SPECIAL SESSION OF THE GROUP OF EXPERTS ON CHEMICAL ACCIDENTS

CHEMICAL ACCIDENT PREVENTION, PREPAREDNESS AND RESPONSE AT THE INTERFACES OF TRANSPORT MODES AND HAZARDOUS INSTALLATIONS

Paris, 30th November and 1st December 1993

DISCUSSION DOCUMENT

OECD EXPERT GROUP ON CHEMICAL ACCIDENTS

SPECIAL SESSION ON CHEMICAL ACCIDENT PREVENTION, PREPAREDNESS AND RESPONSE AT TRANSPORT INTERFACES
(Paris, 30 November - 1 December)

DISCUSSION DOCUMENT

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DISCUSSION DOCUMENT

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DISCUSSION DOCUMENT

1. INTRODUCTION

1.1 Background

One of the objectives of the 1992-1994 OECD(1) Chemical Accidents Work Programme is to expand the "Guiding Principles for Chemical Accident Prevention, Preparedness and Response" [1](2) - currently addressing fixed installations only - to transport interfaces(3). At such interfaces, dangerous goods are being transferred from one transport mode to another, transferred within one transport mode from one transport equipment to another or stored temporarily during transfer between transport modes.

To start elaborating on the issues of chemical accident prevention, preparedness and response at transport interfaces, a Workshop on Chemical Safety in Port Areas was organized by OECD, IMO and UNEP from 18 - 21 October 1993 in Finland [2]. During a previous Workshop on Strategies for Transporting Dangerous Goods by Road, organized by OECD from 2 - 4 June 1992 in Sweden [3], safety issues of road transport of dangerous goods were discussed. However, the question of transferring dangerous goods between trucks or between trucks and other transport modes at transport interfaces was not considered in detail then.

In order for a consensus on the envisaged additional Guiding Principles to be reached by the end of 1994, it was decided to have - in addition to the two workshops - a Special Session where experts should exchange information and experience on, and reach conclusions on "best practice" for improving chemical accident prevention, preparedness and response at transport interfaces.

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(1) Appendix C contains the list of acronyms:

(2) The numbers in square brackets refer to the list of references in Appendix A.

(3) Appendix B contains a glossary of the most often used terms.

The Special Session is scheduled from 30 November - 1 December 1993 in conjunction with the December 1993 meeting of the Expert Group on Chemical Accidents.

1.2 Objectives

To facilitate discussions at the 1-1/2-day Special Session, the present discussion document was prepared by Switzerland(4). Its overall objective is to address the chemical safety at transport interfaces. Firstly, the relevant issues relating to the chemical accident prevention, preparedness and response at transport interfaces are identified (Section 2). Particular attention was given to the transport interfaces in connection with rail, road and air transport. Secondly, draft conclusions are formulated for consideration by the Special Session to aid in the later elaboration of the additional Guiding Principles by the OECD Expert Group on Chemical Accidents (Section 3). Recognizing that many of the principles related to fixed installations also apply to transport interfaces, the focus will be on those aspects of transport interfaces which differ from fixed installations.

The topic treated in this document covers a broad field because transport interfaces may vary widely in type, size and importance. There are many stakeholders and each one may weigh the relevant issues raised and the draft conclusions stated depending on his involvement in the operation of the interface. It is nevertheless hoped that the document will help in setting the stage for a fruitful discussion. The document does not claim to be definitive and complete. It may be necessary to make additions to or modify it as a consequence of the Special Session.

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(4) The Swiss Ordinance on the Protection against Major Accidents [4,18] breaks new ground by including transport routes in its scope, because serious damage to the public and the environment may arise not only from chemical plants but also from the transport of dangerous goods. The experience gained with the elaboration and application of the regulation has been used in preparing this discussion document. Practical guidelines for transport routes on which dangerous goods are transported are published by the Federal Office of Environment, Forests and Landscape (FOEFL) [5].

