

## A violent fire in a processed pork product manufacturing plant

June 19, 1998

**Ambérieu-en-Bugey – [Ain]  
France**

Food industry  
Refrigeration  
Fluorinated species  
Sandwich panels  
Organization / Works  
Intervention difficulties  
Victims  
Judicial procedures  
Securing  
Expert assessments

### THE INSTALLATIONS IN QUESTION

#### The site:

Since 1981, the processed pork product plant has operated near residences in an industrial and commercial in the city of Ambérieu-en-Bugey in the Ain *département*. An extension was added to the establishment in 1986 and modifications were made in 1992 and 1995-1996; the plant has a production capacity of 15,000 t/year or 300 t/week and had 270 employees in 1996 when it was taken over by a large food industry group.

After restructuring in 1997 and 1998 (2 x 4 MF) and while undergoing administrative adjustments, the plant has since employed 140 people and produces 35 t/day.

#### The installations:

The establishment includes a 2-storey 1,500 m<sup>2</sup> building consisting of offices and employee facilities. A 2<sup>nd</sup> building (15,000 m<sup>2</sup>) is used for the reception, storage, manufacture and shipping of raw materials or finished products. This building consists of a metal framework, columns and framework support elements (made of reinforced concrete until 1992, and since made of metal) and partitions made of polyurethane foam insulating panels. Concrete block walls separate the technical and administrative buildings, and certain specific rooms (boiler room...). Part of the roof is made of bitumen-coated profiled steel sheeting and a 2<sup>nd</sup> level exists in certain areas (machine room, white rooms...).

### THE ACCIDENT, ITS BEHAVIOUR AND CONSEQUENCES

#### The accident

A fire broke out in the processing plant on June 19, at around 1.25 pm. The alarm was sounded and the emergency services arrived at the site 7 minutes later, although the fire had already become widespread. Four-thousand square meters of the plant were engulfed in flames in just 17 minutes (sandwich panels), spewing thick smoke.

Despite the progressive arrival of reinforcements, the 15,000 m<sup>2</sup> of the operations building and the refrigeration units (F22) were destroyed in less than 2 hours. The emergency services confirmed several elements that explain how the fire was able to spread so quickly and the difficulties in combating the fire:

- ✓ A delay in contacting emergency services (by dialling 18 – in France) due to the lack of an audible alarm, the late detection of the fire (noon break) and the inappropriate means of communication (telephone in the work areas without outside access, switchboard closed).



RD



Source : BARPI

without repercussion.

- ✓ The construction principle retained, a box (sandwich panels) within a box (siding and roofs), without a smoke ventilation system, initially leads to the confinement of the heat and radiation inside the double shell preventing hot gasses from escaping.
  - ✓ Insufficient, or even inexistent partitioning combined with the extensive use of polyurethane foam sandwich panels (wall and ceiling). These M1-classed panels offer no resistance above 300 °C, increase the thermal load and generate dangerous gases and volatile materials that fuel the flames which spread through the walls "like blow torches".
  - ✓ The metal framework elements collapsed in the fire and the use of bituminous profiled steel roof panels lead to the melting, flowing and combustion of the bitumen.
  - ✓ Inaccessible false ceilings in certain areas, isolating large volumes under the roof and very large volume freezing rooms are aggravating factors.
  - ✓ The heat loads are very variable (packing equipment...) and the ignition of frozen merchandise is promoted by the cold which dries out the contents. A high filling rate leaves little place to move around and stacking of racks creates a "chimney" effect.
  - ✓ The abundant smoke prevents the heart of the fire from being located precisely, although the refrigerants, glycol water and R22 are
- ✓ Furthermore, the destruction by fire of plastic rainwater downspouts that are not reinforced by a metal sleeve, could allow firefighting water to enter the water table directly via the rainwater drainage network, notably when it is connected to a percolation well.

**The consequences:**

Despite the progressive arrival of reinforcements, the 15,000 m<sup>2</sup> of the operations building and the refrigeration units (F22) were destroyed in less than 2 hours. Four-hundred fifty cubic meters of water per hour were required during the most intense firefighting operations. The fire was finally brought under control at 3.50 pm and put out the next day at 8 am. Emergency operations were completed on Sunday at 3 pm.

