

Fire outbreak inside a warehouse

5 December 2013

Crépy-En-Valois (Oise)

France

Fire
Warehouse
Property damage
Extinguishing water
Environmental impact
(analysis, monitoring)

THE FACILITIES INVOLVED

The warehouse where the accident occurred was located within the enclosure of a distribution platform dedicated to servicing large retailers.

The site was composed of a refrigerated warehouse built in 1991 encompassing 17,565 m² and storing various foodstuffs (fruits, vegetables, meats, etc.), plus a warehouse containing consumer products compartmentalised into three 10,000-m² cells assigned to store dry foods, alcoholic beverages, and hardware goods and aerosols. The characteristics of this storage building were as follows:

- floor area: 33,000 m²;
- year of construction: 1993;
- metal structural frame;
- double-skin metal cladding on the facade;
- 2-hour fire walls separating each of the storage cells;
- sprinkler protection installed in each cell.

Warehouse employee shifts extended from 5 am until 9 pm.

Aerial view (before the accident):



Source: Google Maps

Regulatory status:

The "dry" warehouse status required filing for registration under Section 1510 in the classified facilities register.

The installations located on the Crépy-en-Valois site had been authorised by Prefectural orders dating from 29th April 1993 and 14th August 2002. A subsequent order issued on 28th July 2011 served to update these two previous orders.

Some of the provisions contained in the 15th April 2010 Ministerial decree relative to refrigerated warehouses, whose registration is governed by Section 1511, were also applicable to this site's installations.

THE ACCIDENT, ITS CHRONOLOGY, EFFECTS AND CONSEQUENCES

Chronology of this accident:

5:30 am: Fire ignited outside the dry goods warehouse on the Cell No. 2 transfer platform (northern side), where 230 m³ of paraffin oil were being stored in 20-litre cans. The alarm was sounded by the shift manager, who proceeded to evacuate all personnel.

The platform's sprinkling system was activated at 5:32, while the system in Cell 2 turned on 2 minutes later. A joint visual and sound alarm was triggered, alerting the site watchman.

5:35 am: Fire-fighters were notified and reached the site at 5:45. First responders let the merchandise contained inside Cell 2 continue to burn.

6:20 am: Cell 2 collapsed.

6:43 am: The fire spread to Cell 3, where about one-fourth of its contents burned. The aerosol storage in Cell 1 however resisted the raging fire.

6:50 am: The site's gas supply was shut off.

6:53 am: The inspection authorities for Classified Facilities was informed of the accident by the Oise Departmental Prefecture and arrived at 8 am to consult with the Beauvais Departmental Operations Centre.

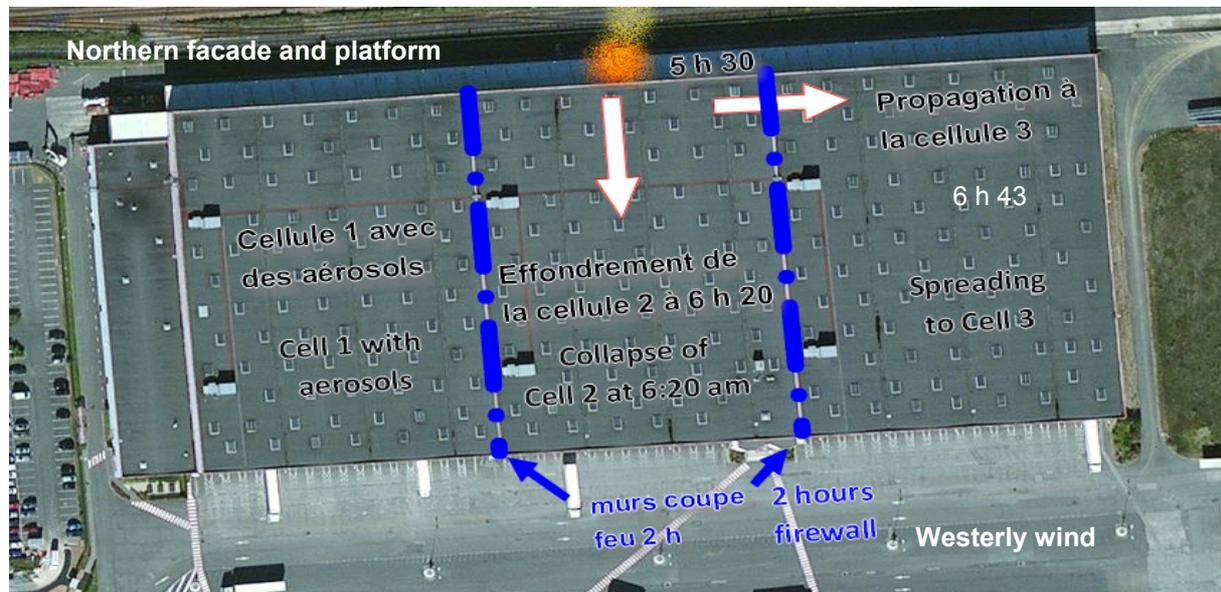
7:15 am: The warehouse operator launched the site's internal emergency plan.