2. MAJOR ISSUES AT TRANSPORT INTERFACES

This Section identifies the issues regarding chemical accident prevention, preparedness and response at transport interfaces and elaborates in particular on the following aspects:

- What are transport interfaces and how should the scope of the additional Guiding Principles be defined (Section 2.1)?
- What are the relevant legal and regulatory issues at transport interfaces (Section 2.2)?
- What are the roles and responsibilities of the many stakeholders regarding chemical safety at trasnport interfaces (Section 2.3.1)?
- What are the appropriate organisational and technical safety measures at transport interfaces in view of the large number of stakeholders involved , the handling of dangerous goods among a large amount of other goods and the complex situation regarding communication (Section 2.3.2)?
- What are the relevant issues regarding communication, training and education at transport interfaces? (Section 2.4);

2.1 Scope

2.1.1 Transport Interfaces[5]

The transport of dangerous goods[6] originates from fixed installations, where hazardous substances are being produced and processed. It then continues on transport routes like railways or roads. The dangerous goods may change transport modes at stationary transfer points like harbours, railway stations, terminals

(5) The term "interface" should not be understood in the narrow legal sense to define the dividing line between transport and loading/unloading operations. The term is used in a broader sense to describe the site where all the activities of a transfer point such as arrival and unloading, temporary storage as well as loading and dispatching of the dangerous cargo take place.

(6) It should be in order to use the term "dangerous goods" for substances which in [1] would be called hazardous substances. The term "dangerous goods" is well defined, used consistently in the transportation and shipping industry and covers for all practical purposes what is meant in [1] by hazardous substances. The only exception is that some of the purely ecotoxicological substances may not be covered.

for intermodal transport between rail and road, truck terminals, airports, etc.

For these facilities the term "transport interface" is used in this discussion document and defined defined as an area where dangerous goods are being transferred from one transport mode to another (e.g. from rail to road), transferred within one transport mode from one transport equipment to another (e.g. from truck to truck) or stored temporarily(7) during transfer between transport modes.

The question which transport modes - leading into transport interfaces - should be considered in developing guidance for chemical safety is addressed in Section 3.1.1 together with the question to what extent such guidance may be applicable to loading/unloading facilities at fixed installations.

2.1.2 Likelihood of Major Accidents

The likelihood that a major accident could happen at an interface depends on such factors as the chemical hazard potential, the surrounding environment and the characteristics of the interface operations (accident frequency). The chemical hazard potential is primarily a function of the amount and the physico-chemical properties of the dangerous goods handled at the interface. The hazard potential and the situation regarding human, environment and property exposure at the site and in the surroundings define the possible extent of harm to human health and damage to the environment, including property, and thus whether a major accident is possible.

Chemical accidents arise primarily from a loss of containment of the dangerous goods, due to inadequate packing and securing, mishandling during unloading/loading operations, traffic accident, etc. The number of such containment losses depends on the frequency and complexity of unloading/loading operations and on the safety technology regarding transport equipment.

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(7) What is meant by "temporary storage of dangerous goods at a transport interface" is explained in Section 3.2.2.

Compared to fixed installations, transport interfaces present on one hand advantages as to the likelihood of accidents with loss of containment. There will be none of the accidents due to the manufacturing or processing of hazardous substances. At transport interfaces where only packaged goods and containers are transferred from one transport mode to an other, the likelihood of loss of containment is reduced compared to loading/unloading operations with bulk liquid dangerous cargo. On the other hand, the movement of equipment inherent in the operation of transport interfaces increases the possibility of collisions and traffic accidents. Also the awareness regarding safety matters of the personnel may be lower and communication problems more important at transport interfaces than at fixed installations.

Given the fact that the transport interfaces range from small loading /unloading facilities handling packaged goods to major facilities, where substantial quantities of bulk dangerous cargo may be handled, the question seems justified whether a distinction should be made between transport interfaces where the likelihood of causing a major accident is negligible and those where it is not (Section 3.1.2).

