

GENERAL DISTRIBUTION

OCDE/GD(94)55

<p>Cancels & replaces the same document sent to OLIS on 09-Jun-1994</p>
--

OECD ENVIRONMENT MONOGRAPHS NO. 93

REPORT OF THE OECD WORKSHOP ON CHEMICAL SAFETY IN PORT AREAS

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1994

COMPLETE DOCUMENT AVAILABLE ON OLIS IN ITS ORIGINAL FORMAT

OECD
ENVIRONMENT
MONOGRAPHS

No. 93

REPORT OF THE OECD WORKSHOP ON CHEMICAL SAFETY IN PORT AREAS

Environment Directorate

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1994

ENVIRONMENT MONOGRAPHS

The OECD Environment Monograph series is designed to make selected technical reports prepared by the OECD Environment Directorate available to a wide readership. The Joint Meeting of the Chemicals Group and Management Committee recommended that this report be derestricted. It has been made public under the authority of the Secretary-General. Copies of Environment Monographs can be obtained upon request, on a limited basis, from the Environment Directorate, Environmental Health and Safety Division, 2 rue André-Pascal, 75775 Paris Cedex 16.

Table of Contents

	page
Introduction	9
Introduction	11
Workshop Conclusions	15
Conclusions de l'Atelier	29
Discussion Document: Chemical Safety in Ports G.C. de Jong and H.B. Hanekamp	45
Background Document: The Port Legal Environment J.L. Alexander	75
Heads of Delegations to the OECD Expert Group on Chemical Accidents	81

Introduction

This Environment Monograph contains documents from the Workshop on Chemical Safety in Port Areas, co-sponsored by the Organisation for Economic Co-operation and Development (OECD), the International Maritime Organization (IMO), and the United Nations Environment Programme (UNEP). The Workshop, hosted by the government of Finland, was held in Naantali, Finland, on 18-21 October 1993.

The Naantali Workshop was one of a series of activities planned by the OECD Expert Group on Chemical Accidents related to the transport of hazardous goods, with a view to developing guiding principles concerning accident prevention, preparedness and response at the interface of various transport modes. These guiding principles will complement the existing OECD Guiding Principles,¹ which focus on fixed installations.

Included in this Environment Monograph are the conclusions of the Workshop, i.e. those points raised during discussions for which there was a general consensus among the Workshop participants. Also included are two documents prepared for the Workshop: the Discussion Document, drafted by G.C. de Jong and H.B. Hanekamp of the Port of Rotterdam, and the Background Document on "The Port Legal Environment", drafted by J.L. Alexander of the Health and Safety Executive of the United Kingdom. Both of these documents were revised to take into account comments made at the Workshop.

It should be kept in mind that the documents in this Environment Monograph have not been endorsed by, and do not necessarily reflect the views of, the OECD or its Member countries.

OECD work on chemical accidents

This is one of a series of Environment Monographs that have been published as part of the OECD Environment Programme's work on improving chemical accident prevention, preparedness and response.

OECD work related to chemical accident prevention, preparedness and response began in 1988, following a call by Ministers and other high-level officials at the OECD Conference on Accidents Involving Hazardous Substances. A group – now called the Expert Group on Chemical Accidents – was established to supervise this work. The Expert Group includes national experts and representatives of relevant international organisations. Representatives of industry, labour organisations and other interested groups take part in its work.

¹ See Environment Monograph No. 51, *Guiding Principles for Chemical Accident Prevention, Preparedness and Response: Guidance for Public Authorities, Industry, Labour and Others for the Establishment of Programmes and Policies related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances*, published in 1992.

The objectives of the OECD's Chemical Accidents Programme include: the exchange of information and experience; the analysis of specific issues of mutual concern in Member countries; and the development of guidance materials related to chemical accident prevention, preparedness and response. As a contribution to meeting these objectives, six other Workshops have been held since 1989.²

Each of the Workshops provided an opportunity for exchange of information and experience among the participants, who included representatives of public authorities, industry, labour, public interest groups, academia, and other international organisations, including experts from non-OECD countries. In addition, the output from the Workshops has been used as a basis for the development of guidance documents and, in particular, the 1992 OECD *Guiding Principles for Chemical Accident Prevention, Preparedness and Response*. Supplementary guiding principles will be prepared taking into account the outcome of the 1993 Workshops.

The Expert Group on Chemical Accidents decided to publish this Monograph in order that the Workshop documents could be circulated widely. The Expert Group would welcome feedback on these documents from as many interested parties as possible. Comments received will be taken into account in the development of guidance materials, in order that they can be as practical and up-to-date as possible.

Anyone wishing to comment on the documents contained in this publication should directly contact their country's representative to the OECD Expert Group on Chemical Accidents. A list of Heads of Delegations to the Expert Group will be found at the end of this Monograph. Those persons who come from a country which is not included in that list are requested to send their comments to:

**OECD Environment Directorate
Environmental Health and Safety Division
2, rue André-Pascal
75775 Paris Cedex 16
FRANCE**

FAX: (33-1) 45.24.16.75

² See Environment Monograph No. 28, *Workshop on Prevention of Accidents Involving Hazardous Substances: Good Management Practice*, hosted by the Federal Republic of Germany (held in Berlin, 1989); Environment Monograph No. 29, *Workshop on the Provision of Information to the Public and on the Role of Workers in Accident Prevention and Response*, hosted by Sweden (held in Stockholm, 1989); Environment Monograph No. 30, *Workshop on the Role of Public Authorities in Preventing Major Accidents and in Major Accident Land Use Planning*, hosted by the United Kingdom and the Netherlands, supported by the Commission of the European Communities (held in London, 1990); Environment Monograph No. 31, *Workshop on Emergency Preparedness and Response and on Research in Accident Prevention, Preparedness and Response*, hosted by the United States and Canada, co-sponsored by the United Nations Environment Programme (held in Boston, 1990); Environment Monograph No. 44, *Workshop on Prevention of Accidents Involving Hazardous Substances: The Role of the Human Factor in Plant Operations*, hosted by Japan (held in Tokyo, 1991); and Environment Monograph No. 66, *Report of the OECD Workshop on Strategies for Transporting Dangerous Goods by Road: Safety and Environmental Protection*, hosted by Sweden, sponsored by the OECD Road Transport Research Programme in co-operation with the Expert Group on Chemical Accidents (held in Karlstad, Sweden, 1992).

