16 Transport interfaces, port areas, pipelines and marshalling yards

This chapter addresses limited aspects of the transport of hazardous substances. Specifically, it provides guidance related to transport to the extent it involves fixed facilities. This includes transport interfaces in general (e.g. railroad marshalling yards, road terminals, airports, loading and unloading facilities), port areas, pipelines and marshalling yards. It also provides guidance on the roles and responsibilities of stakeholders which, in addition to the stakeholders addressed generally in the Guiding Principles, here include the owners/operators of the transport interfaces and pipelines, the owners/operators of the transport means (ships, trucks, trains) and the labour involved in the transport and loading/unloading operations.

This chapter takes into account that a prerequisite for the safe transport and handling of hazardous substances is the proper identification of their hazards as well as proper containment, packaging, packing, cargo separation, securing, marking, labelling, placarding and documentation. Each country/jurisdiction should decide the point where substances are covered by regulations relating to transportation and where they are covered by other requirements to ensure that there are no gaps. The allocation of responsibility can differ among countries but in no case should there be gaps in regulation.

Transport interfaces

For purposes of this publication, a "transport interface" is defined as fixed (identified) areas where hazardous substances are: transferred from one transport mode to another (e.g. road to rail, or ship to pipeline); transferred within one transport mode from one piece of equipment to another (e.g. from one truck to another); transferred from a transport mode to a fixed installation or from the installation to a transport mode; or stored temporarily during transfer between transport modes or equipment. Thus, transport interfaces involve, for example, loading and unloading operations, transfer facilities, temporary holding or keeping of hazardous substances during cargo transfer (e.g. warehousing) and handling of damaged vehicles or spilt goods. Examples include railroad marshalling yards, port areas, receiving/loading docks at hazardous installations, terminals for roads and for intermodal transport between road and rail, airports and transfer facilities at fixed installations.

Box 16.1. International regulations for the transport of dangerous goods

An international set of regulations has been created for the transport of "dangerous goods", which basically guarantees the safe transport of these sensitive goods.

The United Nations have developed mechanisms for transport conditions for all modes for transport. They should be considered when operating and managing transport interfaces. The United Nations Economic Commission for Europe (UNECE) administers regional agreements for the effective implementation of these mechanisms for road, rail and inland waterways transport of dangerous goods (ADR/RID/ADN).

Note: ADR - Agreement concerning the International Carriage of Dangerous Goods by Road; RID - Regulation concerning the International Carriage of Dangerous Goods by Rail; ADN - Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.
Source: UNECE (2023[11]), *Dangerous Goods*, https://unece.org/transport/dangerous-goods.

Chemical accident prevention, preparedness and response at transport interfaces should be addressed in an integrated way, taking into account chemical safety at the interface itself and the safety of all modes of transport that utilise the interface (e.g. high-speed trains passing through marshalling yards) as well as the public, environment and property potentially affected in the event of an accident.

The geographical boundaries of transport interfaces that handle hazardous substances should be clearly defined and should include areas where hazardous substances are handled, transported and/or kept temporarily.

- Areas where hazardous substances are kept should be clearly marked, properly supervised and regularly inspected for leakage or damage.
- Access to transport interfaces should be clearly regulated with regard to people and vehicles.

- Appropriate arrangements should be in place to maintain the security of transport interfaces where hazardous substances are located to minimise the possibility of security breaches due to, for example, terrorist activities, sabotage, vandalism or theft of such substances.

Land-use planning arrangements should be applied to transport interfaces to minimise the risks of adverse effects in the event of an accident and to prevent the placing of inappropriate developments near the interface. Planning and construction of new and expanded facilities at transport interfaces should take into account the requirements for the prevention of and response to chemical accidents. This involves preparing an assessment of the risks to determine the probability of accidents and their possible effects on health, the environment and property and incorporating appropriate safety features and equipment.

Box 16.2. Relevant characteristics of transport interfaces

There are a number of characteristics that differentiate transport interfaces from fixed installations for purposes of chemical accident prevention, preparedness and response.

