

Fire in a tire storage facility

February 4, 2002

Artaix (71) - France

Tires

Fire

Pollution

Malicious intent

Difficulties of intervention

Environmental analyses

Expertises

Health impact

THE INSTALLATIONS CONCERNED

Approximately 5 million tires had accumulated since the early 1990s at an old roofing tile manufacturing facility that stopped production around 1955. The storage facility is located in a rural area near a hamlet with a population of roughly forty, nearly 3 km from the village of Artaix.

Owing to the presence of third party residences less than 50 meters away, the facility was governed by authorisation under the terms of section No. 98A although no administrative procedure had been undertaken by the operator.

The DRIRE was informed of the existence of this facility in August 1999.

The operator initiated liquidation proceedings by order of the court in September 1999.

The judicial liquidator was served formal notification by an order dated November 2, 1999 to eliminate the tires. The formal notification was not respected, thus leading to consignment proceedings were undertaken as per the order of January 14, 2001. In a letter dated April 10, 2001, the General Paymaster stipulated that the consignment could not bound over. By order of June 22, 2001, the owner was required to eliminate the tires within a period of six months, that is prior to December 26, 2001.

THE ACCIDENT, ITS BEHAVIOUR, ITS EFFECTS AND CONSEQUENCES

The accident:

Monday morning, February 4, 2002, a fire broke out in a storage facility holding 5 million tires extending to the base of a former 8-story roofing tile factory, also used as a storage facility. The firemen were informed at 9.53 am. The fire spread rapidly. The flames rose to heights of 10 meters and the plume of black smoke was visible 40 kilometres away.

The six houses closest to the fire were evacuated, and 35 people were relocated in the local community hall. A safety perimeter was set up and a departmental road blocked.

The fire was surrounded at 6 pm, although the firemen monitored the area for more than 2 weeks. The accident mobilised a large number of firemen: 70 on the 1st day, 35 the 2nd day and 12 on February 8. Owing to insufficient local water resources, the emergency services had to procure water from the Loire River side canal approximately 2 kilometres



Source : Drire Bourgogne

away.

Once the fire was brought under control, the plume of residual smoke progressively went away until it was reduced to just a few fumaroles. The fire smouldered in this manner for 9 months. Final extinction was achieved by removing the residues or tires that were still incandescent and soaking them in a bin containing water. This action took 24 days.



Source : DIRE Bourgogne

The consequences:

Environmental consequences:

Owing to fire's high intensity, the pollutants emitted were widely diffused. Soot deposits in the surrounding area were never significant and were no longer visible after the first rainfall.

Measurements were conducted of the fallout in the environment:

✓ By the local air quality monitoring association, ATMOSF'air, from February 6 to 13:

- ✗ Only on February 6th, the SO₂ concentration exceeded the average European limit value for human health, set at 125 µg/Nm³ in terms of daily average. This limit must not be exceeded more than 3 times per year.
- ✗ The CO concentrations remained below the average 8-hour European daily maximum rates.
- ✗ The concentrations in suspended particles significantly exceeded the European daily threshold for human health of 50 µg/Nm³.
- ✗ The benzene concentrations distinctly exceeded the average European yearly value set at 5 µg/Nm³, although owing to their short duration, the impact on health was not significant.

- ✗ The concentrations of polycyclic aromatic hydrocarbons (PAH), measured February 7 and 8 approximately 4 km from the site of the accident, were similar to those commonly measured in the ambient air of metropolitan municipalities or near highways.
- ✗ The results of the measurements conducted by ATMOSF'air show that the pollution peaked on February 6 around 6 am then fell off considerably around 1 pm.
- ✓ By the veterinary services:
 - ✗ Analyses of the soil and vegetation showed no health risks (see the report by the *Direction Générale de l'Alimentation*); the following elements were sought: PAH, zinc, cadmium, dioxins and dioxin-like PCBs.
- ✓ By the SDIS ("Service Départemental d'Incendie et de Secours, departmental fire and emergency service):
 - ✗ On February 6th, 3 water samples taken at the site, before emptying into the Arcon and in the river downstream from the release point, showed no pollution in the natural environment.



Source Drire Bourgogne

Next, during the smouldering phase, the ADEME had measurements taken to evaluate the effects on the environment: analyses in the ground water and underground water, in the soil and in the fumaroles.