Introduction

La présente Monographie sur l'environnement contient des documents provenant de l'atelier consacré à la sécurité chimique dans les zones portuaires, parrainé conjointement par l'Organisation de coopération et de développement économiques (OCDE), l'Organisation maritime internationale (OMI) et le Programme des Nations Unies pour l'environnement (PNUE). Cette réunion, accueillie par les autorités finlandaises, s'est déroulée à Naantali, Finlande, du 18 au 21 octobre 1993.

Cet atelier s'insère dans une série d'activités organisées par le Groupe d'experts de l'OCDE sur les accidents chimiques associés au transport de marchandises dangereuses, visant à la mise au point de principes directeurs relatifs à la prévention, la préparation et l'intervention en matière d'accidents intervenant à l'interface de divers modes de transport. Ces principes directeurs viennent compléter ceux que l'OCDE a déjà mis au point pour les installations fixes³.

La présente Monographie sur l'environnement contient les conclusions de l'atelier, c'est-à-dire les questions débattues au cours de la réunion sur lesquelles les participants étaient généralement du même avis. Elle renferme également deux documents établis pour l'atelier : un document de synthèse, rédigé par G.C. de Jong et H.B. Hanekamp du port de Rotterdam, et un document de référence traitant du contexte juridique portuaire, rédigé par J.L. Alexander du Health and Safety Executive du Royaume-Uni. Ces deux documents ont été révisés pour prendre en compte les commentaires formulés lors de l'atelier.

Il convient de garder à l'esprit que les documents présentés dans la présente Monographie sur l'environnement n'ont pas été approuvés par l'OCDE ou par ses pays Membres, dont ils ne reflètent pas nécessairement le point de vue.

Travaux de l'OCDE sur les accidents chimiques

La présente publication fait partie d'une série de Monographies sur l'environnement qui ont été publiées dans le cadre du Programme des travaux de l'OCDE sur l'environnement qui visent, entre autres, à améliorer la prévention, la préparation et l'intervention en matière d'accidents chimiques.

Les travaux de l'OCDE relatifs à la prévention, la préparation et l'intervention en cas d'accident chimique ont débuté en 1988, à la suite d'un appel lancé par les ministres et autres représentants de haut niveau lors de la Conférence de l'OCDE sur les accidents liés aux

³ Voir Monographie sur l'environnement n° 51, *Accidents chimiques, principes directeurs pour la prévention, la préparation et l'intervention : Orientations à l'intention des pouvoirs publics, de l'industrie, des travailleurs et d'autres parties intéressées à l'élaboration de programmes et de politiques relatifs à la prévention, la préparation et l'intervention en matière d'accidents associés à des substances dangereuses*, 1992.

substances dangereuses. Pour superviser ces travaux, il a été créé un groupe – appelé maintenant Groupe d'experts sur les accidents chimiques – qui réunit des experts nationaux et des représentants d'organismes internationaux compétents en la matière. Des représentants de l'industrie, du monde du travail et autres groupes concernés, participent également aux travaux du Groupe d'experts.

Le Programme sur les accidents chimiques vise notamment à : faciliter l'échange d'informations et d'expérience, analyser des problèmes spécifiques d'intérêt commun dans les pays Membres et à mettre au point des éléments d'orientation, s'agissant de la prévention, de la préparation et de l'intervention en matière d'accident chimique. Dans le cadre des efforts visant à remplir ces objectifs, six autres ateliers ont été organisés depuis 1989⁴.

Tous ces ateliers ont fourni aux participants, qui comprenaient des représentants des pouvoirs publics, de l'industrie, du monde du travail, de groupes d'intérêt public, de l'université et d'autres organisations internationales, ainsi que des experts de pays non membres de l'OCDE, l'occasion d'échanger informations et expériences. En outre, les résultats acquis lors de ces ateliers ont servi de base pour la mise au point de documents d'orientation, et notamment du document établi par l'OCDE en 1992, intitulé *Accidents chimiques : Principes directeurs pour la prévention, la préparation et l'intervention*. Des principes directeurs complémentaires seront établis à la lumière des conclusions des ateliers tenus en 1993.

Le Groupe d'experts sur les accidents chimiques a décidé de publier la présente Monographie afin d'assurer une large diffusion aux documents de l'atelier. Le Groupe d'experts souhaiterait connaître les réactions à ces documents du plus grand nombre possible de parties intéressées. Les commentaires qu'il recevra seront pris en compte pour la mise au point de documents d'orientation aussi pratiques et à jour que possible.

⁴ Voir Monographie sur l'environnement n° 28, *Atelier sur la prévention des accidents liés aux substances dangereuses – Bonnes pratiques de gestion*, accueilli par la République fédérale d'Allemagne (Berlin, 1989) ; Monographie sur l'environnement n° 29, *Atelier sur la communication d'informations au public et le rôle des travailleurs dans la prévention des accidents et l'intervention*, accueilli par la Suède (Stockholm, 1989) ; Monographie sur l'environnement n° 30, *Atelier sur le rôle des pouvoirs publics dans la prévention des accidents graves et dans l'aménagement du territoire en fonction des risques d'accidents graves*, accueilli par le Royaume-Uni et les Pays-Bas, avec l'aide de la Commission des Communautés européennes (Londres, 1990) ; Monographie sur l'environnement n° 31, *Atelier sur la préparation et l'intervention en cas d'urgence ainsi que sur la recherche dans les domaines de la prévention des accidents, la préparation et l'intervention en cas d'urgence*, accueilli par les Etats-Unis et le Canada, co-parrainé par le Programme des Nations Unies pour l'environnement (Boston, 1990) ; Monographie sur l'environnement n° 44, *Workshop on the Prevention of Accidents Involving Hazardous Substances – The Role of the Human Factor in Plant Operations* (anglais seulement), accueilli par le Japon (Tokyo, 1991), et Monographie sur l'environnement n° 66, *Report of the OECD Workshop on Strategies for Transporting Dangerous Goods by Road: Safety and Environmental Protection*, accueilli par la Suède, parrainé par le Programme de l'OCDE de coopération dans le domaine des recherches en matière de routes et de transports routiers, en coopération avec le Groupe d'experts sur les accidents chimiques (Karlstad, Suède, 1992).

Toute personne désireuse de formuler des observations à propos des documents figurant dans la présente publication devra contacter directement le représentant de son pays auprès du Groupe d'experts de l'OCDE sur les accidents chimiques. On trouvera la liste des chefs de délégation auprès du Groupe d'experts à la fin de la présente Monographie. Les personnes dont le pays ne figure pas sur la liste des chefs de délégation sont invitées à adresser leurs commentaires à :

**Direction de l'environnement de l'OCDE
Division de l'hygiène et de la sécurité de l'environnement
2, rue André-Pascal
75775 Paris Cedex 16
FRANCE**

FAX : (33-1) 45.24.16.75

Workshop Conclusions

Presented below are the Conclusions from the Workshop on Chemical Safety in Port Areas held in Naantali, Finland, on 18-21 October 1993.