- Different modes of transport meet at the interface, with different supervisory bodies and possibly different safety practices due to different safety goals which must be reached.
- There are changing amounts and types of hazardous substances at the interface, including bulk and packaged cargo.
- There are continuous transfer and handling operations.
- There may be differences between the way hazardous substances are classified and labelled within fixed facilities and within the transportation regime.
- Packaging, labelling and documentation are likely to be carried out in remote locations, outside the control of those responsible for safety in the interface.
- The stakeholders concerned are both different and more numerous.

The various parties involved with handling hazardous substances at transport interfaces should co-operate to help ensure the safe operation of transport interfaces and to provide for emergency preparedness and response. The roles and responsibilities, with respect to chemical accident prevention, preparedness and response, of all parties involved in and around a transport interface should be clearly defined.

All parties involved in the transport of hazardous substances should ensure that they have access to information necessary to fulfil their responsibilities for the safe handling of cargo containing hazardous substances and to provide information to others concerning the substances.

- Those responsible for the shipping, packing, packaging, repackaging, marking, securing, labelling, placarding and documentation of hazardous substances at the hazardous installation should ensure that all relevant information is passed on to those involved in the transport chain. This information should allow for the tracking of cargo containing hazardous substances and should, amongst other things, address the substances being handled, as well as provide guidance for safe handling, emergency preparedness and response to accidents.
- The guidance should be in a form and in a language that can be understood by those that might need to take emergency action, including drivers and response personnel.
- All parties in the transport chain should ensure that their employees (including contractors) are competent and adequately trained to handle hazardous substances under both normal and abnormal conditions.

Operators should prepare “safety reports” for transport interfaces where there are risks of significant chemical accidents, with the reports tailored to the level of the hazard potential of each site.

Operators should develop and enforce a safety management system and procedures necessary for the safe handling of hazardous substances at the transport interface. The safety management system should address all of the modes of transport using the interface, not just the primary mode (e.g. operators of railroad marshalling yards should also be concerned with trucks that transport hazardous substances to the yards.)

Operators should ensure that the equipment and safety systems (including hardware and software) used at transport interfaces are suitable for their purposes and are compatible with current technical standards.

- One of the most common risks at transport interfaces involves loading/unloading operations. Particular attention should be paid to equipment for such operations including, for example, cranes, pumps, flexible hoses and pipes, as well as instrumentation for monitoring equipment, automatic overflow indicators and automatic shutdown systems especially for unloading from ship to shore.
- Operators of transport interfaces should ensure that all equipment and safety systems used in connection with loading/unloading operations and with other handling of hazardous substances are appropriately constructed and maintained. In this regard, it should be recognised that the equipment and systems may be owned by different contractors.
- Operators should ensure that the equipment and safety systems are designed and operated in a way that minimises the risk of human error and that employees are trained in the safe operation of the equipment and systems (recognising that there often are (sub)contractors or short-term workers at transport interfaces).
- Operators should apply the best available safety technologies where appropriate and replace dated and aged equipment as soon as possible.
- Operators should also:
    - Ensure that they have adequate information for the safe handling of hazardous substances and have systems for being notified in advance of the arrival and departure of hazardous substances intended for transit, handling or temporary holding at transport interfaces.
    - Keep records of hazardous substances arriving at transport interfaces, including their quantities and classification, and their location.
    - Establish mechanisms to ensure that all relevant contractors are competent for the work to be undertaken.
    - Set standards for the competency of carriers and equipment and assess compliance with these requirements.
    - Have equipment and procedures in place for dealing with damaged cargo involving hazardous substances.
    - Be empowered to refuse cargo if it is considered to endanger health, the environment or property. In addition, this should cover instances where incomplete or incorrect information and documentation are available.

Cargo interests (including, e.g. cargo manufacturers, consignors/shippers, forwarders, consolidators, packers, brokers and traders) should:

- Ensure that information necessary for the safe handling of hazardous substances and emergency preparedness and response is available to the operators and managers of transport interfaces and, as appropriate, to public authorities.
- Establish standards and systems for screening/reviewing the competency of carriers and equipment to be used.