2.1.3 Pipelines

The question has been raised whether interfaces in connection with pipeline transportation of hazardous substances should be included in the scope. Many smaller pipeline systems are used at transport interfaces to load/unload bulk liquid dangerous cargo. Pipelines used in such systems have generally small diameters, are limited in extent and operate at low pressures. They belong to the technical loading/unloading equipment at the interface and play an important part in the safe handling of bulk liquid dangerous cargo. The technical safety aspects of such systems are discussed in Section 3.4.

The oil and natural gas industry uses pipelines to transport hazardous substances over long distances. These pipelines have generally large diameters and operate at high pressures. Auxiliary facilities (interfaces) are tank farms, liquefaction plants, pump stations, etc. In most countries these pipelines are subjected to

very stringent safety regulations. The international agreements covering the transport of dangerous goods do not apply. Issues relating to the accident prevention, preparedness and response of such systems should be delt with in an other context.

2.2 Legal and Regulatory Issues

2.2.1 Dangerous Goods in Transit

Several international organisations have over the years through international agreements established standards for the transportation of dangerous goods by sea (IMDG-Code) [6], inland waterways (ADN) [7,8], rail (RID) [9], road (ADR) [10] and air (TI) [11]. These standards have been adopted into national law by the signatory states of the respective international agreements. Both, the IMDG-Code and the technical instructions for air transport of dangerous goods (TI) are practically applied worldwide. The ADN, RID and ADR regulations apply mostly in European states. It is clear that similar regulations for transport of dangerous goods exist in other parts of the world (e.g. USA [12]).

Parallel to these activities the United Nations' Committee of Experts on the Transport of Dangerous Goods has issued "Recommendations on the Transport of Dangerous Goods (the so-called 'Orange Book') [13](8). They define the classes of dangerous goods and contain provisions regarding general packing requirements, labelling of packages, transport documents and special technical recommendations (excluding handling of bulk liquid dangerous cargo). The 'Orange Book' is becoming the definitive guideline for the setting of worldwide standards on the safe carriage of dangerous goods by sea, inland waterways, rail, road and air.

The provisions regarding the definition of classes of dangerous goods, the packing requirements, the labelling of the packages

(8) The transport of radioactive substances is excluded from the UN Recommendations on the Transport of Dangerous Goods, but regulated instead by the IAEA [14]. The international organisations mentioned harmonise their standards for the transport of radioactive substances with the recommendations of the IAEA.

and the transport documents will be incorporated into the standards of the above mentioned international agreements and come into force as national legislation of the signatory states by 1 January 1995.

Because the transport of dangerous goods leads directly into transport interfaces, the issues to be considered are:

- Have the separate developments of the international agreements for the different transport modes led to regulatory conflicts or gaps at the transport interfaces?
- Are there major problems with the enforcement of standards for the transport of dangerous goods at interfaces?

The draft conclusions are presented in Section 3.2.1.

2.2.2 Legal Requirements at Interfaces

Those responsible for the safe management and operation of transport interfaces are confronted with a variety of legal and regulatory issues such as:

- What are the legal bases that apply to the dangerous goods being unloaded/loaded - or temporarily stored - at transport interfaces?
- What kind of legal requirements need to be considered at transport interfaces regarding the protection of the workers, the public and the environment from chemical accidents as well as regarding land-use planning?

The draft conclusions are presented in Section 3.2.2.

2.3 Organisational and Technical Issues

2.3.1 Stakeholders

Stakeholders who have responsibilities in varying degrees in the chemical accident prevention, preparedness and response at transport interfaces are primarily those involved in the transportation chain of dangerous goods. This chain begins with the manufacturers of hazardous substances, involves distributors and packers, the transporters, the interface owners including workers, and ends with the receiver (customer) of the shipment.

Besides those directly involved in the transportation chain, the public authorities play an important role in accident prevention, preparedness and response and the public living in the surrounding area needs to be included in the information and decision processes.

