

Fire in a pesticide warehouse

27 June 2005

Béziers – [Languedoc-Roussillon]

France

Agrochemical/Phytosanitary products
 Storage
 Toxic fumes
 Extinguishing water
 Confinement
 Organisation / Procedure
 Lift pump
 Partitioning
 Automatic extinguishing
 Anti-intrusion device

THE INSTALLATIONS IN QUESTION

Installation concerned

The company formulates, packages and stores solid and liquid agropharmaceutical products (insecticides and fungicides). The production site at Béziers includes 2 operational units:

- the liquids unit (water and solvent-based)
- the solids unit (powders and granulates).

Main products stored at the site

	Risks
Liquid and solid substances (classes T', T, others)	Emissions of toxic products in case of fire Pollution from firefighting water

The company operates 9 production and/or storage building located on 17 ha of land:

- a set of buildings designated " A,B,C,D " and a building " R " dedicated to the powder and granulate activity,
- a set of buildings designated " G,H,I " dedicated to the liquids activity,
- a active material and/or finished product storage building, designated "T"
- an above-ground flammable liquid storage facility, and several buildings used for offices, cafeteria and laboratory...
- a 10,000 ml firefighting water recovery basin and two 600 m3 water reservoirs.

THE ACCIDENT, ITS BEHAVIOUR, EFFECTS AND CONSEQUENCES

The accident

On June 27, 2005, at around 3 am, a fire started in a building consisting of 4 sub-assemblies (A,B,C,D) for the formulation, packaging and storage of agropharmaceutic products.

The site employs a guardian. No personnel were at the site at the time.

At 3.05 am, the guard was alerted by the fire alarm in the workshop D1 (upper part of zone D). After confirming on site that there was actually a fire, he contacted both the fire and rescue department and the executive on duty at around 3.10 am.

The firemen at the scene at 3.25 am noted that zones B,C and D of the building were engulfed in flames. At around 3.40 am, the fire had spread throughout the building.

The operator activated the site's retention system by blocking the rainwater network (inflatable balloons). The gas at the site was shut off at around 4.10 am, then at 4.25 by the gas utility.

As the site had no electrical backup, the site had no power.

The Special Intervention Plan was put into motion at 4.22 am. A safety perimeter of 400 m was established in cooperation with the prefectural authorities and the various administrative services concerned, based on the quantities of products involved and evaluated by the operator and the duration of the fire (instead of 200 m provided for by the danger study).

Following a failure of the site's lifting pump, the operator contacted a specialised company which arrived at 5.33 am to pump the polluted firefighting water into the retaining basin and transfer it into the hermetic 10,000 m³ basin designed for this purpose. A fixed pumping installation was then set up at the end of the day.

The firemen conducted aerial reconnaissance by helicopter at around 8.15 am. A significant plume of smoke extended all the way to Coursan (roughly fifteen kilometres in the direction of Narbonne).

The fire was brought under control at around 8 am although continued burning until late morning. The building was destroyed.

The Special Intervention Plan was lifted at 16.15 am.

A judicial inquiry was opened prohibiting intervention on the building's "remains". Products continued to smoulder under the watchful eye of the firemen until July 4th and then by the operator thereafter.

The slow combustion lead to more or less important wisps of smoke with the fire restarting occasionally.



Buildings on fire

Consequences

On the day of the fire, Monday, June 27th, 2005, the operator presented the Classified Installations Inspectorate an evaluation of the situation and the compensatory measures to be implemented in order to limit the environmental impact and prevent increasing the damage.

Findings:

- widespread fire in building A, B, C, D,
- recovery of the firefighting water in the lower portion of the building by pump trucks from the specialised company into the 10,000 ml basin after a back-up pump was put into service,
- the site was secured by special balloons to block the firefighting water and by closing the natural gas supply line,
- significant release of smoke,
- precise list of physico-chemical data and quantities of products in building A,B,C,D not immediately provided by the operator to the intervention services due to the electrical and computer networks being unavailable.



Plume of smoke rising above the site

European scale of industrial accidents

By applying the rating rules of the 18 parameters of the scale made official in February 1994 by the Committee of Competent Authorities of the Member States that oversees the application of the 'SEVESO' directive, the accident can be characterised by the following 4 indices.

Dangerous materials released		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Human and social consequences		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Environmental consequences		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Economic consequences		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The parameters that comprise these indices and the corresponding rating method are available at the following address: <http://www.aria.ecologie.gouv.fr>.

The 87.73 tons of toxic substances involved in the fire represent 44% of the corresponding Seveso threshold (200 tons – toxic substances), which equals level 4 of the "quantities of dangerous materials" index according to parameter Q1 (Q1 between 10% and 100%).