Carriers/transporters should:

- Maintain an inventory of hazardous substances being transported.

- Ensure the selection and maintenance of appropriate equipment.
- Ensure that all paperwork is properly passed along for, or to, the next responsible party in the transportation chain and that the handover of goods is well documented when loading, unloading or transferring hazardous substances.

Customers (with respect to the transport interface at the delivery point) should:

- Ensure that they have the types of information needed for the safe handling of hazardous substances and for emergency preparedness and response.
- Have procedures and equipment/facilities in place for handling leaking or damaged cargo, and collect and move the substances to safe storage areas as quickly as possible.
- Be empowered to refuse cargo if the state of the cargo is considered to endanger health or the environment, including property. In addition, this should cover instances where incomplete or incorrect information and documentation are available.

Special consideration should be given to the storage of hazardous substances at transport interfaces.

- In this regard, regulations concerning the storage of hazardous substances should apply to the storage of such substances at transport interfaces.
- The extent of storage of hazardous substances (in terms of their quantity, hazardous nature and length of time stored) at transport interfaces should be minimised to the extent consistent with increased safety (reducing the overall likelihood or consequences of accidents involving hazardous substances).

Public authorities should ensure that their control framework and enforcement activities (including monitoring and inspection) address transport interfaces. There should be a clear delineation between jurisdictions and communication protocols that allow the exchange of information and co-operation between different authorities. This control framework should for example:

- Address the competency of managers and carriers to handle safely the hazardous substances that will be at the interfaces.
- Determine the classes and quantities of hazardous substances that may be permitted to be handled or in transit at a transport interface and the conditions under which they are to be handled.

There should be emergency planning at transport interfaces handling hazardous substances that is co-ordinated with the offsite emergency plan.

Operators and public authorities should make a concerted effort to ensure that information concerning potential hazards and the appropriate actions to be taken in the event of an accident is provided on a continuing basis to the potentially affected public. Transport interfaces may have special characteristics, in particular their proximity to transport routes that make communication with any affected public difficult.

Systems should be in place for the timely notification/reporting of incidents (accidents and near misses) at a transport interface.

- Specifically, cargo interests, carriers/transporters and customers should notify the operators of the interface in the event of an incident involving hazardous substances (e.g. leaking or damaged containers) and, when appropriate, should notify the public authorities (including response personnel) and the manufacturers of the substances.
- Further efforts should be made to share experiences both within a country and among countries, concerning incidents at transport interfaces and lessons learned from them.

At the national level, public authorities should have a consistent approach with respect to the laws and policies – including mechanisms for oversight and co-ordination – relating to all modes of transport. This helps to ensure that there are no gaps or inconsistencies in regulatory requirements or in the allocation of

responsibilities as hazardous substances move from one transport mode to another. Care should be taken to avoid any contradictions in the various laws and policies that may apply to transport interfaces (which might include national and international rules for transport, legislation concerning hazardous installations and local laws for land-use planning).

Efforts should be made to adopt internationally accepted standards.

Operators of hazardous installations should endeavour to choose the safest practicable means of transport and the safest practicable routing of hazardous substances being taken from, or delivered to, an installation. This will help to, for example, minimise the number of people potentially affected in the event of an accident.

- Risk assessments should be used as one input into the decision-making process to compare various modes of transport and alternative routing of dangerous goods traffic.
- The choice of transport mode should be case-specific, as studies indicate that no one mode is generically safer than another. Safety is dependent on a number of factors, such as the substance involved, the route used and local management practices.
- To the extent that management of a hazardous installation can choose between transport modes and routes for hazardous substances, the decisions should take into account broader environmental and health considerations.
- Operators should co-operate with public authorities (including authorities at the local level) when making transport and routing decisions concerning the transport of hazardous substances.