A major issue circles around the question: What are the roles and responsibilities of the many stakeholders, in particular:

- the different parties involved in the operation of an interface, i.e. the interface owners and operators, possible subcontractors and the workers including their representatives (Section 3.3.1)?
- the "users" of the interface, i.e. the manufacturers and their customers, the distributors, the transporters, etc. (Section 3.3.2)?
- the public authorities as (a) owner of the interface, (b) competent (controlling) authority and (c) coordinator of the emergency response services, the land-use planning process and the information dissimination to the public (Section 3.3.3)?
- the public living in the surrounding area of a transport interface (Section 3.3.4)?

2.3.2 Safety Measures at Interfaces

The issues presented in this Section focus on those on-site safety measures which are notably different from those for fixed installations. Organisational as well as technical safety measures are designed to either:

- improve the safe handling of dangerous goods at transport interfaces (i.e. chemical accidents prevention)(9), or

(9) An efficient safety measure to prevent chemical accidents, especially major accidents, is the reduction of the chemical hazard potential. The quantities of certain dangerous goods transported to the interface could for example be limited. One could even consider to ban the transportation of a certain very dangerous good. It is obvious that such measures are not within the competence of the transport interface owner. In addition, transporters (e.g. railway companies) may be subjected to an obligation to transport. One of the possible solutions lies with the chemical industry, in that the production and processing of less hazardous substances for transportation would reduce the chemical hazard potential transported by the different transport modes.

- become active when a chemical accident occurs and therefore mitigate its consequences (i.e. chemical accident preparedness and response)[10].

Issues regarding organisational safety measures can be summarised according to the following main areas of concern:
- multiplicity of owners,
- irregular nature of the operations, which at peak times puts a stress on technical and qualified human resources,
- awareness of the workers regarding safety matters may be lower than at fixed installations.

The draft conclusions are presented in Section 3.4.1.

Issues regarding technical safety measures can be summarised according to the following main areas of concern:
- safety of cargo transfer equipment (e. g. pumps and flexible lines to handle liquid bulk cargo, cranes to handle containers of all sizes, equipment to handle packaged dangerous goods),
- improvement of equipment to mitigate consequences of equipment failure.

The draft conclusions are presented in Section 3.4.2.

2.4 Issues of Communication, Training and Education

Given the international nature of transport, especially at large interfaces, differences in language, culture, laws and practices are likely to affect the communication during handling at transport interfaces. An important issue is therefore, how to ensure that information is properly passed between stakeholders at an interface.

Training and education is generalls more difficult at a transport interface among others due to the many rules and regulations pertaining to the transport of dangerous goods and the involvement of other stakeholders, especially the transporters, the chemical safety on the site of the interface.

(10) A clear distinction between the two types of measures (prevention versus preparedness and response) is not always possible. No attempt has been made to indicate in Section 3.4 which safety measures belong to which type.

3. DRAFT CONCLUSIONS

The draft conclusions presented in this Section are for consideration by the Special Session. The revised conclusions will be a basis for later development of additional Guiding Principles by the OECD Expert Group on Chemical Accidents. The draft conclusions relate on the one hand to the scope and nature of the principles to be developed and on the other hand to their content.

3.1 Scope

3.1.1 Transport Interfaces

The scope of the additional Guiding Principles should include all transport interfaces where dangerous goods are being transferred or stored temporarily[11] during transportation by sea, inland waterways, rail, road and air.

Fixed installations (e.g. chemical plants, tank farms) are the senders and/or receivers of transported dangerous goods and have most likely their own on-site loading/unloading facilities. Although the conditions at these on-site facilities are usually different from those existing at transport interfaces, much of the additional guidance developed for the latter may also apply.

3.1.2 Likelihood of Major Accidents

The additional Guiding Principles should address chemical accident prevention, preparedness and response at transport interfaces regardless of their likelihood to cause a major accident. Hence, all interfaces from small to large ones should be included in the scope. Another choice would not be consistent with the approach chosen for the Guiding Principles for fixed installations.

