

Meteorological events of early 2018

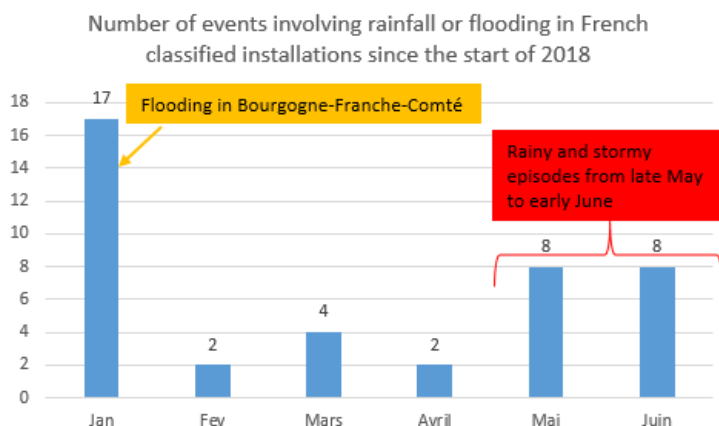
Without trying to predict the weather for late 2018 and the seasonal storms in the Cévennes of south-central France, we note that the first half of the year was marked by a number of floods impacting factories in France. In addition to the economic consequences (water damage, production stoppage, a period of technical unemployment for the employees, etc.) often observed in such circumstances, environmental damage was also reported.

Several types of phenomena are generally observed at the national level: overflowing of rivers, runoff and the accumulation of rainwater due to problems with the sizing or maintenance of stormwater networks, rising water tables, submergence (high tide or failure of hydraulic structures: dikes, dams). Out of a total of 508 events recorded as of end July 2018 in the ARIA database, 41 events (8% of cases) involved floods or rainwater accumulation, with consequences on the activity of French industrial sites.

ARIA 51017 - 22/01/2018 - DOUBS

During the night, the Doubs River flooded a company specialised in the manufacture of steering columns for vehicles. The site's production facility was shut down while the water was drained off. Production was also paralysed at one of its customers which could not be supplied (ARIA 51009). The operator **had been monitoring the water level hourly via www.vigicrues.gouv.fr**. At the same time, a water level measurement was conducted every 2 hours on a manhole in the stormwater network inside a building.

When the level reached 10 cm below the level of the workshop, the operator triggered the **emergency flood plan**. This monitoring procedure made it possible to anticipate and conduct the necessary security actions:



ARIA 51663 - 11/06/2018 - LOIRE-ATLANTIQUE

During a major rain storm (32 mm/h), an aeronautical plant experienced significant infiltration of water through the roof as well as from underground sources and saturated rainwater networks. In light of the rising water levels, the facility's crisis unit was mobilised. The event resulted in the following:

- The increase in the amount of water in the retention basin of the surface treatment waste storage tanks. **An acid waste tank rose and was pierced when it settled back onto its fixture: 8 m³ of acid spilled into the retention basin.** The operator had the contents pumped out of the basin and transferred to a dedicated processing facility.
- **flooding of paint booth pits.** Effluent samples were taken around the surface treatment building. All of the effluents were pumped out and retained in the containment basin before being sent to dedicated treatment facilities.



The flood risk in a few figures

- **17.1 million French residents** are exposed to the various consequences of river flooding, including 16.8 million in mainland France.
- **1.4 million inhabitants** exposed to the risk of marine flooding.
- **More than 9 million jobs** are exposed to the risk of overflowing rivers and more than **850,000 jobs** are exposed to marine flooding.

- **Verification of the electrical installations:** no electrical load less than 40 cm from the floor level;
- **Chemical inventory controls** during the flooding season;
- **Evacuation of a large part of the finished products** to a logistics platform;
- **Raising of manufacturing components to a higher level.**

The flood resulted in a 29-hour shutdown of the activities and **the site remained inaccessible for 24 hours**. The cost of the flooding is estimated at €110k plus €75k in labour.

Following this event, the operator planned to update its emergency flood plan, and to estimate the cost of acquiring cofferdams for the buildings' openings.

ARIA 51053 - 25/01/2018 - MARNE

In a methanisation plant, the **leaching water from external stocks spilled over during a major downpour**. These effluents polluted 1.5 km of a trench and the Ante River. The local biodiversity services noted the pollution. The digestates disintegrated due to the excess amount of water and covered part of the site's roadways. The operator cleaned the trench.

The leaching water collection tank of the external stocks was saturated by heavy rainfall. The effluents then flowed to the non-polluted effluent collection basin and then to the outside. In addition, the outlet valves of the buffer tank, acting as a retention tank, had not been closed. **The operator had not taken any measures to limit runoff onto its storage facilities.**



Condition of the site following the overflow of leaching water (© DREAL)

ARIA 51019 - 26/01/2018 - BOUCHES-DU-RHONE

At around 10:30 p.m., following a heavy rainstorm event, a breach occurred on a water supply pipe on a storm tank in a refinery. Trace amounts of hydrocarbons were found along the adjacent canal, over a distance of 5 km. The internal emergency plan was initiated. The operator's internal emergency response team intervened, assisted by the fire brigade. Booms were deployed on the canal, and pumping was undertaken to limit the risk of hydrocarbons spreading. The internal emergency plan was lifted the next day in the early afternoon, after ground-based and airborne observations confirmed the absence of residual pollution. The operator issued a press release.

The operator bore the cost of processing the waste, stripped and evacuated the polluted soil, and repaired the piping. Water analyses were conducted to monitor the pollution's impact on the natural environment.



Preventing natural and technological risk (NaTech) related to meteorological events, in 3 key steps:

1 Characterize the potential impacts and the sectors affected

The consultation of geographical information systems (GIS) or flood risk prevention plans (FRPP) offers a good overall view of the areas flooded, for example. However, the accidentology has shown in the past that non-floodable areas could still be flooded (ARIA 35426).

Examples of GIS for the general public: <http://www.georisques.gouv.fr/cartes-interactives#/>
<https://www.fmglobal.com/research-and-resources/global-flood-map/flood-map>

2 Identify the accident sequences

Consulting industrial accidentology databases can, to a certain extent, provide information on potential accident scenarios or difficulties encountered by other operators.

An analysis of the events reveals the vulnerability of certain units or accessories:

- Building infrastructures (maintenance, drainage of roof water, etc.);
- Insulated equipment;
- The impact of water on equipment and stocks (care should be taken regarding products that may react with water!);
- Piping (risk of differential settling or bending, unearthing);
- Underground storage facilities or tanks;
- Utility networks (gas, electricity, telecommunication, IT, cooling water, etc.);
- The access roads to the site (essential if it generators must be supplied with fuel oil for example).

3 Implement a technical and organisational strategy

A prevention strategy should be adopted once the above two steps have been completed. It is generally based on two types of measures:

- **Technical:** oversizing of stormwater networks, purchase of cofferdams, premises built above crawl space, increase in the height of retention walls, construction of dikes, etc.
- **Organisational:** monitoring of storm warnings, emergency flood procedure depending on water levels, definition of a safe fallback phase for the installations where no impact on third parties and the environment can occur.