The 98.92 tons of very toxic substances involved in the fire represent 495% of the corresponding Seveso threshold (20 tons – very toxic substances), which equals level 5 of the "quantities of dangerous materials" index according to parameter Q1 (Q1 between 10% and 100%).

The overall "dangerous materials released" rating is thus 5.

Parameter H7 of the "Human and social consequences" index is rated as level 4: 3,000 people were confined indoors for 12 hours ($5,000 \leq N \leq 50,000$ with $N = \text{number of residents evacuated or confined indoors} > 2 \text{ h} * \text{number of hours}$).

Parameter €16 of the "economic consequences" rating is 4: an initial estimation evaluated production losses at 40 M€ (€16 between 10 and 50 M€).

ORIGIN, CAUSES AND CIRCUMSTANCES OF THE ACCIDENT

The origins and causes of the accident have still not been determined.

A judicial inquiry was conducted. The forensic police visited the site of the fire two times and the insurance company appointed experts to determine the cause. Several leads were explored:

- auto-catalytic decomposition of phytosanitary products,
- electrical short-circuit,
- gas leak,
- malicious mischief.

The auto-catalytic decomposition of products could lead to their ignition. However, it is generally a long process which always involves the release of fumes and odours. The guardian had passed by point D1 (upper part of building D) during his rounds at least 1 hour before the fire and had not noticed anything.

As far as the other hypotheses are concerned, neither the forensic police nor the insurance company experts were able to determine the cause of the fire, nor explain the speed at which the fire spread to the other buildings; possibly due to the lack of fire-break partitioning at the circulation alley level between buildings D and B.

During his round prior to the fire, the guard was supposed to open all the firebreak doors to facilitate the arrival of the first morning shift which starts at 5 am. The closure of these doors is triggered via a temperature fuse and not directly slaved to the fire detection system.



Firefighting water

ACTION TAKEN

On June 28, 2005, the DRIRE proposed the Prefect of Hérault an emergency prefectural order outlining the security of the site, monitoring of the environment and the conditions for restarting the units not effected by the fire.

In particular, the order required:

- the suspension of all the establishment's activities,
- the monitoring of the installations involved in the accident to prevent the fire from spreading to the adjacent installations,
- the control and protection of the site's installations, up to the re-establishing detection and extinguishing means, these means having to undergo prior verification before being placed back into service,
- the re-establishment of the site's electric and water networks so that they participate in the protection and alarm means,
- collect the firefighting water contained upstream of installations A,B,C,D and transfer them into the firefighting basin designed for that purpose,
- environmental monitoring including, as a minimum:
 - monitoring of the air quality near the site, at periods adapted to the evolution of the accident and meteorological conditions until the fire is completely put out,
 - monitoring of the quality of underground water at the site and soil and surface water pollution outside the site. This monitoring focuses on the chemical substances released during the fire.
- elimination of the firefighting water in a centre authorised to do so. All resumption of activity cannot be considered until 80% of the fire basin's capacity can be used,
- the demolition of buildings A,B,C,D and the removal of structures, rubble and remaining products to appropriate processing centres,
- submittal of an accident report in application of article 38 of the order of September 21, 1977.

Furthermore, on 7/07/2005, the operator was requested to have the sanitary impact of the fumes, released during the fire on the neighbouring populations, evaluated by a competent and recognised organisation.



Destruction of the burned out buildings

LESSONS LEARNT

Several lessons can be learnt from this accident:

✓ Concerning the fire:

- the fire's extremely rapid propagation to all the buildings placed side-by-side, while the products being stored were considered to be "flammables",
- the non-pollution of surface and underground waters; the measures in place functioned correctly despite the failure of the lift pump,
- the discomfort of numerous people induced by the smoke from the fire, although the toxicity threshold for irreversible effects was not reached,
- combustion residues such as dioxins, phtalates, PAH, phytosanitary products, measured in the environment (soil and plants) show values that are not significantly different from those normally found in an urban or industrial zone,
- the need to improve communication of the authorities with regard to the press and the public, notably during the first hours of an accident,
- the difficulty to quickly obtain a list from the operator regarding the type and quantity of chemical substances involved.



Spread of the fire to several buildings

✓ Concerning the measures implemented within the reconstruction framework:

- the concrete structure's 2-hour fire resistance for walls and frameworks,
- the partitioning of each building to separate the raw materials from the formulation and packaging area, as well as the finished product storage part by 2-hour fire break walls, rising above the roof at least 1 m,
- automatic fire extinguishing backed up by foam with a high expansion ratio for each of the cells created,
- firebreak doors slaved to the fire detection system,
- installation of anti-intrusion devices,
- installation of a back-up electrical substation.