

## Result of the Incident Investigation

**Truck damages unloading station during unloading of nitric acid, causing spillage and fire.**



### Incident description

A tank truck containing 98% nitric acid arrived at a chemical site for unloading.

Having passed through the site entrance gate, the truck driver drove to the unloading station. It was the first time that the driver unloaded at this site.

The unloading station is not permanently manned, but camera surveillance is used.

The driver approached the control stand of the unloading station to unload his tank. The driver did not speak the local language or any other language the site unloading staff could understand. This made appropriate communication with the site staff virtually impossible. Before the unloading was started, the site operator in charge followed the unloading procedure (technical verification of the transport equipment, documentation check, checking of adequate storage capacity, connections to the tank, etc.) while filling in the check list (in local language) used for unloading.

Before the unloading of the product was finished, the driver received the shipping documentation. The driver thought that this meant that the unloading was completed and that he could leave. He started up his vehicle and moved his vehicle away from the unloading station with the hoses for product and nitrogen still attached to the truck. No stop sign or barrier was used to prevent the truck from driving away while still connected.

The hoses were torn off and caused a spillage of the product. The contact of the spilled nitric acid with the truck produced a fire (nitric acid is a strong oxidiser and can react with metal and non-metal products resulting in flammable sub-products). The fire was extinguished by the site fire brigade.

**Type of events (from the list in chapter 3.1)**

- 3.1.10. Loss of containment
- 3.1.16 Chemical reaction
- 3.1.8 Fire

<b>Immediate/direct causes (from the list in chapter 3.2)</b>		<b>Basic/Root causes (from the list in chapter 3.3)</b>
<p><b>3.2.21 Operating equipment without permission</b> <i>The driver drove away his truck while the hoses were still connected to the unloading station. The hoses were turn off</i></p>	<p><b>3.2.14 Lack of coordination between operator and driver.</b> <i>The driver did not understand the operator leading to assumption of authorization to leave.</i></p>	<p><b>3.3.1.1 i) Inadequate communication (misunderstanding).</b> <i>Checklist used but driver did not understand</i></p> <p><b>3.3.1.2 ii) No or inadequate procedure:</b></p> <ul style="list-style-type: none"> <li>• <i>The driver was allowed to enter the site without checking his language skills.</i></li> <li>• <i>The driver received the shipping documents before the unloading was finished.</i></li> </ul> <p><b>3.3.1.2 iii) Task design inadequate (responsibility not clear).</b></p> <ul style="list-style-type: none"> <li>• <i>No operator available to stop the truck.</i></li> <li>• <i>The driver did not carry out a vehicle check before moving the vehicle.</i></li> </ul>
	<p><b>3.2.22 Human Failure.</b> <i>The actions of the driver and the operator resulted in the incident.</i></p>	<p><b>3.3.1.1 ii) Inadequate guidance / supervision / monitoring / coaching:</b> <i>The operator allowed the driver to leave after having delivered the shipping documents.</i></p> <p><b>3.3.2.2 Unintentional behaviour</b></p> <p><b>iii) Poor or wrong judgement.</b> <i>The operator gave shipping papers to driver before unloading was finished.</i></p> <p><b>iv) Wrong action –</b> <i>The driver drove off without formal permission. He assumed that receiving the paperwork was the permission.</i></p>
	<p><b>3.2.16 No warning.</b> <i>No stop sign or barriers at the unloading station to avoid the movement of the truck while still connected.</i></p>	<p><b>3.3.1.7 Inadequate design.</b> <i>No use of barrier or sign to prevent the truck from driving away while still connected.</i></p>

## 4.2 Corrective actions on organizational causes (between brackets the root causes that are addressed)

- **4.2.10 Improve communication** (addressing 3.3.1.1 i):
  - The gate has to check language capability of the driver and refuse or escalate when there is no compliance.
  - For foreign language speaking drivers not able to understand the local language, the specific checklists of the site have to be translated into the most common languages.
  - These checklists have to be explained to the driver by the site operator in advance to the loading/unloading process and the driver has to confirm by signing that everything was properly understood by him/her
- **4.2.3.3 Installation of interlock systems to avoid human error** (addressing 3.3.2.2 and 3.3.1.7): Use of immobiliser systems (such as “Stop” sign in front of the truck combined with a wheel lock) to avoid leaving the site before completion of the unloading operation (i.e. with hoses still connected).
- **4.2.5 Define/implement/improve procedures** (addressing 3.3.1.1 ii, 3.3.1.2 ii, 3.3.1.2 iii):
  - Design the organisational process in such a manner that the shipping documents won't be handed over to the driver before the loading/unloading process is entirely finished
  - In case of drivers understanding only non-common languages, for which a translation cannot be made available in short term, the driver has to be accompanied and guided by a site operator through the whole filling/emptying process or be refused for unloading.
  - There should be a procedure in place to ensure that the transport company has been informed prior to the operation about the site access and unloading requirements (including language skills). In case the transport company has been contracted by the supplier, the supplier should provide this information to the transport company ( e.g. by using SULID)
- **4.2.13 Provide training / refresher training** (addressing 3.3.1.1 i): The operators and drivers should be required to be familiar with and to be able to use the expressions/terms of “Transperanto” before the driver enters into the site, as recommended by the Cefic “Best Practice Guidelines for Safe Loading and Unloading”( guidelines recommend knowledge of at least the English expressions of Transperanto).

## 4.3 Corrective actions on human causes

The human failures were considered to be unintentional and the prime corrective actions will be organizational. However, it can be considered to have additional training for the loading stand staff on making interventions and for the transport company to retrain the driver on making the right vehicle checks after finishing unloading. Both can be strengthened by a toolbox on these two subjects in the respective companies.