However, special care should be taken to show how small and medium size transport interfaces - where the likelihood of major

(11) What is meant by "temporary storage of dangerous goods at a transport interface" is explained in Section 3.2.2.

accidents is negligible - could best use the guidance developed to improve chemical safety. Criteria should be developed which help in estimating what the likelihood of a major accident at an interface could be[12].

3.2 Legal and Regulatory Matters

3.2.1 Dangerous Goods in Transit

The harmonisation of the international standards for the transport of dangerous goods on the basis of the 'Orange Book' [13] (excluding the special technical recommendations) will become effective as of 1 January 1995 practically worldwide for sea and air transport and in Europe for transport by inland waterways, rail and road. Therefore, the continuity of the regulatory requirements for classification, packing, labelling and transport documents between different transport modes at the interface is given. The harmonisation of the special technical recommendations, which presently show a number of relevant gaps especially between sea, rail and road transport, should be advanced as much as possible.

Through this process of harmonisation, the enforcement of the standards for the transport of dangerous goods will be simplified. It is a general feeling today that these standards are sufficient. Those involved in the enforcement and control of the regulations know from experience how difficult it is to enforce the large number of existing regulations. The effort should now be concentrated on the enforcement of these standards.

3.2.2 Legal Requirements at Interfaces

In order to determine which legal requirements apply, the boundaries of the different parts of an interface should be clearly established. The "true" interface should be that part where loading and unloading, temporary holding or keeping of dangerous

(12) It is beyond the scope of this document to elaborate on such criteria. They should be based, however, on the frequency of movements as well as the amount and the classification of the dangerous goods handled at the site.

goods during direct cargo transfer, handling of damaged vehicles or spilled dangerous goods take place.

The temporary holding or keeping of dangerous goods means that these goods are held over a short period of time on the interface during transfer activities. The ownership of the goods should not change during temporary holding.

For reasons of continuity, the international regulations for the transport of dangerous goods should apply also to the dangerous goods during their handling on the transport interface.

Temporary or intermediate storage (possibly including storage fees) of dangerous goods on storage areas or in warehouses goes beyond the temporary holding or keeping. **Facilities where dangerous goods are temporarily stored over a longer period of time or even repacked, handled or processed should be treated like fixed installations.**

Most OECD countries have regulations which establish the requirements for major accident prevention, preparedness and response at hazardous installations [e.g. 15]. **The safety requirements of such regulations should in principle also be applied to transport interfaces where the likelihood of major accidents is not negligible.** For temporary storage areas, these requirements should apply, if the area falls within the scope of the regulation due to the amount of the hazardous substances stored.

The legal requirements for land-use planning should not be different for transport interfaces than for fixed installations. However, the relationship of the different stakeholders and the local site conditions - which should be clearly established for a successful land-use planning - may be more complex than for fixed installations. For example, transport routes leading to and coming from the transport interfaces should be considered also.

3.3 Roles and Responsibilities of Stakeholders

The accident-free transport of dangerous goods depends upon a full commitment from everyone in the distribution chain to safe

operation and to the adherence to the safety regulations. **Therefore, the roles and responsibilities of the different stakeholders should be clearly defined.**

3.3.1 Transport Interface Owners and Workers

Safety Management: A responsible management of chemical accident prevention, preparedness and response is organised on three levels. There is a strategic level where basic siting and development decisions are being made which also influence safety. On the tactical level a safety policy provides the framework for the safe operation of the facility. On the operational level, the necessary safety measures are implemented and controlled.

For fixed installations the three levels can usually be located within the same company. At transport interfaces, the responsibilities may be distributed between the different parties involved in the operation (or they may even be overlapping). **Therefore, the responsibilities for the different levels of safety management should be clearly established among the different parties involved in the operation of an interface.**

Safety Policy: **The owners of a transport interface should take all appropriate safety measures to reduce the risk of harm to the workers and the public and of damage to the environment caused by a chemical accident.** These measures aim both at preventing accidents and at mitigating the consequences of accidents. They have to take into account the current technological development[13] and be reasonably practical[14].