I. Preamble:

- (a) In reviewing these conclusions, it should be recognized that they focus on those aspects of chemical safety in ports which are unique relative to fixed installations. Recognizing that most of the existing OECD *Guiding Principles for Chemical Accident Prevention, Preparedness and Response* apply equally to ports and hazardous installations and that ports should achieve the same level of safety as these installations, Workshop discussions which are consistent with provisions of the Guiding Principles have generally not been reflected in this text. Thus, the focus of these conclusions is on the issues/ concerns in ports which would suggest the need for supplementary provisions to the Guiding Principles. To assist in review, these conclusions have been organised under the same subheadings as the Guiding Principles.
- (b) These conclusions have been drafted with the recognition that ports in different countries are subject to differing legal structures and cultures. For example, a port authority may be a public authority, private entity or some combination of the two. Another example is that some public authorities differ in their regulatory determinations on, for example, whether cargo is considered to be in transit or in storage. Thus, the conclusions should be read with the understanding that there is the need for flexibility in their application.
- (c) From the perspective of port safety, the differences in types of port management may impact the allocation of roles and responsibilities among stakeholders. For this purpose, it is useful to classify ports in the following three categories: service ports, tool ports or landlord ports.⁵
- (d) Many of the conclusions note actions which should be taken for the safe operation of a port without indicating which party should be responsible for that action. This was done in the recognition that the allocation of responsibilities will differ among countries and, in some cases, even within a country. In any case, the assignment of responsibility should be clearly defined in each country.

⁵ Definitions of these types of ports, as well as of other terms used in the Workshop Conclusions, are set out in the "Definitions for Purposes of the Conclusions" on page 27.

- (e) Another underlying concept is that the safe operation of ports in the international context may benefit from some degree of commonality. This could include common criteria/guidelines for various aspects of port development and operation including, for example, port design and layout, risk assessment, operational procedures/limits and quantity limitations, storage, compatibility, separation and segregation, marking, labelling and placarding, information, advance notification, reporting, documentation and training.
- (f) Due to the complexities of the operations of the port, the numerous actors involved and the differences among countries, the word "port" as used in these conclusions should be understood to encompass both a geographic region and the variety of functions connected with the transfer of goods and the variety of different functions involving the nautical, cargo transfer and inland processes and their interaction among the stakeholders.
- (g) The factors that differentiate ports from fixed installations include:
- In ports different modes of transport (one of which is always marine) meet. Each mode may be subject to various legislative and regulatory requirements, safety practices and supervisory bodies. While the meeting of two modes is referred to as the "interface," it in fact reflects both overlapping jurisdictions/standards as well as the potential for gaps in jurisdictions/standards;
 - The international nature of ports, with operators, ships and cargoes from different countries;
 - Due to historical developments, ports tend to be located near large and densely populated areas, and sensitive environments and waterfront locations attract housing and other developments;
 - Continually changing amounts and types of hazardous substances in ports, including bulk and packaged hazardous substances in transport or in storage;
 - The fact that the packaging, labelling, and documentation of hazardous substances as well as the packing and placarding/marketing of cargo transport units containing such substances are likely done by a party who is remote from the port;
 - The continuous handling operations in ports;
 - The greater likelihood of periodic use of casual labour in ports;
 - The large differences in the levels of technological development among ports;
 - The variety of employers in ports, with differing management structures and attitudes toward safety.

- (h) Ports are a strategic economic asset; any action which reduces the competitive position of the port can have far-reaching economic impacts. Harmonized approaches to safety create a "level playing field," eliminating low prices at the cost of safety as a basis for competitiveness.
- (i) It should be kept in mind that there are a variety of concerns related to the maintenance of safety in ports. For example:
- There is substantive evidence of noncompliance with established safety standards and regulations, especially with respect to cargo transport units carrying hazardous substances coming from the various transport modes;
 - There are different levels of safety standards among ports, which in many cases do not meet (internationally) acceptable levels; and
 - The various means of transport (trains, ships, trucks and pipelines) too frequently do not meet minimum safety standards for their construction, maintenance and operation.

II. Conclusions

1. The primary objective of port emergency prevention, preparedness and response activities should be to minimize the risks to people, environment and property from hazardous substances, with a continuous effort towards the improvement of safety.
2. To achieve this objective, there is a need for co-ordination and consistency of safety policies among the various parties in the port.
3. Safety is an essential and necessary element of the economic activity of a port. Safety should be an integrated part of the management of a port, rather than an "add-on".
4. In setting policies and operating practices, industries and public authorities should distinguish between hazardous substances carried in bulk (solids, liquids and gases) and those carried in packaged form. For example, the shipment and trans-shipment of bulk and packaged hazardous substances should be kept separate, physically or in time, to the extent possible.

Prevention of Accidents⁶

5. Given the number of parties involved in the operation of a port (some located far removed from the port geographic area), key accident prevention activities include: the identification of all stakeholders; definition of their roles, authorities and responsibilities; and the establishment of a communications mechanism. All stakeholders have a responsibility to accurately classify the cargoes under their care and ensure that proper documentation is passed to the next step in the transport chain. This responsibility is of particular concern for the transport of packaged hazardous substances.
- A typical list of stakeholders includes:
 - public authorities at all levels (e.g. authorities exercising port state control, regulatory authorities, and emergency response organisations);
 - representatives of ships using the port (e.g. owners/operators, ships' agents);
 - representatives of land-based modes of transport (rail, road, and pipeline owners/operators);
 - other shore-based interests (e.g. dock workers and their representatives, stevedores, trade unions, port authorities, berth operators and other employers, clean-up companies and external community/public);
 - cargo interests (e.g. cargo manufacturers or owners, shippers, forwarders, consolidators and packers);
 - other shipping interests (those not involved in the transport of hazardous substances including, for example, ferry operators);
 - international organisations (both intergovernmental and industry).
 - The variations among the national legal frameworks will create variations in the allocation of roles and responsibilities among the stakeholders. Nevertheless, some broadly defined roles of a few key stakeholders can be described.
 - Chemical industry (cargo manufacturers). The industry should take a lead role in tracking a chemical through its life cycle from manufacture through transport and use to disposal, and assist all parties in identifying safe procedures. This is consistent with the established programmes of Responsible Care and product stewardship.
 - Flag state. For ships registered in its state, the flag state is responsible for ensuring the implementation of any international convention to which it is a party. This implementation is accomplished through the translation of these conventions

⁶ Note: These subtitles are taken from the OECD *Guiding Principles for Chemical Accident Prevention, Preparedness and Response*. They have been used to give some indication of where the conclusions might fit within these existing Guiding Principles.

into national law, and regulation and development of appropriate compliance mechanisms. Through a national maritime administration, the flag state carries out its responsibility to ensure the safe construction, manning, equipping, and operation of a ship.