Port areas

This section focuses on issues that specifically concern port areas. For purposes of this document, “port areas” are defined as the land and sea area established by legislation, including the fixed facilities and vessels (ships and others) in the area. Hazardous substances may be in port areas: to be loaded or unloaded from ships, inland barges, trains, trucks or pipelines; or to be held as cargo in ships without being handled in the port; or as packaged goods handled for consolidation or dispersal. Because port areas have certain additional characteristics as well as additional stakeholders that differentiate them from other transport interfaces, further guidance is appropriate. These characteristics include:

- Ports are inherently international in nature, with operators, ships and cargo coming from different countries.
- Ports are large, complex entities involving sea-going traffic and inland (river, rail and road) transport of hazardous substances. They may contain a number of fixed installations including terminals, warehouses and repair/maintenance facilities where hazardous substances are transferred, used, handled or stored. Port areas may also include (hazardous) installations not directly involved in transport activities.
- The complexity of port areas complicates land-use planning decisions related to developments both within and outside these areas.
- For historic reasons, ports tend to be located near large, densely populated areas and waterfront locations often attract housing and other developments.
- The ship-shore interface creates the potential, on an operational level, for a conflict of interest between environmental protection and marine safety.
- Stakeholders at ports, in addition to those involved in other transport interfaces, include, for example, port authorities, ships agents, flag state administrations of ships using the port, berth operators and ship and cargo surveying agents.

In addition, reference is made to the UNECE *Safety Guidelines and Good Industry Practices for Oil Terminals* (2015[2]). The guidelines are intended for application at land-based oil terminals. Oil terminals within the meaning of the principles and recommendations set forth in these safety guidelines and good industry practices are facilities for storing oil and its derivatives, including loading, unloading and transfer activities, functioning either alone or within bigger industrial activities, e.g. oil refineries.

Port authorities should develop and enforce local port rules, consistent with relevant laws and regulations, to address the safety of hazardous substances in port areas.

- All operators in a port area should co-ordinate with the port authorities and with relevant public authorities to help ensure that the actions of different operators do not increase the risk of accidents (e.g. through domino effects) and to facilitate emergency planning and response.
- Port authorities are responsible for being aware of the activities of each operator in their port areas and for ensuring appropriate co-operation and communication with public authorities.

Box 16.3. The International Maritime Organization

The International Maritime Organization (IMO) is the UN's specialised agency responsible for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. The IMO has 175 members states and 3 associate members. Under its auspices, over 50 conventions, protocols and numerous codes, as well as several guidelines and recommendations, have been prepared. Some of those instruments cover the handling and transport of hazardous substances.

Some of the main IMO instruments are: the International Convention for the Safety of Life at Sea (SOLAS); the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocols of 1978 and 1997 (MARPOL); and the International Maritime Dangerous Goods (IMDG) Code. In particular, from the IMO legal instruments, the Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas (MSC.1/Circ.1216, 26 February 2007) apply to dangerous cargoes in port areas as part of a transport chain, in which case land-use planning and other specifics pertaining to the temporary storage and regular checks of dangerous goods are taken into account.

Port authorities should ensure that all users of their ports (such as berth operators) establish operational procedures for activities and events that could increase the risk of an accident involving hazardous substances.

An international body should develop parameters for the safe operation of ships entering and manoeuvring in ports, which can be adapted to the circumstances of an individual port.

An international system should be developed for the reporting of ship deficiencies affecting accident potential and for the dissemination of these reports to port authorities.

Port authorities should establish procedures for proper maintenance and repair operations on ships that carry hazardous substances.

Prior to entering a port area, the master of a ship carrying hazardous substances should check the material condition of the ship and cargo for their readiness to safely enter the port and engage in cargo handling operations.

- The master should inform the port authority of any relevant deficiency of the ship, its machinery, equipment or appliances, or any leakage of hazardous substances or damage to their containment that may present a risk of a chemical accident.

- The master should ensure that, upon entering the port area, any safety requirements, including those pertaining to the proper stowage, packaging and segregation of hazardous substances, are carefully followed.

