



## **Vulnerability of critical infrastructure to natural hazards. Case study: Fire at hexane tank park damaged by earthquake**

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Natural disasters can lead to heavy damages, especially when they occur in areas vulnerable because of high industrialization and population density. Earthquakes can especially generate serious accidents with regard to critical infrastructure for production and storage of petroleum products. A notable example in this case is the fire produced at the tank park of Tupras Izmit Refinery (Turkey), after the earthquake of 17 August 1999 (Kocaeli, Mw 7.4). The fire at the tank park lasted three days and could only be extinguished with international cooperation.

The present study considers a tank park of petroleum products (mainly hexane) belonging to a refinery located in the central-south area of Romania, in an urban area (Ploiesti City).

For this study, the following accident scenario was considered: an earthquake causes structural damages to a hexane tank, leading to a release of its content in the retention vat and the contents ignite. Because another hexane tank is located in the same retention vat, a domino effect occurs and the entire amount of hexane in the two reservoirs will be involved in the accident. The accident has a high potential for aggravation because the tank containment dike is made of earth and was not properly maintained, and a residential area is located nearby the tank park.

Simulations were conducted for this fire scenario, in case of ignition in the retention vat of the hexane content of the tank taken into account, and also for the case in which the quantity in both tanks located in the retention vat is involved in the fire.

It is considered that this scenario is credible because the site is located on the border of the area characterized by a probable seismic intensity 8, close to Vrancea area, which has the highest seismic intensity in Romania (9) (MSK scale). Also most of the tanks in the park are old, as they were built in the middle of last century and were not upgraded since. Thus, in case of an earthquake, they are likely to be affected.

The study of this type of scenarios in which natural disasters trigger technological accidents is appropriate, since in this area of Romania there is a large density of storage and processing facilities for oil products, being an area with a tradition in this type of industry. Since it is located in a seismic zone, in the event of natural disasters such as earthquakes, these plants may be affected.