Safety Report: **For transport interfaces where major chemical accidents may happen, a formal safety report should be required.**

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(13) Consistent with the current technological development are safety measures which have been implemented or tested with success at some transport interfaces and which can be transferred to other interfaces. Hence, the current state of technological development comprises more than the acknowledged technical standards. It comprises the present, in the specialised field accessible knowledge on available safety measures.

(14) See Appendix B for explanation of "reasonably practical".

The safety report is a tool for management as well as controlling authority to set objectives of safety performance, to identify the areas needing particular improvement, to measure compliance with the safety goals and to provide a basis for an adequate follow-up of the safety measures taken. The safety report contains a detailed description of all the organisational and technical safety measures and the conclusions from the assessment of the risks of the transport interface for workers, the public and the environment.

3.3.2 Manufacturers, Distributors, Transporters

The chemical industry is providing with its Responsible Care Program [16,19] a framework for good safety practices. By managing products through all stages of their life cycle including customer use and disposal, the program intends to improve the safety for health and the environment. The Program also provides a framework for manufacturers, distributors and transporters in their efforts for an improved safety of the transport of dangerous goods. As first experiences with the Responsible Care Program show, customer-controlled transportation is a serious challenge. As far as manufacturer-controlled transportation is concerned, the chemical industry can influence safe transport by awarding contracts to distributors and transporters among other things also on the basis of their safety performance. As mentioned previously, a reduction of the chemical hazard potential during transport of dangerous goods could also be achieved by producing less hazardous substances for transportation.

3.3.3 Public Authorities

The roles and responsibilities of the public authorities are not basically different for transport interfaces than for fixed installations. There are however some particular points to be considered. If several public authorities are involved for example as owner and as competent controlling authority, particular attention should be given to a clear definition of the respective responsibilities. For transport interfaces where major accidents could happen, attention should be given to a setting of clear priorities for control and enforcement. Because transport inter-

faces border on (public) transport routes, the public authorities should be particularly involved in the preparation of on- and off-site emergency preparedness plans and the information of the public.

3.3.4 Public Information, Community Awareness

Public information and community awareness are not basically different for transport interfaces than for fixed installations. Compared to fixed installations, it may be however more difficult to communicate to the public what the risks accociated with a given transport interface are, because the assessment of the risks is more difficult. Furthermore, these risks do not only exist at the transport interfaces, but also on the transport routes leading into the interfaces. Finally, the local community around an interface (e.g. railroad marshalling yard, airport) may not be involved to the same extent economically in the operation of the interface as this may be the case around a fixed installation, which may affect the perception of the risk.

The public in the vicinity of a transport interface - having the potential of causing major accidents - should be informed in an appropriate manner about the activities at the interface.

3.4 Safety Measures at Interfaces

3.4.1 Organisational Aspects

The addditional Guiding Principles should pay particular attention to the organisational aspects of chemical accident prevention, preparedness and response, because organisational safety measures are likely to be very cost-effective.

Organisational Rules for Interface Operation:

- **The owners should establish clear rules as to who has access to and controls which operations on the site.** This is particularly important because of the many operations done by different operators and because the work force may fluctuate depending on the amount of cargo to be handled.

- The interface should provide clear prescriptions as to the technical operations at the interface, for example handling of containers (stacking), handling of loading/unloading pipeline systems.
- The owners should strive toward a well-trained stable worker force. This leads to an effective and safe operation of the interface.
- The workers'active participation should be a sought in the setting-up of the organisational safety measures.
- These rules should include that the interface operator be notified in advance of any particularly dangerous cargo intended for transit, handling or temporary holding at the interface.

Inventory of Dangerous Goods at Site:

- **Records should be kept at least of the quantities and the classification of the dangerous goods arriving at transport interfaces which could cause major accidents because a substantial amount of dangerous goods is being handled.** This information is readily obtainable from the transport documents and should be used to provide a continuously up-dated inventory of the goods in the temporary keeping area(15).