The water analyses showed values very close to the values of the impact report for a few pollutants such as arsenic and benzopyrene.

Analyses conducted in the fumaroles and the evaluation of their toxicity potential showed that the latter presented a health risk (a risk indicator of 14.9 for the threshold effects, thus significantly greater than 1 and $7.6 \cdot 10^{-2}$ for effects without threshold, thus distinctly greater than 10^{-5}).

Considering the direction of the wind during the 9 months while the fire was smouldering and the actual period over which the residents were exposed allows us to conclude that the risk index values were very close to the usual thresholds.

An expert company conducted a study aimed at evaluating the toxic potential of the fumaroles.

During the extinguishing phase, the analyses conducted in the atmosphere around the site and near the closest homes, did not indicate concentrations liable to lead to significant health-related consequences. The measurements were most often lower than the detection threshold. Two pollutants considered to be representative of the two families of chemical compounds contributing to the toxic potential of the fumaroles were selected: benzene (a toxic pollutant with threshold effects) and naphthalene (a carcinogenic pollutant).

Property damage:

The buildings of the former tile kiln, measuring 35 meters tall, were very badly damaged by the fire and run the risk of collapsing.

The estimated amount for cleaning operations of the site is about 1 Million euros.

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.

The Artaix accident is 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 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 checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The parameters comprising these indices are available at the following address: <http://www.aria.ecologie.gouv.fr>

The emergency services evacuated 6 houses and 35 people were relocated because of the great plume of black smoke. These evacuations lead to an index relating to human and social consequence of 2 (see parameter H). The rehabilitation cost was evaluated to 1 million euros which leads to an index relating to the economic consequences equal to 4 (see parameter €).

ORIGIN, CAUSES AND CIRCUMSTANCES OF THE ACCIDENT

The tire storage facility was neglected. The fire appears to have been set intentionally by an individual who was stopped and questioned by the gendarmerie on May 28, 2002.

The tires' storage conditions, with no reasonable unitary distribution of the volume, promoted the fire's development.

ACTION TAKEN

An inventory of tire storage facilities in Bourgogne was conducted; 15 facilities were identified.

After having required the owner to undertake emergency measures, which were not respected, the intervention by the ADEME was obtained, particularly for the following actions:

- ✓ Erection of a fence,
- ✓ Reestablishment of a trench damaged during the fire extinguishing operations,
- ✓ Evaluation of the impact on underground water,
- ✓ Characterisation of the toxicity potential of the fumaroles (during the 9 months that the fire was smouldering),
- ✓ Soil and combustion residue analysis,
- ✓ Extinguishing, in October – November 2002, of tires still incandescent by dumping them in a bin full of water,
- ✓ Demolition of the damaged building,
- ✓ Processing of combustion residues and rubble from the demolition of the building, while privileging their storage on site.

This accident and the 9 months during which the fire was smouldering created a significant emotion in the surrounding area; even an association was organised: the "Comité pour l'environnement d'Artaix et des communes voisines" (the committee for the environment of Artaix and surrounding communities). This association subjected a considerable amount of pressure on the *préfecture* to obtain information, particularly concerning the results of the environmental pollution analyses.

A follow-up committee, including the administrative departments, local elected officials, the ADEME and the president of the aforementioned committee, was created; it met 6 times (March 7, 2002, April 8, 2002, June 25, 2002, October 14, 2002, March 5, 2003 and June 11, 2003).

In order to respond to the population's concerns, a pneumologist was placed at its disposal; less than 10 individuals called upon the doctor.

THE LESSONS LEARNED

In the absence of a tire disposal sector, small companies collect them without appropriate means to manage the risks inherent with this type of storage facility. Large tire depots are thus created without control of the associated risks.

In the case of an accident, conducting measurements of pollution concentrations in the immediate environment of a site, particularly during the accident, is highly useful in providing elements to assess the impact on health.

However, the evaluation of a smoke plume's toxicity inevitably leads to high risk indices. It is then difficult to assess the true impact on the health of the local residents owing to difficulty encountered in determining their exposure to the plume's pollutants. Pollutant concentrations in the ambient air must be measured near the residences and not in the smoke plume.