- Port state. The port state is responsible for inspecting visiting ships and other modes of transport to see that they meet the requirements laid down in national law and international conventions, and is responsible for providing for the safe operation of all modes of transport in its ports.
- Employers. Employers have an obligation to provide their employees with the necessary training to perform their routine and emergency activities in a safe manner. Employers are also required to ensure that proper procedures are established, and that equipment is appropriate to the task and well maintained.
- Port authorities. Port authorities are generally responsible for the day-to-day operations of the port. However, the specific responsibilities of a port authority will differ considerably among countries, and will depend on the type of port which it operates (i.e. service, tool or landlord port).

Establishment of Safety Objectives and a Control Framework by Public Authorities

6. In light of the various national and local requirements applicable to ports, monitored and enforced by different authorities, it is critical that these authorities strive for compatibility and co-ordination of their requirements, as well as among their monitoring and enforcement activities.
7. In light of the dynamic and complex nature of the legal/regulatory regimes applicable in a port, these regimes need to be continuously reviewed, and updated when appropriate. It should be recognized that the regimes provide a minimum standard for safe operations which can, and should, be improved upon, consistent with "good practice" or even "best standard".
8. Public authorities at all levels should make every effort to prevent conflicts with established international guidance and standards. Nothing precludes public authorities from establishing standards which are more stringent than those established by international organisations.
9. There is the need for further efforts toward the harmonization of international requirements for different modes of transport. The Recommendations of the United Nations Committee of Experts on Transport of Dangerous Goods is the basis for such harmonization. The International Maritime Dangerous Goods Code, which amplifies the requirements of Chapter VII of the International Convention for the Safety of Life at Sea (SOLAS), has already achieved a high degree of consistency with these

Recommendations and work should be undertaken to ensure that consistency with the Recommendations is achieved for requirements relative to other modes of transport.

10. The IMO Recommendations on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas, together with the OECD Guiding Principles, should be used as a basis for establishing a common framework for relevant legislation and regulations and for describing the roles and responsibilities of the stakeholders.
11. Public authorities should support international efforts to establish reasonable levels of mandatory insurance. An international convention establishing uniform rules for determining liability and providing for adequate compensation to victims of chemical spills from ships is needed. The IMO is encouraged to continue to seek the development of such a convention.

Establishment of a Safety Policy by Industry

12. Shippers, port authorities, insurance companies and others should establish financial or other incentives to improve safety. Such incentives could include: lower insurance premiums and reduced fees for safe performance and/or safety features; awards (e.g. the "Green Award" for ships); and increased premiums and fees for substandard performance and/or equipment. It is reasonable to expect shippers to avoid using carriers with marginal or substandard performance or equipment and to pay higher rates to compensate for safety features and higher standards of operation. It is also reasonable to expect shippers and carriers to carry sufficient insurance to cover their potential liabilities in the event of an accident involving hazardous substances.
13. Due to the variety and number of entities managing and handling hazardous substances in ports, the establishment of a general safety culture is particularly difficult. Therefore, special efforts are needed to develop and practice a common port safety culture.

Planning and Construction

14. In planning for new and expanded port facilities, designers of ports should consider: proper access by all modes of transport; surge capacity; access for emergency response; the need for buffer zones to separate hazardous substances from the general population; segregation of commodities; the possible need for emergency storage of damaged cargoes; survivability of essential services in an emergency; support of emergency response activities (e.g. access for responders, staging areas); means for environmental protection in the event of an accident; and facilities for drainage and for collection of contaminated runoff.

Operations

15. The port authority, or other appropriate organisation, should establish operational procedures for, e.g.: safe handling, keeping and storage of cargo; traffic management; services; dock labour; security; emergency services; berths; and health/personal protective measures.
16. The port authority, or another appropriate organisation, should ensure that up-to-date information concerning port procedures is available to users of the port in a language which can be understood. For example, information should be available to ships and ships' agents, in advance of arrival, on relevant procedures including those related to vessel traffic management, anchorage, berth mooring, restricted commodities, documentation, contact points for the reporting of emergencies, and other aspects which may effect safety. Checklists and special arrangements needed for cargo transfer, such as vapour emission control, should be highlighted within this information package.
17. There appears to be a trend towards increased use of subcontractors and the use of "spin-off" companies in the transport of hazardous substances. The potential adverse effects of such practices, as they may lead to reduced expertise, knowledge and resources, should be recognized and properly addressed. For example, the chemical industry can play a role in assessing the quality of such companies before engaging them.
18. Education and training are fundamental to enhancing safety in ports. Therefore, such education and training should be:
 - seen as an investment, not a cost;
 - broad-based, covering all aspects of the safe operation of the port, including emergency preparedness and response needs;
 - delivered at the appropriate level of sophistication of the audience;
 - continuous and, in particular, be provided when entering a work environment, at the change of jobs, when there is the use of new materials or new methods, and when new hazards are identified;
 - given to employees at all levels. In this regard, it is particularly important for managers to be trained with respect to hazardous substances handling so they can understand the issues involved as well as train and properly supervise staff;
 - function-specific, taking into account applicable international guidelines, e.g. the UN Recommendations on the Transport of Dangerous Goods (eighth revised edition, 1993), chapter on "Training of Dangerous Goods Workers".

19. In light of the fact that the work pace in ports can be episodic, with surges resulting in use of lesser skilled work force, extra efforts are needed to ensure that any casual labourers are given the appropriate training and are well supervised in their tasks.
20. In establishing a training programme, core/priority groups for training should be identified as a starting point. To facilitate the training process, emphasis should be on "training the trainers".
21. A common set of internationally acceptable parameters should be developed for the safe operation of ships entering and manoeuvring in ports. These should be applied to the particular circumstances of individual ports. Any port-specific limitations for transit or cargo operations, such as wind speed limits or pilotage and tug requirements, should be communicated to all relevant carriers.
22. By reducing the total quantity of hazardous substances kept in the port, minimizing unnecessary administrative delays in the movement of such substances will result in a reduction of accident risk. Therefore, procedures should be established to facilitate the movement of cargo through a port. In this regard, customs and other formalities should be streamlined, consistent with legitimate monitoring needs.
23. There should be an international standard established for the mandatory reporting of ship deficiencies affecting accident potential. Procedures for the dissemination of these reports to port authorities should be established.
24. The use of safety committees with worker elected representatives, as described in the Guiding Principles, is applicable in ports, recognizing the need to take account of the special issues in ports such as the large numbers of employers. In this regard, means should be established for the implementation of recommendations of the safety committees.