Berth operators should ensure that:

- Adequate and safe mooring facilities are provided and adequate safe access is provided between the ship and shore.
- A list of all hazardous substances in their facilities, with their locations and safety-related information, is readily available.
- Hazardous substances entering their premises have been duly certified or declared by the relevant cargo interests as being properly identified, packed, marked, labelled and placarded.
- No person, without reasonable cause, opens or otherwise interferes with any container, tank or vehicle containing hazardous substances.

Berth operators should co-ordinate with the ship's masters and the individuals responsible for other transport modes to ensure that all relevant regulations and codes are followed for proper cargo transfer and storage of hazardous substances.

Cargo interests should ensure that containers, tanks and vehicles used for carrying hazardous substances have current safety approval. Cargo interests should ensure that the physical condition of each freight container, tank container, portable tank or vehicle is checked for obvious damage potentially affecting safety.

Cargo interests and berth operators should ensure that every necessary support will be given to the port authority or any other person or institution entitled to carry out inspections or audits.

Public authorities should ensure that all emergency plans in the port area are mutually consistent and are operationally controlled by a designated party or authority.

- Emergency plans should take into account that port operations typically involve a large number of diverse public and private entities.
- Whenever possible, port emergency planners should use internationally recognised and accepted methodologies to ensure compatibility of approach and commonality of terms.

Ship's masters should be informed of how the port emergency response is organised and how their ship and crew fit into this system. The port authority should be informed of a ship's response plan so that actions can be co-ordinated. At each cargo transfer site, the ship's master and the berth operator should agree on the appropriate emergency procedures.

Port emergency plans should take into account that hazardous substances may be carried into the port area by ships and other modes even if they are not to be (un)loaded there. Emergency plans should also take into account the possibility of shipboard emergencies involving hazardous substances posing a threat to the port or the marine environment.

Port emergency response forces should be available and ready to respond to accidents wherever they occur in a port area. In this regard, they should be able to effectively respond and support operations from the quayside to ship, on the quay, on land and ship to ship.

Pipelines

While the provisions of all of the Guiding Principles generally apply to pipelines, this section addresses special concerns with respect to pipelines transporting hazardous substances. For purposes of this publication, pipelines are defined as a conduit made from pipes connected end-to-end for long-distance

fluid or gas transport to include all equipment used for pipeline operation, such as pumping, branching, transfer, shut-off and relief stations, as well as compressor, control and measuring systems. Pipelines are not part of an industrial installation.

Pipelines are recognised as an increasingly important option for transporting a variety of hazardous substances in addition to petrochemicals. Experience indicates that they are generally safe and, for certain substances, a vital means of transport. Among the advantages of pipelines is that they can move large quantities of hazardous substances quickly, relatively inexpensively and reliably, with relatively few associated impacts on the environment (as compared with other transport modes that involve vehicular exhaust, aesthetic impacts, noise and congestion).

The disadvantages of pipelines include infrastructure costs associated with construction, the delays inherent in making a pipeline operational, the problems associated with soil protection and the lack of flexibility in regard to delivery points and quantities that can be transported.

Regulatory approaches to pipelines differ significantly among countries although there are common elements in most approaches (including a general obligation to operate safely). Despite the differences in regulatory approaches, industry appears to have similar safety practices in different countries in order to maintain the integrity of pipeline networks.

In recognition of the hazards from pipeline accidents and their potential impacts, the parties to the UNECE Convention on the Transboundary Effects of Industrial Accidents (Industrial Accidents Convention) and the UNECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) drew up and published safety guidelines and good practices for pipelines. These take the form of a set of recommendations that will assist national authorities and operators to ensure an adequate safety level for pipelines and the hazards they pose. The guidance document contains principles and key elements for the safe transport of hazardous substances by pipeline, whether transboundary or not. The guidelines and practices set out are designed to prevent incidents and limit accidental consequences for human health and the environment (2015[3]).

Pipelines for transporting hazardous substances should be designed, constructed, operated, maintained and monitored so as to reduce the frequency of accidents and mitigate the consequences of accidents that do occur.