12:30 pm: Fire-fighters brought the blaze under control.

8:30 pm: The refrigerated warehouse was reopened for business.

The remaining fire sources were all extinguished by 7th December.

Spreading of the fire:



Source: Google Maps

In the opinion of fire-fighters, flames had climbed to the roof and extended to the cladding on the northern side of Cell 3, in spite of the firewall surpassing the roofline. The fire wound up spreading from Cell 2 to Cell 3 via the smoke exhaust hatches and skylights.

The site operator informed inspectors that 2 fire doors (between Cells 2 and 3) were operable yet ineffectual: a cart had prevented one door from closing, and an explosion of canned food due to the heat release immobilised the 2nd door.

Crisis management:

With the smoke plume heading westward and causing no adverse impacts to sensitive zones (fields, gardens, public venues, etc.), the Operations Centre decided, upon consulting the Emergency Situation Support Unit affiliated with the National Institute for Industrial Environment and Risks (INERIS), not to proceed with sampling and not involve the Post-Accident Response Network (RIPA).

Rail traffic was suspended from 6:30 and 8 am on the Paris-Laon line in both directions, which required trains to be diverted onto other tracks.

Consequences of this accident:

Considerable property damage was reported; the facility operator estimated property losses at €40 million. Moreover, 198 employees had to be made temporarily redundant.

The refrigerated warehouse sustained no damage, nor did Cell 1 of the dry goods warehouse.

Photographs of the accident:



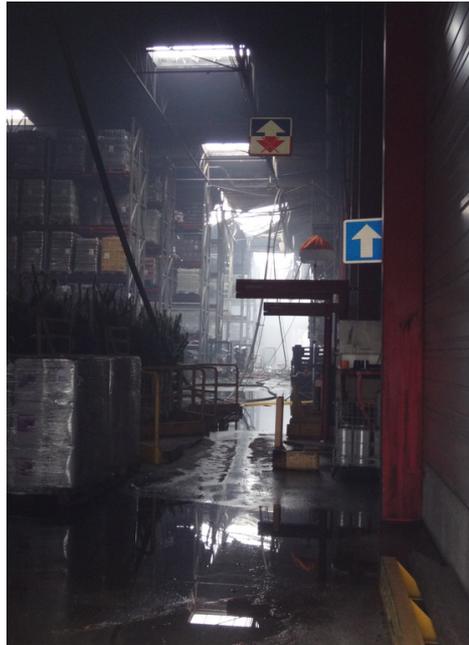
View of the northern facade and platform after the accident (Source: DREAL Picardy)



View of the southern facade between Cells 1 and 2 (Source: DREAL Picardy)



View of the northern facade and the fire wall between Cells 2 and 3 (Source: DREAL Picardy)



View of the inside of Cell 3 (Source : DREAL Picardy)



Paraffin oil storage on the northern platform (Source: DREAL Picardy)



20-litre cans of paraffin oil (Source: DREAL Picardy)

European scale of industrial accidents:

By applying the rating rules applicable to the 18 parameters of the scale officially adopted in February 1994 by the Member States' Competent Authority Committee for implementing the "SEVESO" Directive for hazardous substances and in light of available information, this accident can be characterised by the four following indices:

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

The parameters associated with these indices and their rating scale are available at the website: <http://www.aria.developpement-durable.gouv.fr>

The "Dangerous materials released" index was scored at least a "1" due to the burning of nearly 230 m³ of paraffin oil (parameter Q1).

The "Human and social consequences" index recorded a "1" since one fire-fighter was slightly injured (parameter H5).

The "Economic consequences" index was assigned a "4" as a result of the property damage, which was estimated at €40 million (parameter €15).

The "Environmental consequences" index went unrated given the lack of data regarding this indicator. Classified facilities inspectors requested some additional information from the operator in order to fully assess the environmental impact caused by the accident (by modelling the smoke cloud and analysing the extinguishing water, etc.).

THE ORIGIN, CAUSES AND CIRCUMSTANCES SURROUNDING THIS ACCIDENT

Two days before the fire outbreak, an electrician had performed some works on the platform lighting system. A circuit-breaker problem was noticed by the shift manager around 5:10 am. This breaker was reset at 5:15, restoring lighting to the northern platform.

An expert appraisal of the electrician's work was commissioned. A judicial inquiry was also conducted in order to determine the causes of this accident.

Even though a video monitoring system had been installed covering the northern facade platforms, its recordings had not been backed up.

