

Fire and explosions of tanker lorries





3 April 2016

Bassens (Gironde)

France

Explosion / BLEVE
 Mobile storage
 Liquefied gas
 Dangerous goods transportation

THE ACCIDENT AND ITS CONSEQUENCES

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The site

The accident occurred in the parking area of a road transportation firm. The substances being transported were mainly liquefied flammable gas (LFG) stored in tanks and bottles, along with hydrocarbons contained in tanks.

This site was used for parking lorries, especially at night and towards the end of the week (approx. 100 lorries).



Extracted from an amateur video



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Until 25 November 2013, the site had been subject to a special administrative status, in accordance with the regulation applicable to classified facilities and relative to the storage of gas bottles.

In 2013, the site operator filed a permit application to increase the depot's gas bottle capacity (from 50 to 100 tonnes), which led to the issuance of a Prefect order on 25 November 2013 placing the site above the lower-tier SEVESO classification rating. However, this capacity increase was never implemented.

The parked fleet of vehicles was not taken into account when determining the site classification, nor was it included in the safety report appended to the permit application. In fact, the application indicated that no hazardous substance was being brought to the site and moreover that all parked tanks returned empty, although some LFG transport vehicles might contain a residual quantity of gas or vapours (estimated at between 300 and 500 kg).

The site is located in an industrial zone. The closest industrial installations are located just a few meters from this facility's boundary, i.e. roughly 50 meters from the scene of the accident. The closest dwellings were also in proximity to the site boundary, some 250 meters from the outbreak of the fire and explosions.

Situation prior to the accident

The total quantity of LFG present on-site in the tanks before the accident could be estimated at 150 tonnes, on 30 vehicles, including 19 tanks loaded on semitrailers and 11 tanks on lighter duty vehicles. Three tanks for transporting ammonia, each containing approx. 500 kg of residual gas, were also being stored on-site. Many other vehicles were also parked, including gas bottle carriers and tanks containing flammable liquids.

The accident and its consequences

Fire broke out on Sunday 3 April 2016 at 5:37 am on a lorry carrying a 20-m³ volume LFG tank. It spread to 7 other vehicles of the same type. Two BLEVE events on tanks occurred at 7:14 and 7:33 am.

Four minor injuries were reported among the first responders. Fire-fighters did not hear the whistling noise characteristic of the imminence of a BLEVE which would have alerted them; the response team was set up around 40 m from the point of ignition and protected by the vehicles when the second BLEVE happened. They continued to battle the blaze after this second BLEVE and brought it under control by 9 am. No local residents were adversely affected by the event.

The company's offices, some 200 meters away, and the premises of neighbouring firms bore the brunt of the shock wave (damage to structures, broken window panes at distances of up to 700 m).

Some pieces of tanks, weighing up to several tonnes, were found as far as 100 meters away, yet for the most part remained within the site boundary. The technical control station, at a distance of roughly 50 meters, was hit by a projectile weighing an estimated 500 kg. Many fragments were strewn as far as 250 meters. One fragment weighing approx. 50 kg landed in a garden 1.5 km from the blast site.

Both tanks involved in the BLEVE had contained respectively 1.5 tonnes and 2.5 tonnes of LFG. The total tonnage of LFG destroyed during this accident was estimated at 5 tonnes.

The maximum distance of thermal effect on humans was calculated to be 40 m. The 20-mbar pressure surge effect was felt at a distance estimated at 280 m.

THE ORIGIN AND CAUSES OF THIS ACCIDENT

The time of fire outbreak makes it very unlikely, actually impossible, that the fire was caused by the overheating of brakes, shock absorbers or the engine, even if one of the vehicles had been running late the day before.

An electrical fire outbreak, on either vehicle equipment or personal devices containing batteries like smartphones or e-cigarettes, is indeed possible. Nonetheless, the vehicle construction features coupled with the instructions issued to drivers greatly reduce the likelihood of this hypothesis.

The most probable cause of this accident is malicious act (however the criminal investigation is still underway).

ACTIONS TAKEN

Emergency measures were mandated to the site operator on 4 April 2016, stipulating:

- shutdown of site activity;
- hiring of a permanent watchman;
- notification to cease the parking of vehicles carrying hazardous substances;
- drainage and degassing of damaged tanks and bottles according to a protocol validated by the inspection authorities for Classified Facilities;
- verification of fire-fighting equipment and all electrical installations;
- repairs and inspection of the fence.

Actions to improve safety specific to the lower-tier Seveso rating were also prescribed on 4 July 2016, namely:

- update of the safety report;
- fence reinforcements;
- fire detection, water reserves and cooling devices.

The company relocated its stationary storage of gas bottles to another site by the end of 2016. The site still housed a single installation authorised under the declaration status : a filling station. The facility therefore is no longer governed by the SEVESO regulation, rendering all prescriptions associated with this designation null and void.

LESSONS LEARNT

It is advisable to strengthen the regulatory framework for this type of installation, which is not addressed in the Classified Facilities regulations. Efforts have been undertaken by the General Directorate of Risk Prevention within the scope of the Joint Ministerial Commission on Transporting Dangerous Goods, for proposing updated regulations that would target tighter conditions for storing hazardous merchandise in vehicle depots.

As regards the technical and organisational approach to prevention, monitoring and response, experience feedback has served to propose the following improvements:

- measures to prevent malicious acts like reinforced fences, services of a watchman or supervisor, given the resources to sound an alarm and intervene quickly;
- restrictions to mitigate hazard potential, such as the limitation by type, quantity and duration of presence regarding hazardous substances;
- an organisation that enables, under all circumstances, early action from the operator (intrusion and/or fire detection, emergency preparedness, knowledge of fleet status, quick removal of vehicles);
- pre-established procedures to ensure response in case of an accident and all post-accident management;
- an alarm system for fire-fighters in case of pressure rise in tanks exposed to flames.

When establishing these technical and organisational measures, it is advisable to define the competent administrative authority in charge of control.