Safety Performance Review and Evaluation

25. The extensive discussion of risk assessment in the Guiding Principles applies in ports. It is useful to recognize that risk assessment should be done on a routine basis as well as when proposed developments may affect the level of risk. Risk assessment can, *inter alia*, help identify port-specific risks and procedures to address them and help determine the efficacy of established procedures, practices and requirements. It can also be used for the development of appropriate emergency plans. However, risk assessment should not be used as a justification for limiting compliance with established safety procedures, industry standard practices or national/international safety requirements. The type and sophistication level should depend on the use to be made of the risk assessment, as well as the size and complexity of the situation.

26. In light of the extensive problems with compliance, there should be an increased effort to improve safety through the more complete implementation of national laws, regulations and policies as well as international conventions, codes and guidelines. For this to be successful, there should be a strong commitment to monitoring for compliance coupled with vigorous enforcement.
27. An international reporting system of the results of port state control monitoring functions should be established to provide information to port authorities concerning the safety status of ships and other related safety information. This will allow for more efficient use of inspection resources, by allowing authorities to target resources where most needed and avoiding unnecessary surveys.

Land Use Planning

28. Safety should be a key consideration in the development of land use planning policies and their application. The design of ports is an important matter for land use planning and therefore this planning should deal with, e.g.: infrastructure, buildings, land and water resources needed for different port activities; and location of hazardous substances. In this regard, safety requires consideration of not only protecting the public from the activities of the port but also protecting the port from increased risk posed by people/organisations from outside the normal port functions.
29. Land use planners should establish policies for how population centres will be incorporated into, or separated from, the port (e.g. development projects).
30. The land use planning process should include provision for input by the various stakeholders.
31. Land use planning policy should take account of, *inter alia*,
 - visual impacts of port development;
 - strategic land use plans;
 - health and safety;
 - social and economic concerns;
 - flora and fauna;
 - surrounding land use;
 - soil and drainage;
 - transport and traffic;
 - community input;
 - air quality; and
 - cultural impact.

Community Awareness

32. There is a definite need to communicate with the public potentially affected in the event of an accident. A concerted effort should be made to inform the public as to the nature of port activities, including potential hazards, and actions to be taken in the event of an accident. Ports present a particular challenge in the identification of and communication with the potentially effected public, for example with respect to passengers using the port.
33. In addition to traditional information sources (e.g. brochures), alternative, creative means to reach the public should be explored including, for example, visits and use of the media.

Emergency Preparedness and Response

34. Recognizing that there is the likelihood of the existence of numerous emergency plans (including those for ships and various other stakeholders), efforts need to be made by the port authority, or other competent authority, to ensure that each of these plans work in harmony. This includes the various plans within the port as well as off-site plans at the local, area-wide and national levels. The port preparedness and response system should also work in harmony with the national system. The need for co-ordination among plans should be recognized and incorporated throughout the process of development, training, and exercising of these plans. There should be particular emphasis on role clarification and clear identification of who is in charge for the various types of possible incidents.
35. National authorities should take action to further mutual assistance arrangements among ports within their countries and at international level. International and regional arrangements, where they exist, should be included in the national and local planning processes. Governments are encouraged to ratify the relevant international conventions, e.g. the International Convention on Oil Pollution Preparedness, Response and Co-operation.
36. Special efforts should be made to inform ships' masters and crews about the nature and organisation of port emergency services.
37. The expansion of the use of APELL as a process in port and surrounding communities should be pursued and should be accomplished through a joint APELL/IMO activity, recognizing the need to identify the range of stakeholders which need to be involved. Port authorities are an appropriate point for initiating APELL activities.

38. Any response organization should be capable of dealing with: conduct of operations; establishing operational plans; provision of logistic support; finance; and public/media relations. It should also provide for the need for sufficiently trained and equipped response personnel, including access to environmental specialists.
39. With respect to the public/media relations, local and national/international media will potentially play different roles in communicating with the public and this should be recognized in planning and response. Communication of information during a response should be two-way: with means for information to be provided to, and from, local stakeholders.
40. Response plans should establish:
 - a mechanism for access to special technical advice;
 - a mechanism for dispute resolution, recognizing that a well organised plan will minimize disputes.
41. The planning process should include regular communication among parties who might be involved in future response activities.
42. Efforts should be made to conduct risk analyses by ship class and type, and to share this information among ports, with a view towards the development of standard procedures to deal with the risks for incorporation into port emergency plans. The international community is encouraged to collaborate in the conduct of these analyses and development of the procedures.
43. Those in charge of emergency response activities should be aware of the safety and health issues which affect responders. Once the pressure of immediate response has ended, action should be taken to limit unnecessary risks to those involved in the response operations.
44. A national emergency response system should include a co-ordinating body, with representatives of all relevant government agencies responsible for preparedness and response. Ports should participate in area-wide contingency planning and the port plan should be integrated into the national system through the area-wide planning process.
45. Emergency response plans relevant to ports should take into account the possibility of simultaneous incidents, as well as the need for sufficient response organisations.

Incident Reporting and Investigation

46. Frequent operational reports during response should be undertaken, as they represent a valuable tool to track events as they occur and to direct operations. These reports can be used as part of an historical record to: improve prevention, preparedness and response; review and improve legislation and procedures; and aid in financial accounting. Appropriate portions of these reports should be made widely available to interested parties, including the media and the potentially affected public.
47. Efforts should be undertaken to build an international system for collecting and disseminating data related to emergency response in ports. In developing such a system there is a need to understand the purposes for the collection of data and make it useful to those supplying the data. In this regard, the value to those who would report should be clear to help ensure continuing interest in, and support for, the system.
48. There is a need for improved reporting of accidents and significant near misses to enhance learning from experience. Investigations to identify the causes of an accident or incident are essential to the process of feedback for continuing improvement of prevention and response systems, recognizing that investigations could be undertaken in different ways. The relevant sections of reports from the investigations should be shared among the ports, ships, chemical industry, etc.

