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Implementation of new legislative measures on industrial risks prevention and control in urban areas

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Abstract

Incompatible at first sight, but vital to each other, the industry and the city have been developing a complex relationship for decades. From 1810 on in France, risk prevention and control in and around major industrial sites evolves step-by-step, learning from accidents. Land-use planning in the vicinity of SEVESO[1] establishments becomes one of the key policies in the prevention of major industrial accident hazard on European level in 1996, focussing on historical situation of concern [M.D. Christou, S. Porter, Guidance on Land-use Planning as required by the Council Directive 96/82/EC. Joint Research Centre, European Commission, 1999]. The Toulouse (F) accidents, on 21 September 2001 evidenced the need for new tools to reinforce protective action and ease the situation of clusters of factories engulfed in the urban setting. In France, new legislative measures adopted on 30 July 2003 deeply modified the approach to land-use planning around the main dangerous facilities (622 establishments). The implementation of technological risk prevention plans [Fr. "PPRT"] will limit the exposition of the population to the consequences of accidents. These plans, derived from the risk assessment (safety reports) produced by the operators of the hazardous facilities, will delineate areas within which requirements can be imposed on existing and future buildings and within which future building rights may be restricted. On the grounds of extremely serious danger that threatens human life, pre-existing constructions may be progressively expropriated. The financing of the corresponding measures, estimated a rough € 2–4 billions, will be defined by agreements among the Central Government, the industrial company and the local and regional bodies.

Keywords: Industrial risk; Urban; France

1. Maintaining "appropriate distances" between dangerous activities and urban areas is a two centuries old concern in France

From 1760 to 1800, heavily polluting factories were transferred from Paris to the countryside, by royal, imperial or court decision. In 1794 the explosion of the Grenelle explosive manufacture in Paris, killing 1000 people and destroying hundred of buildings, triggered a major scientific and regulatory change. The Institute (Academy of Sciences nowadays), consulted by Napoleon, defined three categories of dangerous activities and substances. Their report [1] leads to the first general legislation on risk and pollution prevention and control of industrial activities in 1810. The question of the appropriate distance that had to be maintained between hazardous or polluting facility and their neighbours was already subject to scientific and social debate. The president of the Institute concluded that "[*the appropriate distance*] *should not be defined on purely scientific grounds. It was not possible to define the distance in the decree and, try as I might to avoid arbitrary decisions, we had to leave it to the local authority*."

More accidents in the textile, oil, processing and explosive industries during the 20th century lead the governments to complete the regulatory framework in 1917 and 1976. The 19/07/76 law [6] encompassed all activities potentially threatening their neighbourhood or the environment with accidents pollution or nuisances. In 2004 in France, 400 000 installations fell under the scope of this legislation, of which 65 000 need a permit, issued by the state, to operate.

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[1] Referring to the "SEVESO 2" directive (96/82/EU, 9 December 1996) (JOCE no. L 10 du 14 Janvier 1997).

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The lack of legislative tools allowing compensation for land owners to maintain a safe distance and the pressure put on land-use around industrial parks during the second half of the 20th century explain part of the urban development around all major chemical and oil industrial settlements nowadays.

2. The legislative tools used in land-use planning before the 30/07/03 law

In 1980, a ministerial decree defined strict rules for construction around explosives manufactures and storages. It delineates 25 levels of risk and subsequent restrictions, resulting from the combination of five level of probability and five levels of severity of potential accidents. This precise regulation was made possible by the well-known characteristics of the products and documented analysis of centuries of learnt lessons in accidental explosions. The general land-use planning tools around dangerous sites were designed later, in two main phases, in 1987 and 2003.

After the Mexico and Bhopal accidents, a law (22/07/87) and decree (14/11/89) organised civil emergency planning and land-use planning for high-risk facilities. A guidance, published in 1990,[2] defined appropriate distances, based both on local provisions and on the consequences of the worst case scenario (bulk storage explosion or fire, reactor of pipe rupture) with a two level zoning—zone 1: first lethality, zone 2: irreversible damage on human beings. A three-step procedure was used:

1. The state (competent authority for risk prevention and control) notified the distances resulting from the safety report made by the operator of the site (zones 1 and 2) to the local community, responsible for land-use planning.
2. The local community and the state negotiate the "appropriate distance" using a multi-criteria approach based on the local situation (socio-economical provisions . . .) and on the consequence-based distances determined by the state.
3. The local community modifies the local land-use plan to restrict the construction rights in the aforementioned zones.

In case of disagreement, the state had the right to substitute to the local community and impose distances and restrictions for land-use planning.

For new sites, built after 1989: theses restrictions consisted in public utility easements compensated for by the operator generating the risk. For pre-existing sites, the restrictions imposed on land use in large zones (up to 1 km from the source) were not compensated for.

This system was applied from 1989 to 2003 to 30 new sites and 700 pre-existing "high-risk" establishments not without difficulties mainly due to the absence of compensation for the restrictions imposed on land use in large zones (up to 1 km from the source) around existing sites. Theses rules reasonably limited the extension or densification of urban areas in the vicinity of large chemical and oil facilities and storages, but were unable reduce the vulnerability of pre-existing situations were densely populated areas, commercial and public buildings surrounded a plant. Theses rules probably arrived a few decades too late to avoid the already dense urban setting around 60% of the 700 majors industrial sites in France.

The lessons learnt from the 1987 law and the shock of the Toulouse accident in 2001 triggered a deep change in policies tools and maintain, or where possible, reduce, the potential damage by working both on the source of risk and on vulnerability of the surrounding elements.

3. Lessons learnt from the Toulouse accident in risk-informed land-use planning

The explosion of 300 t of off-specs ammonium nitrate-based fertilizers in Toulouse on 21 September 2001, killed 30 people; left 3000 people injured and damaged the surrounding area up to 7 km away from the crater. This scenario was not taken into account in the land-use planning system (Fig. 1).

Two lessons were learnt as far as land-use planning is concerned:

- Defence in depth is more than never necessary. However, good the risk prevention measures are, maintaining appropriate distances and preparedness in case of accident are key elements. The consistency of the four principles of the SEVESO II directive are confirmed but the tools and practical implementation need a brush-up:
  1. Prevent and reduce risk by appropriate design, operation, maintenance and coordination on site. In addition to the technical improvements and the improvements in the reliability of equipment, prevention occurs by better understanding the risk factors in organisation and in people behaviour (human factor) [7].
  2. Emergency plans on and off-site: to be updated and tested on a regular basis.

Fig. 1. Crater left by the explosion in Toulouse and damage.

[2] This guidance was suppressed by a ministerial letter, on 30 September 2003 [12].