

The Worst Ammonia Incident Ever - What Can We Learn? December 2023



Figure 1. Front of the tanker



Figure 2. Rear of the tanker

Parts of the tank truck after the explosion

On March 24, 1992, the worst ammonia release in history occurred at a peanut oil processing mill in Dakar, Senegal. An ammonia tank truck vessel broke in half causing the release of 22 metric tons (50,000 pounds) of anhydrous ammonia. Debris from the explosion pierced other nearby process equipment also containing ammonia. The dense ammonia cloud quickly spread over the oil mill, surrounding businesses, and nearby community. Ultimately, 129 people were killed and 1150 were injured.

Why did this event happen? The tank was not permanently installed; it was a tank truck that was filled at the ammonia supplier's site, then transported to the mill. The tanker was built to regulations and was 11 years old when it failed. Repeated overfilling of the tank led to overpressurization and crack formation. This was detected in 1991. Maintenance workers repaired the cracks and the tank continued to be used. The day before the incident, the tank was filled to 124% of the rated capacity.

In liquefied gas service, over pressurization can lead to significant stress and, as in this case, cause the tank to fail. To add to the catastrophe, the mill had a poorly planned emergency response program. Fortunately, this event occurred during the Ramadan holidays when there were fewer people nearby.

Did You Know?

- Tanks, especially those in liquefied gas service, have a rated capacity. It should be documented in the equipment design information, kept at a facility.
- Tanks should be built to the correct codes or standards. These codes also specify the methods to repair, test and recertify the tank. They also require that repairs are only made by people certified to make them.
- Frequent repairs and maintenance problems are process safety warning signs. Tanks should not develop cracks and if they do, it is a serious concern.
- Ammonia is acutely toxic; inhaling it can lead to respiratory failure. Skin contact with liquid ammonia causes thermal burns due to the extreme cold.

What Can You Do?

- Critical process information such as maximum tank fill level should be noted on the tank, at the filling connection location and be a special warning in the filling procedure.
- Never overfill or exceed the rated capacity of a vessel. If more material is delivered than the rated capacity of the receiving tank, consult your supervisor.
- Repairs to tanks and other equipment require specialized expertise. If asked to perform a repair that you are not trained or certified to do, question it. Better to have a process delay than a process disaster.
- Read the Chemical Engineering Progress article about this incident free of charge at: <https://www.aiche.org/resources/publications/cep/2023/july/learning-worst-ammonia-accident>

Overfilling Vessels Can Have Catastrophic Results!