ACTIONS TAKEN

Administrative course of action:

The inspectors of classified facilities visited the site on 6th December, at which time they noted several organisational malfunctions, including:

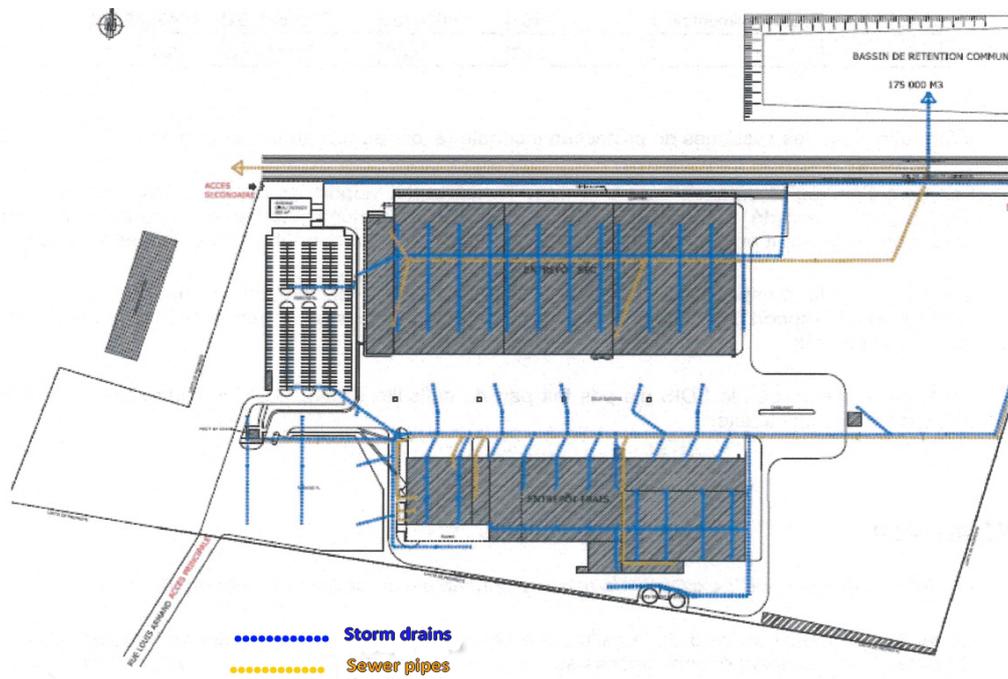
- failure to complete an internal emergency plan drill since 2011;
- a quantity of paraffin oil stored on-site in excess of the authorised limit (230 m³ instead of 150 m³);
- persistent non-compliance recordings listed in the warehouse's electrical installation verification reports (2012-2013);
- along with technical breaches, i.e.:
- absence of a dedicated phone line connecting the facility to the emergency response centre;
- no retention built underneath the paraffin oil storage depots;
- an inoperable fire hydrant;
- a mismatched number of smoke exhaust systems (difference between facility drawings and the report);
- failure to justify fire protection ratings (doors and walls), as well as the absence of confinement for extinguishing water.

These various breaches would be cited in a regularisation request and imposed regular monitoring undertaken by administrative authorities. More specifically, Inspection authorities for classified facilities requested an environmental and health impact assessment related to the accident.

Environmental impact:

The local Water Department evaluated the volume of extinguishing water at some 5,800 m³, of which 20% (or 1,160 m³) evaporated due to the heat, thus accounting for a remaining volume of 4,640 m³.

The site's storm drain network was not confined, and the operator estimated the volume of water lost into the natural environment at 4,050 m³. The extinguishing water recovered (through both the retention basin and pumping) was analysed and then treated using specialised subcontractors.



To track the state of groundwater, the Classified Facilities inspection authority imposed upon the operator semi-annual monitoring through use of a network of piezometers.

The waste generated by this accident was also treated using specialised services. The operator however had to wait until March 2014 for the court to remove the seals before waste could be discharged. In July 2014, a 20-m wide strip, corresponding to the fire outbreak zone, was still cordoned off by judicial authorities.

LESSONS LEARNT

Several lessons may be drawn from this accident, namely:

- waste discharge can take more or less time depending on the court's decision on removing the site's seals;
- the total volume of extinguishing water required to contain a fire is quite high (over 5,000 m³) for a 10,000-m² storage cell;
- storm drain networks must be correctly designed to account for the case of confined extinguishing water;
- this accident underscores the importance of protecting outdoor storage or "picking" (order preparation) zones, which at times might be considered as temporary, yet in reality last for a relatively longer time.

In the case of distribution warehouses, fire is the predominant accident category. The causes of fire are rarely unique and quite often stem from: organisational or human malfunctions, an inadequate maintenance of installations, or even malicious acts.