Monitoring and Servicing of Equipment:

- **The owners should ensure that all the on-site equipment used to load/unload and handled dangerous goods is appropriately serviced and controlled.** This may be particularly important because the equipment may belong to different subcontractors.
- The owners should require from the operators on the site to deliver at regular intervals reports confirming that they are complying with all requirements regarding the monitoring and servicing of such equipment.

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(15) More advanced systems such as electronically based dangerous goods control systems could be used at interfaces with major hazard potentials. In addition to the above information, they record - as far as available - UN-Number, chemical name, CAS-Number, names of company of origin and customer as well as more detailed information on the dangerous properties (Safety-Codes) of the dangerous goods. Such systems could be integrated into larger information and control systems providing information on segregation requirements in storage areas and emergency response.

- The owners should also make sure that the transporters' equipment to transport dangerous goods complies with safety regulations. A report similar to the above, at least from the major transporters often using the interface could be envisaged.

Emergency Preparedness Plans:

- For transport interfaces where major chemical accidents may happen, a separate on-site and off-site emergency preparedness plan should be produced in addition to the safety report.
- The owners should take the lead in preparing the on-site emergency preparedness plan in conjunction with the emergency services (private and/or public). Such plans should be kept up to date.
- The establishment of off-site emergeny plans should be initiated by the public authorities, and prepared in conjunction with the owners of transport interfaces.
- The different stakeholders (owners, subcontractors, transporters, public authorities) should take part in exercices carried out periodically with the emergency services on the basis of these plans.
- Both the details of such plans and the frequency of such exercises should depend on the importance of the interface.

Reporting of accidents:

- The owners should record chemical accidents (incl. near-misses) so that this information can be reviewed and lessons learnt from it.

3.4.2 Technical Aspects

Siting:

- The siting of a new transport interface should take into consideration the necessary safety distances to the public outside the transport interface and provide for an easy access, from several directions, for the emergency services.

Technical Measures at Interface:

- The equipment used should be compatible with the current technical development. This is of particular concerns with regard to cranes (improved stability for loading/unloading

operations) and other equipment such as pumps, flexible hoses, pipelines, etc., because the greatest hazards to transport interfaces arise from the loading/unloading operation.

Safe area:

- There should be the possibility at the interface to handle substandard equipment on the transport units (ships, railroad cars, trucks, etc.).
- To handle the cases of leaking containers, trucks, railroad cars, etc. as well as the case of fires fire at the transport interface, the owners should have an area, easily accessible from all parts of the interface, where damaged vehicles, containers or packages can be safely deposited. These areas have to be equipped with facilities for fire-fighting and for the retention of water-pollutant liquids [17].

3.5 Communication, Training and Education

Communication:

- **The interface owners and the public authorities should have the joint responsibility that rules for communication are defined.** This is particularly important in emergency cases, when one common language should be used. An efficient communication at an interface cannot be resolved by one stakeholder alone.
- Particular attention should be given to the training of an effective communication under abnormal conditions with people using different languages.

Training and Education:

- **Training and education of the workforce at the interface is of great importance for chemical safety, because of the great number of rules and regulations pertaining to the transport of dangerous goods.**
- The workers at interfaces should get part of their training with workers from the other stakeholders (especially transporters).
- Training and education should include information on the classification of dangerous goods, errors likely to be made and defects to be found on transport vehicles and equipment.

- Training should be periodically supplemented with retraining as deemed appropriate. A system according to which new workers are "adopted" by one or more experienced workers to follow up on the training for the first months may be useful.
- Through education workers should become more aware of the chemical safety aspects at an interface. The role of labour organisations is particularly important in this respect as they can effectively contribute to improving the awareness of the workers regarding chemical safety.

APPENDIX A : REFERENCES

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[19] Ainsworth, Susan J.: "Chemical Transportation & Distribution", Chemical & Engineering News, Vol. 71, No. 10, pp. 8-28, 8 March 1993, Washington D.C.

APPENDIX B : GLOSSARY

Accident: Any unplanned, sudden event which causes or is liable to cause injury to people or damage to buildings, plant, material or the environment.

