m (1.5 metres from the mixer and which had a thickness of 25 cm (25 centimetres, 0.25m); the collapse (break down) of three dividing walls in the hall (hangar) of three bays (spans) of hall (hangar) No. 13; the destruction of a hoist (elevator) bay having a size of 1.8x1.5m, located at the opposite side of the hall (hangar); rupture (breaking) of all glass windows (glazing) of the hall (hangar). The mixer in question did not show serious damages, due to the fact that the explosion occurred most probably above the mixer. The motor of the feeder was thrown (projected) at a distance of 2.5 m (metres) from the mixer, whereas the screw (worm) of the feeder although being damaged, stayed in its place, and turned over laterally (on a side) due to the pressure wave. Many windows broke in the buildings of the establishment up to 200 m from the explosion point. There have been no effects off-site (outside of) the establishment

Appendix Short Report / description of emergency measures taken:

The emergency response action started a few seconds after the explosion. A team of fire fighters composed by 25 elements (men) was immediately activated, and, with the help of a special vehicle equipped with a manually controllable and monitored nozzle and portable fire extinguishers with solid materials (dry powder), has extinguished in a

few minutes the small fires which had developed consequent to the explosion. Also the automatic water sprinkler system was immediately activated, with the exception of the installation on the collapsed wall which was destroyed.

When the first fire truck of the fire brigade of Cinisello Balsamo reached (after about 15 minutes) the site of the accident all fires had been already extinguished. Afterwards the fire brigade teams from Milan, Monza, Saronno reached the site.

The first ones to arrive were 60 policemen. After about an hour a police team with dogs intervened to check the eventual presence of bodies under the collapsed wall (debris).

The evacuation plan of the establishment was immediately activated, 267 workers were present at that time.

The first ambulance arrived after approx. 25 minutes from the accident and has rescued and transported to the hospital of Cinisello the most seriously injured. Approx. 10 min after the arrival of the first ambulance other 4 ones equipped for burns arrived from Cinisello, Monza, Milan and Saronno.

The injured persons had been brought outside the hall (hangar) by the on-site emergency response team before the ambulances arrived, while first aid care was left to the specialised personnel.

There was no interruption of services outside of the establishment.

Appendix Full Report A / type of accident:

The dynamic of the accident is still unclear.

Explosion, probably caused by the ignition of ethylacetate vapours released from a mixing machine (mixer) with a capacity of 4 m³ during the loading (charging) operation of the same mixer with nitrocellulose scales with the help of a worm feeder. In the mixer there were approx. 3 tons of liquid ethyl acetate. The amount of nitrocellulose charged is of 1000-1200 kg for each mixer. The ignition source has still to be determined. The singularity of the accident is that it has destroyed structures but not equipment.

Appendix Full Report A / dangerous substances:

The information presently available does not permit to evaluate effectively the amount of ethyl acetate which has evaporated. In the second column are inserted the amounts effectively present in the mixer, but which has not been involved in the explosion.

The second table indicates the estimated amount of ethyl acetate present in the hall (hangar) (in which other 17 mixers are installed) at the moment of the explosion.

The amount of organic pigments is unknown.

For these amounts the amounts present in the flammable solvent storage of the basement of the establishment were not taken into account. The amounts of the 23 flammable solvents stored onsite add up to approx. 700 tons:

Appendix Full Report A / source of accident - remarks:

the BASF establishment produces inks and varnishes. The hall (hangar) No. 13, where the accident occurred, is dedicated to the intermediate mixing operations of the products, before the addition of colouring pigments and the treatment in pearl mills. The mixing operations are batch processes. The accident may have occurred not inside the mixer, but instead above, as the signs left by the accident on the equipment and structure seem to indicate. The mixer is placed in a corner of the hall (hangar) No. 13 against the separating wall of the BASF installation and an underground storage facility of combustible gas of SNAM. The mixers of hall (hangar) No. 13 (approx. 17) are placed in such way that only the lid extends from the floor covering (ground-floor). The remaining part of the mixer is located in the underground (cellar) room in which are placed the solvent storage tanks (flammable liquids). Flammable vapours detectors are installed on all walls of the storage, with an alarm which is activated when the concentration of flammable vapours passes over 1/3 (one third) of the lower flammability limit. Small probes (detectors) are installed inside the mixer connected to an alarm which sounds at the Oxygen (O₂) concentration. above 3% .

Appendix Full Report B / area concerned - illustration of effects:

please specify the attached materials illustrating the geographical extent of the effects.

Appendix Full Report B / area concerned - remarks:

The explosion, with characteristics of a deflagration, has caused: the partial collapse (break-down) of the perimeter wall of the establishment, which was located at 1.5 m (1.5 metres from the mixer and which had a thickness of 25 cm (25 centimetres, 0.25 metres); the collapse (break down) of three dividing walls in the hall (hangar) of three bays (spans) of hall (hangar) No. 13; the destruction of a hoist (elevator) bay having a size of 1.8 x 1.5m, located at the opposite side of the hall (hangar); rupture (breaking) of all glass windows (glazing) of the hall (hangar). The mixer in question did not show serious damages, due to the fact that the explosion occurred most probably above the mixer. The motor of the feeder was thrown (projected) at a distance of 2.5 m (metres) from the mixer, whereas the screw (worm) of the feeder although being damaged, stayed in its place, and turned over laterally (on a side) due to the pressure wave. Many windows broke in the buildings of the establishment up to 200 m from the explosion point. There have been no effects off-site (outside of) the establishment.

Appendix Full Report B / people:

13 persons were injured of which 5 not seriously which were dismissed from hospital the next day, 6 of the other 8 received a prognosis between 30 and 60 days, the other two a reserved prognosis. One of the seriously injured received 3rd (third) degree burns on 70% of the body whereas the other one suffered from a head injury, multiple fractures and a liver injury.

There were 20 persons present in the hall when the accident occurred.

It has not been considered necessary to include in the population at risk the other workers present in the establishment (approx. 250 others), although they may have been exposed to the risk of injury from the projection of fragments (glass in particular).

There has been no damage to the personnel of the emergency relief teams nor to persons outside the establishment.

Appendix Full Report B / ecological harm:

the fire extinguishing water was collected in the used water recovery tanks of the establishment

Appendix Full Report B / national heritage loss:

no national heritage sites are present in that area

Appendix Full Report B / material loss:

damages to equipment has still to be evaluated. Relevant damages to the structures of hall No. 13 and to a lot of windows (glazing) of the buildings in the establishment. The economic damages have therefore still to be quantified..

Appendix Full Report B / disruption of community life:

There has been no interruption of services outside the establishment. The accident has had a resonance at national level due to its gravity (seriously injured workers) as well as due to the singularity of its dynamic.

Appendix Full Report C / lesson learned - prevent:

The installation (adoption) of systems for the detection of flammable vapours inside building (structures) in which working operations with highly flammable liquids.