

Delivery of hazardous materials by tank truck Overflow advisory

While the delivery of hazardous materials by means of road transport onto an industrial site constitutes a relatively commonplace operation, all too often it leads to overly taxing the onsite reception capacities. In addition to generating economic losses, these discharges are potentially hazardous for both human health and the environment.

The two accidents described in detail below highlight not only equipment malfunctions but also organisational breakdowns (missing or inadequate procedures, cases of noncompliance, etc.) and the kinds of anomalies typically found in the ARIA database.

1st case: July 12, 2004 - Reims (ARIA 27903)

A tank containing sulphonic acid overflowed during a transfer operation involving a cistern inside a detergent plant. Upon observing the spillage of sulphonic acid on the floor situated at a level of 5.5 m elevation, a design office staff member sounded the alarm, ordered the truck transfer operation to cease and duly notified the safety staff. The relatively viscous product had flowed between the building wall and the siding and then followed a path into the plant courtyard beyond the transfer zone. A thunderstorm had struck and the sectional valves on the public stormwater drainage system were closed. Nonetheless, the rainfall carried the acid into the plant's stormwater collection network, where once in contact with water, the acid generated a large quantity of foam. A subcontracted company proceeded with pumping 12

m³ of sudsy water from the system's main collector pipe. The employee responsible for the transfer operation had reversed the free capacity values between two of the tanks handling bulk raw materials: 105.1 m³ for one vs. 31.5 m³ for the other. The tank featured a high level indicator associated with a visual relay in the control room, but the employee had constantly remained beside the truck from the beginning of the transfer until the time the overflow was noticed. The acid also leaked via the 15-m long vent-to-atmosphere outlet positioned at the top of the tank; under the weight of the acid spill, the vent detached. Several measures were taken: power-assisted shut-off of the sulphonic acid transfer pump at



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the level of the tank; installation of an audible and visual alarm in the courtyard, connected to all the high level indicators on tanks containing liquids; verification of the good working order of all high level indicators and their servo-control feature; modification of the «inventory» table to avoid reading errors; consolidation of the vent-to-atmosphere pipe on the tank; review with personnel of material transfer and safety guidelines.

What are the risks involved?

Human intoxication subsequent to the release and venting of a toxic product.

Explosion or fire subsequent to the creation of an inflammable and potentially explosive gaseous mix.

Violent or hazardous chemical reaction subsequent to the loss of confinement of a product incompatible with water, other substances likely found in the vicinity of the site, heat, humidity or air.

Pollution of the natural environment (soil, groundwater, surface water) either directly or via the collection systems (stormwater, sewage) subsequent to spillage of a hazardous material.

Damage of property that comes into contact with a product spill.

2nd case: January 10, 2008 - Quettreville-sur-Sienne (ARIA 34509)

During delivery of home heating oil at an oil depot, the driver of a transport company vehicle did not fill the right tank and some 6,000 litres of product spilled via the tank duct, despite the presence of a flow limiter valve. The heating oil could be contained, for the most part, in the retention basin, though a small quantity was still able to reach the floor. Since the retention shut-off valve had not been tightly closed, a portion of product also made its way into the hydrocarbon separation system.

The next day, a specialist company was called in to clean the hydrocarbon separator and pump the heating oil that had entered the retention basin. Given the heavy rainfall during the night, a total of 19 tonnes of water/hydrocarbon mix were recovered and transferred to a waste processing centre.

The driver-deliverer did not stop in at the office to identify which tanks needed to be filled prior to the transfer operation, as stipulated in the official procedure. The flow limiter valve was inoperable, from signs showing that it had to be manually forced. Moreover, the opening and closing directions on the retention valve were not clearly legible.

Subsequent to the accident, the site operator fenced in the site and planned on informing the transport company in writing of the procedure that all drivers, whose responsibilities include onsite delivery, must respect. A specialised firm repaired the limiter valve and the retention valve was upgraded. The operator notified the Classified Facilities Inspection authorities of this incident following another case of water pollution occurring on February 21, 2008 (ARIA 34476).

Questions raised to improve the safety of material transfer operations

These events illustrate that transferring hazardous material from a cistern must be performed jointly by the tanker truck driver / deliverer and the facility operator, with each party assigned responsibilities and a specific role: the transport company's involvement pertains chiefly to navigating the road and reaching the transfer site, while the onsite company's focus begins with the fixed storage installations.

1. Has an analysis been conducted of the risks associated with material transfer operations?
2. Have the roles and duties of the materials transporter and facility operator (in terms of operating protocol, unloading procedures and safety rules) been clearly established; are they known to both parties, easily accessible (appropriately displayed) and effectively communicated prior to every unloading (adoption of a so-called «safety protocol»)? Are these rules actually applied and their compliance controlled by management?
3. Is a representative of the host facility on hand to receive the truck shipment of hazardous material?
4. Do the transport documents (delivery slip, etc.) correspond to the original order?
5. Does the tank receiving the material have sufficient «empty capacity» to accommodate the delivery? Are the storage diagrams and logs kept up to date (type and quantity of products stored in each of the fixed tanks)?
6. Are the tanks and their connection points properly identified and secure (indelible and updated indications, locked plugs, blind flanges, etc.)?
7. Is the receiving tank visible (layout, lighting, etc.) and monitored throughout the transfer operation? If not, has a compensatory device been installed? Does a member of the onsite staff remain present at the transfer zone during the operation?
8. Can the tank filling level be easily controlled on a continuous basis? Have the tanks been equipped with flow limiter valves or a high level alarm? Do they contain an overflow weir directed towards a retention basin or an automatic intake shut-off mechanism triggered by activation of the high level alarm (especially for products that are incompatible with air, inflammable or toxic)?
9. Have the alarms been fitted with visual and audible feedback both at the level of the transfer platform and in the control room, for sites set up with a control room?
10. Are the measurement and safety systems in good working order? Do they undergo testing on a regular basis?
11. Do personnel working within the transfer zone or near the tank during filling wear individual protective gear appropriate for the type of hazardous material being delivered?
12. Should a spill be reported:
 - Is it possible to easily and safely interrupt the transfer operation (e.g. emergency stop button)?
 - Will hazardous material spills be fully and durably confined to the site premises?
 - Are stakeholders aware of the procedures to follow in the event of an accident: first response measures, emergency warning, access to emergency exits? Can they quickly consult the specific characteristics and hazards related to the given products (product fact sheets and safety sheets)?
 - Are initial response resources available and easily accessible (equipment for limiting flows, evaporation ...)?
 - Have stakeholders had drills and received training in the use of response equipment?
13. Have the driver/deliverer and facility receiving agent been trained (in risks related to the transferred products, procedures, safety rules, etc.) and, if so, have they received any kind of certification?

The safety advisor

Since January 1st, 2001, all companies that load or transport hazardous materials must employ the services of a «safety advisor», whose responsibilities include ensuring that the personnel assigned to transport or load / unload hazardous materials be made familiar with appropriate operating procedures and guidelines.

(Arrêté du 17/12/1998 modifié, ADR)

Subcontractor training

Regulations (contained in the «ADR» decree) stipulate that all drivers of vehicles transporting hazardous materials must complete a training sequence that includes product familiarity, safety procedures to apply and steps to implement during handling operations or when securing packages. A review is to be scheduled every five years.

The safety protocol

Loading and unloading operations performed by a subcontractor within a host company's premises must be described within a written «safety protocol», established between the respective employers or their representatives, prior to undertaking said operations. This protocol document serves to evaluate the risks generated by the operation as well as the prevention and safety measures to be implemented.

(Code du Travail art. R4515-4 à R4515-11).