- Pipelines should be designed, constructed and operated consistent with recognised national and international codes, standards and guidance, as well as company specifications.
- Consideration should be given to various aspects which could have an impact on the safety of a pipeline including, e.g. design and stress factors, material quality, wall thickness, depth of burial, external impact protection, markings, route selection and monitoring.
- Pipelines should be constructed with the most suitable materials available to ensure their integrity initially and throughout their lifecycle. Appropriate safety technology should be used such as automatic shutdown systems (in the event of a leak or accident) or safety release systems.
- Adequate safety signs should be installed along the pipeline route.

Land-use planning considerations and risk assessments should be taken into account both in the routing of new pipelines (e.g. to limit proximity to populated areas to the extent possible) and in decisions concerning proposals for new developments/building in the vicinity of existing pipelines.

- Environmental impact assessment for geological and other natural hazards should also be taken into account in order to avoid (to the extent possible) hazardous environments, such as areas susceptible to mining, sinkholes, seismic activity and floods.
- Routing of pipelines should be chosen to minimise adverse impacts in the event of an accident and to facilitate access for maintenance and emergency response personnel.

- Safety distances should be considered to protect the pipeline and protect housing areas against impacts from the pipeline.
- Risks of domino effects in operation and during maintenance work must be considered when pipelines are bundled in one route or laid close together.

Industry should develop safety management systems to meet safety objectives during the design, construction, operation, maintenance and decommissioning of pipelines.

- Elements of safety management systems for pipelines include: clear objectives and policies; a suitable organisation with clear definitions of asset ownership and related responsibilities; competent staff and effective education and training; adequate standards and procedures; performance monitoring and suitable audit/review procedures to identify shortcomings and make corrections; emergency response procedures which are regularly tested and reviewed; and accident investigations.
- Industry should continue to share its experience with respect to the use of safety management systems for pipelines and improve the efficiency of individual elements/techniques of these systems, with the aim of further reducing pipeline accidents.

The integrity of pipelines should be maintained through adequate maintenance, inspection and monitoring and management.

- Means for inspection and monitoring include the use of “intelligent pigs”, patrolling and aerial surveillance.
- In addition to regular maintenance, the objective of continuous improvement in safety performance can be achieved by inspection and monitoring, a wider exchange of information among operators, taking into account lessons learned from reported incidents and utilisation of new technologies and other developments.
- As pipelines age, guidance on the management of ageing and lifetime management[1] should be applied. Additional monitoring may be necessary to continue to ensure their integrity. Consideration should be given to reviewing and revalidating pipelines and their operating conditions once they reach the end of their originally intended design life. In principle, however, continuous inspection and monitoring measures should always indicate irregularities at an early stage regardless of the age of the pipeline.
- Policies should be in place for replacing pipelines or parts of pipelines that may not meet safety standards or have reached the limits of their design life.

While the general principles applicable to emergency planning for hazardous installations also apply to pipelines, it may be necessary to make further efforts, taking into account the specific situation of pipelines including, for example, the hazards associated with the substance they transport.

- Emergency planning for pipelines should consider the special characteristics of pipelines including, for example: the fact that pipelines are normally unmanned; the length and location of pipelines; the high volumes between shut-off devices; the need to be able to shut off or depressurise the flow of materials; and the need to ensure access by emergency response personnel even at remote locations. In addition, an account should be taken of nearby developments. For example, where pipelines cross or parallel rail lines, it is important to interface with plans of the rail industry.
- Emergency planning should take into account a risk assessment of the pipeline system.
- In light of these complexities, it is important to get input from emergency response personnel when preparing, reviewing and revising emergency plans related to pipelines.
- Emergency planning should always be co-ordinated and regularly tested with external emergency services.

Industry responsible for pipelines should review and, as necessary, develop and implement systems to reduce third-party interference, as this is a major cause of accidents.

- This should be done in co-operation with public authorities in all regions/countries.
- Systems for reducing third-party interference involve ensuring that proper information is circulated among interested parties concerning the locations of pipelines in a given area. In addition, it is important to facilitate communication between the pipeline operator and third parties, such as through “one call” systems that provide information about pipelines at one, well-publicised source.
- Construction work on pipeline routes should be avoided.
- Care should be taken, so that heavy vehicles (mobile cranes, tanks, caterpillars) are not crossing depressurised pipelines.

