

Explosion of a tank containing “mostly water”

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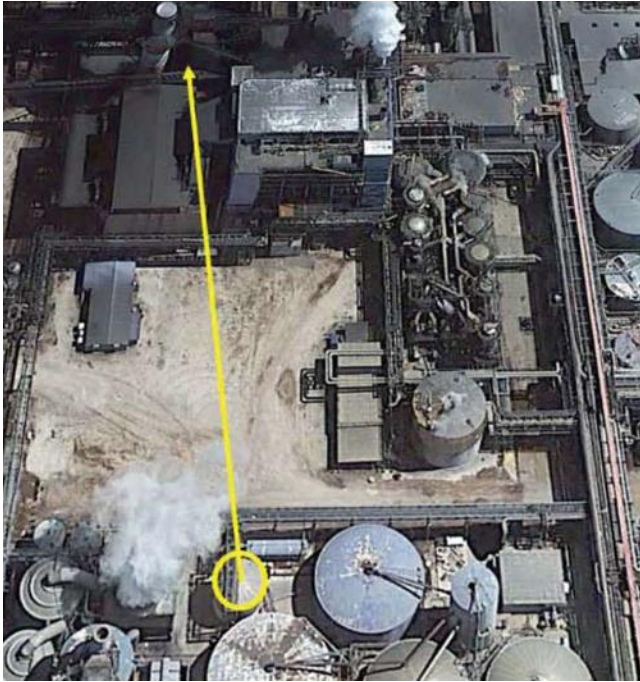


Figure 1. Yellow circle shows the pre-incident location of the condensate tank. The yellow line indicates the tank's path following the explosion. (Photograph from CSB Report Packaging Corporation of America (2017-03-I-LA-1))

An incident in DeRidder, Louisiana, on February 8, 2017, was investigated and reported by the US Chemical Safety Board (CSB). The explosion occurred in a condensate tank (mostly water but containing some organic material) which led to an unanticipated flammable atmosphere.

According to the CSB report, the condensate tank failed at its base and traveled approximately 375 feet, over a six-story building before landing on process equipment. There were three fatalities from the explosion, and seven people were injured.

The source of ignition was probably Hot Work that was performed near the tank. The organic material in the tank was turpentine, a solvent obtained from resin, contained in wood, during paper manufacturing. It consists of several hydrocarbons and is different from mineral turpentine, also called white spirit.

Did You Know?

- Combustible material, a fuel, can form an explosive atmosphere when enough of it is dispersed in air. For liquids, this dispersion is usually caused by evaporation.
- This explosive atmosphere contains the fuel in a certain concentration range, the explosive (or flammable) range. Below this there is not enough fuel, above it there is not enough oxygen in the mixture. 20 g/m³, 4 tablespoons evaporated in 100 cubic feet, can be sufficient.
- Liquids that are volatile enough to create an explosive atmosphere at “normal” temperatures are called flammable liquids and are labeled accordingly. Different systems exist to define what these “normal” temperatures are.
- If the temperature of a liquid is high, it forms an explosive atmosphere even if it is not labeled flammable!
- In processes that involve water and organic liquids, these liquids usually have lower density than water and can float on top of it.
- In bulk tanks, the layer of flammable liquid can vaporize to create an explosive atmosphere in the tank's vapor space (Figure 1).
- Tanks are often protected from over pressure or vacuum with a “breather vent”. These vents can allow air to enter the tank when draining it or vapor to escape when filling.
- Some companies inert bulk tanks containing flammable liquids to prevent ignition of the contents.

What Can You Do?

- Know the properties of the materials used in your area. Pay special attention to tanks that may have two or more phases (layers) in them.
- Wastewater tanks can have a flammable phase that accumulates over time. These tanks may need to be treated as if they contained a flammable material.
- Inspect the inerting systems on your tanks and verify they are operating properly.
- During Hot Work around tanks with flammable or combustible contents, be vigilant and follow the company's Hot Work procedure (ref. Aug-20 Beacon).

A small quantity of flammable liquid is no small hazard!