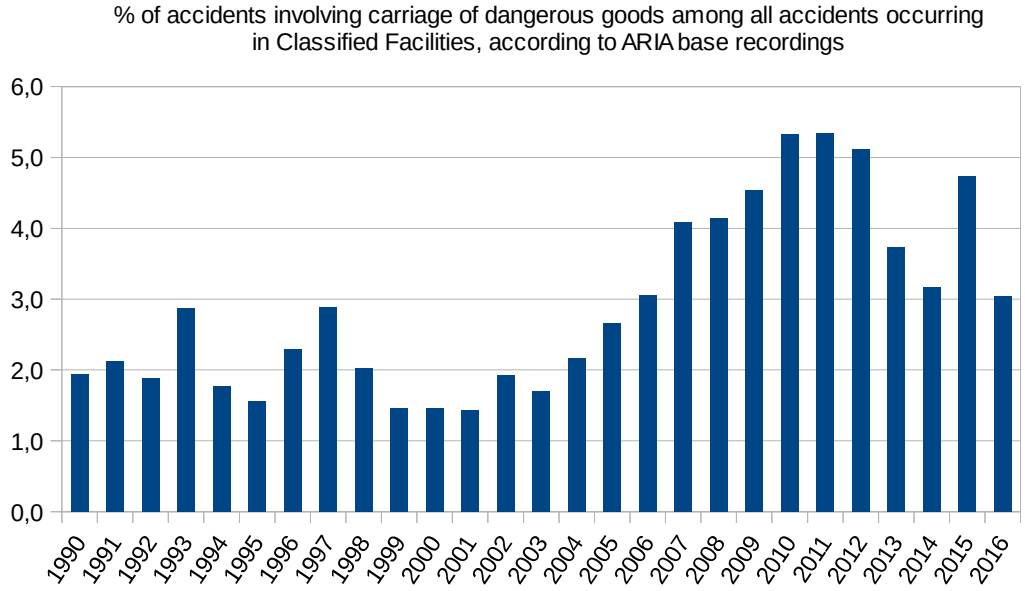
Ensuring safety when transporting dangerous goods within classified facilities

Since 1990, a total of 784 accidents involving transportation of dangerous goods within Classified Facilities have been recorded in the ARIA base. The percentage of this type of accident has nearly doubled over the past 10 years.



The transport of dangerous goods is not a "productive" activity, but it remains vital to industrial operations. It generates risks from both human and environmental perspective. As a case in point, over 40% of all accidents related to this activity and recorded in ARIA resulted in human consequences (injuries or deaths).

1. Characteristics of accidents of transport of dangerous goods within Classified Facilities

1.1. Recurrent accidents at specific industrial sites

Accidents involving the transport of dangerous goods might arise several times at the same industrial site. In 16% of accidents involving carriage of dangerous goods concerned Classified Facilities this type of accident had already been recorded on site.

1.2. Have the measures implemented been efficient?

When the same type of accident recurs at a given site, questions are raised over the efficiency of measures adopted and their monitoring by the site operator. An analysis of accidents recorded in ARIA indicates that in some cases, it takes several accidents to occur before the operator actually introduces corrective measures addressing the deep-rooted causes. By neglecting all the organisational and human failures leading to the event, the operator runs the risk of repeat accidents.

Failure to resolve deep-rooted causes may lead to multiple accidents from a single source, though with different effects. Such was the case at a paint and aerosol plant where flawed maintenance scheduling was responsible for two transfer accidents, 3 months apart, originating from defective equipment in two distinct areas (ARIA 43977 and 44336). Another example pertains to a refinery where several accidental spills occurred during tank transfer operations in 2009, 2012 and 2013. The material transfer procedure was revised, coupled with enhanced awareness targeting lorry drivers, yet these measures did not prevent a subsequent incident from arising (ARIA 36546, 42225, 44834). The operator had undoubtedly failed to identify all of the causes involved.

Far too often, several accidents occur before the operator is able to identify their deep-rooted causes and adopt efficient measures. On a logistics platform, it took 3 perforations by a forklift of barrels storing chemical products, before the operator actually identified the deep-rooted cause. As it turned out, the forks on the vehicle were being deployed at full extension when handling smaller containers, so they were puncturing the containers stored behind the smaller barrels (ARIA 44702, 46435, 46559).

1.3. An activity often managed by subcontractors

Accidents involving transport of dangerous goods within Classified Facilities often entail reliance on subcontracted firms. Goods transfer safety is thus being delegated to subcontractors without sufficient control exercised by the operator. Along these lines, the main deficiencies observed in ARIA focus on the following:

- supervision of verification steps conducted by subcontractors, regarding:
  - cleanliness of the tank, specifically the absence of product residue, materials or tools inadvertently left inside the tank (ARIA 33494);
  - condition and type of equipment used to perform the actual product transfer (coupling, piping, etc.) (ARIA 36005);
- supervision of dangerous goods transfer operations (ARIA 47869);
- controls relative to the level of training and risk awareness provided to subcontractors (ARIA 44835).

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2. Factors giving rise to these accidents

Regardless of the actor implicated in accidents involving transport of dangerous goods within Classified Facilities (subcontractors or hired company staff), it is necessary to identify the deep-rooted causes responsible for the event in the first place. When the operator conducts such analysis, organisational dysfunction is often exposed.

2.1. Many control flaws detected

Over 60% of accidents, whose deep-rooted causes were analysed, included deficient controls, particularly on equipment.

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The majority of deficient equipment inspection protocols pertain to the following points: establishing maintenance frequencies, respecting the equipment life cycle, and implementing the appropriate type of maintenance.

Several accidents also reveal organisational flaws in the controls required when proceeding with dangerous goods transfer operations, more specifically: verifying the level of the tank to be filled, identifying the right tank and right coupling, and controlling the condition of machines in service. The presence of a facility technician assigned to oversee and accompany these operations is not always guaranteed.

2.2. Nearly half of all accidents are linked to a human action, why?

40% of all accidents involving transport of dangerous goods within Classified Facilities stem from inadequate human responses; examples include failure to comply with instructions or procedures. While the operator is able to rather quickly spot this type of human breakdown during an analysis, the reasons behind such errors are more difficult to grasp. Once identified, these deep-rooted causes suggest insufficiency in the formation of operator, accounting for 22% of all sampled accidents, as well as lacking, incomplete or inappropriate instructions and procedures for another 28% of accidents.

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2.3. Equipment selection, loading dock ergonomics and risk identification frequently cited as causes of failure

Among the causes observed, are problems related to equipment selection or loading dock ergonomics, especially missing or erroneous indications on controls or couplings. An absence of floor markings inside the parking zone may lead to connection difficulties. The presence of obstacles or clutter in the handling space is another source of accidents. The choice of pipe couplings and materials is also key in avoiding accidents. 15% of accidents with known causes are tied to inappropriate equipment choices.

In order to avoid these organisational problems, risk analysis constitutes a powerful tool available to operators. However, in 19% of cases with identified accident causes, it appears that this specific analysis was missing or incomplete.

For further information, feel free to consult the newsflash entitled "*Delivery of dangerous goods by lorry tankers: Beware of spills*" or the detailed file sheets of accident involving carriage of dangerous goods on the ARIA site at the following address: http://www.aria.developpement-durable.gouv.fr