In order to facilitate learning from experience, industry responsible for pipelines (as well as public authorities and other stakeholders) should improve sharing of information on improving the safety of pipelines and on accidents/near-miss case histories.

- This should include information concerning pipelines that reach the end of their intended use or design life. Options for dealing with pipelines that are no longer in use include removal, outright abandonment or abandonment with additional actions. Care should be taken to properly assess the associated risks of each option, on a case-by-case basis, recognising that the best solution in a given situation may be a combination of methods.
- Information should also be pooled and shared on the extent of pipeline systems, the amount of materials they convey and on statistical analyses of the use of pipelines to transport hazardous substances.
- Information should be collected and made available concerning the relationship between failure and the characteristics of the pipeline, in order to better understand the nature and causes of accidents (e.g. relating to age, size, location and construction of the pipeline).

Technical and operational measures should be taken to ensure that water, soil and explosion protection continue to be provided when a pipeline is decommissioned.

- The pipeline system to be decommissioned must be drained and hydraulically separated from the pipeline systems to be operated further.
- Depending on the medium, the pipeline system should be cleaned, e.g. by cleaning pigs, and, if necessary, subsequently dried. The pipeline system should be made free of products and, if necessary, of vapours. In the case of flammable liquids, it should be checked that the pipeline is free of vapours and, if necessary, it should be cleaned/dried again. The pipeline system should be sealed.
- Underground and above-ground plant components should be secured: if necessary, the pipeline should be secured in sections or completely for structural reasons, e.g. by grouting at railroad, tramway or road crossings. Securing measures are also important for hydraulic engineering reasons, e.g. to prevent an unintended drainage effect or upwelling. Above-ground plant components should either be dismantled or secured against erroneous use and misuse.

Marshalling yards

This section focuses on issues that specifically concern marshalling yards.[2] For purposes of this publication, a marshalling yard is defined as a place in transit and a link in the transport chain; railway marshalling yards are a special sort of station. They have a number of sets of sidings for receiving and preparing (shunting) freight trains and for sorting the rail wagons to their destination, with the aim of forming

new trains and dispatching these to their destinations. No loading or unloading of hazardous substances takes place at marshalling yards.

Marshalling yards are a subset of transport interfaces and, therefore, all the provisions of the Guiding Principles apply to marshalling yards. However, because marshalling yards have some special characteristics, as compared to transport interfaces more generally, further guidance is appropriate.

Procedures should be established to improve safety at marshalling yards by taking action such as separating incompatible substances, limiting the number of wagons that are shunted and using speed controls when shunting.

- The safety of high-speed train carriages through marshalling yards or railway stations, railroads and other modes of transport should be taken into account.
- If tracks for passenger and high-speed trains are separate from others, marshalling yards should be separate from these tracks and from railway stations as well.

All parties involved in the management and regulation of marshalling yards should have a clear understanding of who is responsible for taking action with respect to chemical accident prevention, preparedness and response, recognising the special characteristics of marshalling yards.

Cargo interests should agree on what is needed for rail cars to be fit for their purpose, specifically with respect to safety standards, maintenance and end-of-life timing and procedures.

References

UNECE (2023), *Dangerous Goods*, United Nations Economic Commission for Europe, https://unece.org/transport/dangerous-goods. [1]

UNECE (2015), *Safety Guidelines and Good Industry Practices for Oil Terminals*, United Nations Economic Commission for Europe, https://unece.org/sites/default/files/2021-01/TEIA_ENG_OilTerminals.pdf. [2]

UNECE (2015), *Safety Guidelines and Good Practices for Pipelines*, United Nations Economic Commission for Europe, https://unece.org/environment-policy/publications/safety-guidelines-and-good-practices-pipelines-0. [3]

Notes

[1] See https://one.oecd.org/document/env/jm/mono(2017)9/en/pdf.

[2] See http://www.oecd.org/env/ehs/risk-management/41945344.pdf.