Bilateral and Multinational Technical and Financial Assistance

49. Assistance for developing countries needs to be a long-term commitment. Development of a safe, environmentally sound port is a step-by-step process. Since all aspects of port operations cannot be improved overnight, priorities must be established. In this regard, the process should be designed based on a risk assessment with due regard to the priorities of the developing country. In establishing such assistance programmes, issues of training are particularly important (see paragraphs 18-20).

Definitions for Purposes of the Conclusions

Cargo:

Hazardous substance is used to include all dangerous cargoes as defined by:

- (a) local, national or regional standards or regulations application for the different modes of transport;
- (b) the UN Recommendation on the Transport of Dangerous Goods (eighth revised edition, 1993);
- (c) the IMO Recommendation on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas.

The conclusions will identify where reference is being made to hazardous substances in either bulk or packaged form only, where appropriate.

Bulk means cargoes without any intermediate form of containment in a cargo space which is a structural part of a vehicle (via rail, road, or ship) or in a tank permanently fixed in or on such a vehicle. [Note: it should be recognized that this definition is not fully in line with common terminology for all modal regulations. For example, according to land mode regulation in Europe, the term "bulk" is used only for carriage of solid substances whereas the transport of liquid and gaseous cargo in road tank vehicles, rail wagons or tank containers is generally termed "tank transport".]

Ports:

Landlord port: In a landlord port, the port authority only develops, provides, operates and maintains the port infrastructure. The superstructure and labour are provided by private companies.

Service port: In a service port, the port authority develops, provides, operates and maintains the infra- and superstructure and also employs the port labour.

Tool port: In a tool port, the port authority develops, provides and operates both the infra- and superstructure, whereas the labour is provided by private companies.

Infrastructure: Includes port basins, quays, and port land areas. Information networks such as the use of telematic data communication could also be interpreted as being part of the infrastructure.

Superstructure: Includes cranes, sheds, cargo handling equipment, etc.

Port authority: Means any person or body of persons empowered to exercise effective control in a port area.

Conclusions de l'Atelier

On trouvera ci-après les conclusions de l'Atelier sur la sécurité chimique dans les zones portuaires, tenu à Naantali, Finlande, du 18 au 21 octobre 1993.

I. Préambule :

- (a) Il convient de reconnaître, lorsque l'on examine ces conclusions, qu'elles visent des aspects de la sécurité chimique dans les ports qui sont très particuliers par rapport aux installations fixes. Etant donné que la plupart des Principes directeurs actuels de l'OCDE relatifs à la prévention, la préparation et l'intervention en matière d'accidents chimiques s'appliquent aussi bien aux ports qu'aux installations dangereuses, et qu'il devrait régner dans les ports une sécurité de même niveau que dans les installations, le présent texte ne reprend pas, en général, les points de vue échangés lors de l'atelier qui concordent avec les principes directeurs. Les présentes conclusions portent donc sur des questions ou des problèmes inhérents aux ports, ce qui laisse à penser que les principes directeurs devraient s'accompagner de dispositions complémentaires. Pour faciliter l'examen, ces conclusions ont été présentées suivant les mêmes rubriques que les principes directeurs.
- (b) Ces conclusions ont été rédigées en tenant compte du fait que des ports situés dans des pays différents sont soumis à des structures et à des traditions juridiques différentes. Par exemple, une autorité portuaire peut être une autorité publique, une entité ou une quelconque combinaison des deux. Il se peut, par ailleurs, que certains pouvoirs publics recourent à des dispositions réglementaires différentes pour déterminer, par exemple, si une cargaison doit être considérée comme étant en transit ou en stockage. C'est pourquoi les présentes conclusions doivent donc être lues sans oublier qu'elles sont à appliquer avec une certaine souplesse.
- (c) Du point de vue de la sécurité portuaire, les différences dans les modes de gestion portuaire peuvent avoir des incidences sur la répartition des rôles et des responsabilités parmi les différentes parties prenantes. Il est utile, à cette fin, de répartir les ports selon trois catégories : «service ports», «tool ports» et «landlord ports»⁷.

⁷ Voir les «Définitions aux fins des conclusions», page 43.

- (d) Nombre de conclusions portent sur les dispositions qui doivent être prises pour qu'un port fonctionne en toute sécurité sans indiquer toutefois à qui incombe la responsabilité de ces dispositions. L'auteur a procédé ainsi pour tenir compte du fait que, d'un pays à l'autre et parfois à l'intérieur d'un même pays, les responsabilités seront différemment réparties. Dans tous les cas, les responsabilités attribuées doivent être clairement définies dans chaque pays.
- (e) Une autre notion sous-jacente est que le fonctionnement en toute sécurité des ports dans un contexte international gagnerait à s'appuyer sur un certain nombre de points communs. Il pourrait s'agir de critères ou principes directeurs communs relatifs aux divers aspects de l'organisation et du fonctionnement des ports comme, par exemple, la conception et l'agencement portuaires, l'évaluation des risques, les procédures ou les conditions limites de fonctionnement et les limitations quantitatives, le stockage, la compatibilité, la séparation et la ségrégation, le marquage, l'étiquetage et l'affichage, l'information, la notification préalable, la consignation, la documentation et la formation.
- (f) En raison de la complexité des opérations portuaires, des nombreux acteurs concernés et des différences d'un pays à l'autre, le terme «port» doit s'entendre, dans les présentes conclusions, comme englobant à la fois une zone géographique et les diverses fonctions associées au transport de marchandises, au transfert maritime de cargaisons et aux procédures terrestres, ainsi que leurs interactions avec les différentes parties prenantes.
- (g) Les facteurs qui différencient les ports des installations fixes sont entre autres :
- Les différents modes de transport (l'un étant toujours maritime) que l'on rencontre dans les ports. Chacun de ces modes peut être soumis à toute une variété de dispositions législatives et réglementaires, de pratiques de sécurité et de d'organismes de supervision. Si l'on appelle «interface» la rencontre de deux modes, cette expression reflète, en fait, aussi bien le recouvrement de juridictions ou de normes que les lacunes que ces juridictions ou ces normes peuvent présenter ;
 - Le caractère international des ports, où exploitants, navires et cargaisons viennent de pays différents ;
 - En raison de l'évolution historique, les ports ont tendance à être situés au voisinage de vastes zones fortement peuplées et de milieux fragiles, et leur situation en bord de mer attire des implantations d'habitations et autres activités ;
 - Les quantités et les catégories de substances dangereuses varient en permanence dans les ports, et notamment les substances dangereuses en vrac ou sous emballage, transportées ou stockées ;
 - Le fait que l'emballage et l'étiquetage des substances dangereuses, les documents les concernant, ainsi que le conditionnement et les panneaux/marquages des unités de charge qui contiennent ces substances sont probablement réalisés par des acteurs qui se trouvent loin du port ;