The fire claimed 3 lives (an outside welding contractor, found in a hallway, and 2 employees on the mezzanine above the coolers were asphyxiated) and 8 individuals were slightly injured. A fire wall protected the administrative facilities, but the plant was completely destroyed. Property damage was evaluated in excess of 40 MF and 120 employees were laid-off.

**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 which oversees the application of the 'SEVESO' directive, the accident can be characterised by the following 4 indices, based on the information available.

This fire can be characterised by the following indices:

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

No elements are available regarding the substances released during the accident and likely to be classified under the terms of the SEVESO Directive.

Three parameters are involved in determining the level of the "Human and social consequences" rating: H3, H4 and H5.

Parameter H3 reached level 3, as the number of deaths (3) was between 2 and 5.

Parameter H4 is level 0, no one seriously injured.

Parameter H5 reached level 2 with 8 slightly injured (6 to 19 injured).

As a result, the overall "Human and social consequences" rating is a level 3.

The "Environmental consequences" index was not rated, as none of the corresponding technical elements were available.

Three parameters are involved in determining the level of the "Environmental consequences" rating: €15, €16 and €18.

Parameter €15 is rated 3, as the amount of property damage in the establishment was evaluated at more than 40 MF.

Parameter €16 was not evaluated as the amount of the establishment's property damage was provided.

Parameter €18 was also not evaluated as no elements were available regarding the clean-up, decontamination or environmental rehabilitation measures.

As a result, the overall "Environmental consequences" rating is 3.

## **ORIGIN, CAUSES AND CIRCUMSTANCES OF THE ACCIDENT**

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The exact origin of the accident is unknown, although reconstruction operations on the installations were ongoing at the day of the accident during a period of reduced activity at the plant (during the lunch break). The extent of the damage, the rapidity at which the fire spread and the fear of toxic emissions complicated the rescue operation.

## **ACTION TAKEN**

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Following the accident and notably owing to the judicial procedure and the expert assessments to be performed, several days were required to remove the 500 t of meat buried under the rubble (odours were noted a long distance away, and outbreak of insects and rats, and the risk of polluting the water table...).

The management announced the final closure of the establishment a year later.

## **LESSONS LEARNED**

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Several preventive or curative measures were recommended:

### **Establishment design**

- ✓ Integrate fire protection into the design,
- ✓ Compartmentalisation of the various spaces (separating walls, M0 glass wool panels, rockwool foam...),
- ✓ Insulate areas at risk or which high calorific value (machine room, boiler room, fuel storage areas...),
- ✓ Protect the electrical installations (fire-resistant cabinets...), avoid passing electrical conductors through sandwich panels, isolate the cables in conduits, place light fixtures a safe distance from walls...
- ✓ Install sprinklers in sensitive areas,
- ✓ Install a detection system (outside freezers).

### **Materials used and building layout**

- ✓ Number and location of hose stations (sufficient pressure),

- ✓ Fire resistant framework and load bearing structure (reinforced concrete or "fire resistant" steel); for concrete, coating of reinforcement rods (at least 4 cm), cellular concrete exterior "walls" or metal siding with M<sub>0</sub> insulating core,
- ✓ Smoke/heat vent + smoke control system.

#### Personnel and workshop operation

- ✓ Increase awareness, inform and train the employees (safety information involving: exercises conducted internally and jointly with the emergency services...),
- ✓ Use the fire permit procedure during work,
- ✓ Install an audible alarm and flashing light,
- ✓ All direct access to workshops by emergency personnel (dial 18 – emergency services (France)).

#### Remedial action

- ✓ Inform people by early triggering of alarms and facilitate the evacuation of the premises, and upper sections such as the mezzanines (upwards toward the roof when it is concrete or downward in the other cases),
- ✓ Ensure proper communication with the emergency services (contact with the officer coordinating the rescue operation, up-to-date plan of the buildings with the location of fire hydrants, hose reel stations...),
- ✓ Save the natural environment (fate of firefighting water, rapid decontamination of the scene of the accident...).