Dangerous Goods: Substances or articles which are posing a significant risk to health, safety and property when being transported and which are classified as dangerous goods in the corresponding listings of the international agreements on the transport of dangerous goods by sea, inland waterways, rail, road and air.

Emergency Preparedness Plan: A formal written plan which, on the basis of identified potential accidents together with their consequences, describes how such accidents and their consequences should be handled either on-site or off-side.

Employee: A person who is under a contract of employment with an enterprise, including management.

Hazardous Installation: A fixed industrial plant/site at which hazardous substances are produced, processed, handled, stored, used or disposed of in such a form and quantity that there is a risk of a major accident involving hazardous substance(s) which could cause serious harm to human health or damage to the environment, including property.

Hazardous Substance: An element, compound, mixture or preparation which, by virtue of its chemical, physical or (eco)toxicological properties, constitutes a hazard.

Major Accident: Any unplanned, sudden event which causes or is liable to cause serious injury to people or damage to buildings, plant, material or the environment.

Land-use Planning: Consists of various procedures to achieve both general zoning/physical planning as well as case-by-case decisionmaking concerning the siting of an installation or of other developments.

Likelihood: The probability that a considered occurrence will take place.

Management: Employees at, or owners of, a hazardous installation who have the responsibility and authority to take decisions concerning the operation of an installation, including decisions relevant to safety and, where appropriate, employees at a corporate level in the enterprise having such authority.

Near-miss: Any unplanned, sudden event which, but for the mitigation effects of safety systems or procedures, could have caused serious injury to people or serious damage to buildings, plant, material or the environment or could have involved a loss of containment possibly giving rise to significant adverse effects.

Public Authorities: Government bodies at national, regional, local and international level with the authority to issue licenses, regulations, standards or other instructions having the force of law.

Reasonably Practicable: All which is possible subject to the qualification that the costs of the measures involved are not grossly disproportionate to the value of the benefits obtained from these measures.

Risk: The combination of a consequence and the probability of its occurrence.

Risk Assessment: The value judgment of the significance of the risk, identified by a risk analysis taking into account any relevant criteria.

Risk Management: Actions taken to achieve or improve the safety of an installation and its operation.

Safety: A situation without unacceptable risks. For purposes of this text, "safety" embraces health, safety and environmental protection, including protection of property.

Safety Report: The written presentation of the technical, management and operational information concerning the hazards of a hazardous installation and their control in support of a justification for the safety of the installation.

Transport Interface: Loading and unloading areas where hazardous substances are being transferred from one transport mode to an other, transferred from one vehicule (equipment) to an other within one transport mode or temporarily stored during the course of transportation.

APPENDIX C : ACRONYMS

ADN: Accord européen relatif au transport international des marchandises dangereuses par voie de navigation intérieure

ADNR: Règlement relatif au transport de marchandises dangereuses sur le Rhin

ADR: Accord européen relatif au transport international des marchandises dangereuses par route

CCR: Central Commission for the Navigation on the River Rhine

CEC: Commission of the European Communities

CEFIC: Conseil européen des federations de l'industrie chimique

FOEFL: (Swiss) Federal Office of Environment, Forests and Landscape

IAEA: International Atomic Energy Agency

IATA: International Air Transport Association

ICAO: International Civil Aviation Organisation

IKSR: International Commission on the Protection of the River Rhine

ILO: International Labour Office

IMDG-Code: International Maritime Dangerous Goods-Code

IMO: International Maritime Organisation

OCTI: Office central des transports internationaux ferroviaires

OECD: Organisation for Economic Co-operation and Development

QRA: Quantitative Risk Assessment

RID: Règlement concernant le transport international ferroviaire des marchandises dangereuses

TI: Technical Instructions for the Safe Transport of Dangerous Goods by Air

UN/ECE: United Nations Economic Commission for Europe

UN/ECOSOC: United Nations Economic and Social Council

UNEP: United Nations Environment Programme

US/DOT: United States Department of Transportation