- Les opérations continues de maintenance dans les ports ;
 - Les occasions multiples d'utilisation régulière de main-d'oeuvre non qualifiée dans les ports ;
 - Les différences importantes dans les niveaux de développement technologique d'un port à l'autre ;
 - La variété des employeurs sur les ports, avec des structures de gestion et des comportements en matière de sécurité qui diffèrent.
- (h) Les ports représentent un atout économique d'importance stratégique ; toute mesure qui réduit leur position concurrentielle peut avoir des incidences économiques de longue portée. L'harmonisation du traitement de la sécurité instaure des règles du jeu équitables, en éliminant les pratiques de prix réduits au détriment de la sécurité, pour établir des conditions de réelle compétitivité.
- (i) Il convient de ne pas oublier que le maintien de la sécurité dans les ports pose des quantités de problèmes. Par exemple :
- Il existe des preuves tangibles de non-conformité avec des normes et règlements de sécurité bien établis, notamment lorsqu'il s'agit d'unités de transport de fret contenant des substances dangereuses acheminées par différents modes de transport ;
 - D'un port à l'autre, on constate des différences entre les normes de sécurité qui, dans bien des cas, ne respectent pas les critères acceptables (au niveau international) ; et
 - Trop fréquemment, les divers moyens de transports (trains, navires, camions et pipelines) ne respectent pas les normes minimales de sécurité, s'agissant de leur construction, de leur entretien et de leur fonctionnement.

II. Conclusions

1. Les activités portuaires de prévention, de préparation et d'intervention en cas d'urgence devraient essentiellement viser à réduire au minimum les risques que les substances dangereuses présentent pour les personnes, pour l'environnement et pour les biens, grâce à des efforts permanents visant à l'amélioration de la sécurité.
2. Pour que cet objectif soit atteint, il est indispensable que les procédures de sécurité des divers participants aux activités du port soient coordonnées et cohérentes.

3. La sécurité est un élément essentiel et indispensable à l'activité économique d'un port. La sécurité devrait être intégrée à la gestion du port plutôt que d'y être ajoutée.
4. Lorsqu'ils mettent au point leurs stratégies et leurs modes de fonctionnement, les secteurs industriels et les pouvoirs publics devraient distinguer les substances dangereuses transportées en vrac (à l'état solide, liquide ou gazeux) de celles qui sont transportées sous emballage. Ainsi, les opérations d'embarquement et de transbordement de substances dangereuses en vrac et conditionnées doivent s'effectuer, dans toute la mesure du possible, séparément dans l'espace ou dans le temps.

Prévention des accidents⁸

5. Etant donné le nombre d'acteurs qui participent à l'activité d'un port (certains pouvant se trouver loin de la zone portuaire géographique), les principales activités de prévention des accidents consistent à identifier de tous ces acteurs, à définir leurs rôles, leurs compétences et leurs responsabilités et à mettre en place un mécanisme de communication. Les parties prenantes ont toutes le devoir de classer avec précision les cargaisons confiées à leur soin et de faire en sorte que les documents adéquats sont transmis au stade suivant de la chaîne de transport. Cette responsabilité est particulièrement importante pour le transport de substances dangereuses sous emballage.
 - Une liste représentative des parties prenantes comporte :
 - pouvoirs publics de tous niveaux (par exemple, autorités contrôlant l'état du port, autorités responsables de la réglementation et organismes d'intervention en cas d'urgence) ;
 - représentants (propriétaires/exploitants) des modes de transport terrestre (voies ferrées, routes et pipelines) ;
 - autres groupes riverains (par exemple, les dockers et leurs représentants, les manutentionnaires, les syndicats, les autorités portuaires, les exploitants de postes de mouillage et autres employeurs, les entreprises de nettoyage et autres entreprises hors-port) ;
 - les entreprises de fret (par exemple, fabricants ou propriétaires de fret, chargeurs, transitaires, groupeurs et conditionneurs) ;

⁸ Ces sous-titres figurent dans le document de l'OCDE intitulé "Accidents chimiques : Principes directeurs pour la prévention, la préparation et l'intervention". Ils ont été repris afin d'indiquer à quel niveau des principes directeurs actuels ces conclusions pourraient se rattacher.

- autres entreprises de transport maritimes (non concernées par le transport de substances dangereuses, par exemple, exploitants de navires transbordeurs) ;
 - organisations internationales (aussi bien intergouvernementales que professionnelles).
- Les différences entre les contextes juridiques nationaux entraîneront des variations dans l'attribution des rôles et des responsabilités parmi les parties prenantes. Il est cependant possible de décrire dans leurs grandes lignes les rôles incombant à quelques acteurs essentiels.
 - Industrie chimique (fabricants de marchandises). Cette industrie devrait prendre l'initiative de suivre chaque produit chimique tout au long de son cycle de vie depuis sa fabrication jusqu'à son élimination, en passant par son transport et son utilisation, et aider toutes les parties prenantes à déterminer des procédures sûres. Ceci est conforme avec les programmes de gestion responsable et vigilante des produits.
 - Etat du pavillon. Pour les navires immatriculés dans leur Etat d'origine, l'Etat du pavillon a la responsabilité de faire appliquer toute convention internationale dont il est signataire. Cette mise en oeuvre s'effectue grâce à l'incorporation de ces conventions dans les législations et réglementations nationales et à la mise au point de dispositifs appropriés de mise en conformité. Grâce à ses services administratifs maritimes, l'Etat du pavillon assume ses responsabilités qui sont de faire en sorte que la construction, l'équipage, l'armement et l'exploitation d'un navire répondent aux règles de sécurité.
 - Etat du port. Il incombe à l'Etat du port de procéder à l'inspection des navires et autres modes de transport pour vérifier qu'ils respectent les conditions requises par la législation nationale et les conventions internationales ; cet Etat doit aussi assurer les conditions nécessaires au fonctionnement sûr de tous les modes de transport utilisés dans ses ports.
 - Employeurs. Les employeurs sont tenus d'assurer à leurs employés la formation nécessaire à l'exécution de leurs activités de routine et d'urgence dans des conditions de sécurité. Les employeurs devraient également faire en sorte que des procédures adéquates soient mises en oeuvre et que les équipements nécessaires pour ce faire soient adaptés et bien entretenus.
 - Autorités portuaires. Les autorités portuaires sont en général responsables du fonctionnement du port au jour le jour. Cependant, les responsabilités spécifiques d'une autorité portuaire vont être extrêmement différentes d'un pays à l'autre et dépendre de la catégorie du port qu'elles gèrent (c'est-à-dire, «tool port», «service port» ou «landlord port»).

Etablissement d'objectifs de sécurité et d'un cadre de contrôle par les pouvoirs publics

6. Etant donnée la variété des dispositions qui sont exigibles dans les ports aux niveaux national et local, et qui sont suivies et mises en oeuvre par différentes autorités, il est essentiel que ces autorités fassent en sorte que ces dispositions soient compatibles et coordonnées, tout autant que les activités relatives à leur suivi et à leur mise en oeuvre.
7. Du fait de leur caractère dynamique et complexe, les régimes juridiques/ réglementaires applicables à un port devraient être constamment revus et mis à jour en cas de besoin. Ces régimes, il faut le reconnaître, constituent une norme minimum pour des opérations sûres qui peuvent, et doivent, être améliorées pour se conformer à la «bonne pratique», voire la «norme la meilleure».
8. A tous les niveaux, les pouvoirs publics devraient mettre tout en oeuvre pour éviter les conflits avec des lignes directrices et des normes reconnues au niveau international. Rien n'empêche les pouvoirs publics de mettre au point des normes plus strictes que celles qui ont été établies par des organisations internationales.
9. Les efforts consacrés à l'harmonisation des conditions requises au niveau international pour différents modes de transport doivent se poursuivre. Les Recommandations du Comité d'experts des Nations Unies relatives au transport de marchandises dangereuses constituent les bases d'une telle harmonisation. Le Code maritime international des marchandises dangereuses, qui élargit les conditions requises au Chapitre VII de la Convention internationale pour la sauvegarde de la vie humaine en mer (SOLAS), concorde déjà très largement avec ces recommandations et il faut que des travaux soient entrepris pour que les conditions requises pour d'autres modes de transport deviennent elles aussi compatibles avec ces recommandations.
10. Les recommandations de l'OMI relatives à la sécurité du transport, de la manutention et de l'entreposage des substances dangereuses dans les zones portuaires doivent, avec les Principes directeurs de l'OCDE, servir de base à l'établissement d'un cadre commun englobant la législation et les réglementations connexes et servant à décrire les rôles et les responsabilités des différents intervenants.
11. Les pouvoirs publics devraient encourager les efforts internationaux visant à établir des conditions raisonnables d'assurance obligatoire. Il faudrait une Convention internationale fixant des règles uniformes pour la détermination de la responsabilité et pour l'attribution d'une indemnisation adéquate aux victimes de fuites de produits chimiques à partir de navires. L'OMI est invitée à poursuivre ses efforts pour l'élaboration d'une telle convention.

Etablissement d'une politique de sécurité par l'industrie

12. Chargeurs, autorités portuaires, compagnies d'assurance et autres devraient recourir à des mesures d'incitation financière ou autres en vue d'améliorer la sécurité. Ces incitations peuvent comporter : des réductions de primes d'assurance et de redevances pour un fonctionnement sans danger et/ou l'adoption de dispositifs de sécurité ; des récompenses (par exemple, le «Green Award» pour les navires) ; ainsi qu'une augmentation des primes et redevances en cas de performances et/ou d'équipements sous-normes. On peut raisonnablement s'attendre à voir les chargeurs éviter de recourir à des transporteurs dont les performances ou les équipements sont marginaux ou sous-normes et accepter des tarifs plus élevés pour des dispositifs de sécurité et des normes de fonctionnement plus strictes. On peut aussi raisonnablement s'attendre à voir chargeurs et transporteurs opter pour des contrats d'assurance suffisants pour couvrir leurs responsabilités éventuelles en cas d'accident associé à des substances dangereuses.
13. Etant donné la variété et le nombre d'entités qui gèrent et manipulent des substances dangereuses dans les ports, le développement d'une culture générale de sécurité s'avère particulièrement difficile. C'est pourquoi il faut s'efforcer tout particulièrement d'établir et de mettre en pratique une culture commune de sécurité portuaire.

Planification et construction

14. Lorsqu'ils planifient de nouvelles installations portuaires et élargissent les anciennes, les concepteurs portuaires devraient prendre en compte : l'accès adéquat par tous les modes de transport ; la capacité en cas de grande affluence ; l'accès pour des interventions d'urgence ; la nécessité de zones tampon pour séparer les substances dangereuses de l'ensemble de la population ; la séparation des installations ; la nécessité éventuelle de stocker d'urgence des cargaisons endommagées ; la survie des services de base en cas d'urgence ; le soutien des interventions en cas d'urgence (par exemple, accès des équipes d'urgence, zones de ravitaillement), et les dispositifs de protection de l'environnement dans le cas de l'utilisation d'équipements d'urgence pour la collecte et l'avacuation des produits contaminés.

Exploitation

15. L'autorité portuaire, ou tout autre organisme compétent, devrait instaurer des procédures d'exploitation concernant, par exemple : la manipulation, la garde et le stockage des cargaisons en toute sécurité ; la gestion de la circulation, les services, l'emploi des dockers ; la sécurité ; les services d'urgence ; les postes à quai et les mesures de protection de la santé/du personnel.

16. L'autorité portuaire, ou tout autre organisme compétent, devrait faire en sorte que des informations à jour relatives aux procédures portuaires soient fournies aux utilisateurs du port dans une langue qu'ils puissent comprendre. Par exemple, les navires et leurs agents devraient disposer, avant l'accostage, d'informations relatives aux procédures à appliquer, et notamment celles qui portent sur la gestion de la circulation, le mouillage, l'amarrage à poste, les installations d'accès limité, les documents nécessaires, les points de contact pour le signalement des urgences et autres aspects qui pourraient avoir des incidences sur la sécurité. Pour le transfert de cargaisons, il faut des listes de vérification et des dispositions spéciales, comme le contrôle des vapeurs émises, qui doivent être précisées dans les informations fournies.
17. Il semble que la tendance soit de plus en plus au recours à des sous-traitants et à des «firmes-rejetons» pour le transport de substances dangereuses. Les effets négatifs probables de telles pratiques, puisqu'elles risquent d'entraîner un appauvrissement des compétences, des connaissances et des ressources, doivent être reconnus et correctement pris en compte. Par exemple, l'industrie chimique peut jouer un rôle important en évaluant la qualité de telles entreprises avant de les engager.
18. L'enseignement et la formation sont indispensables au renforcement de la sécurité dans les ports. C'est pourquoi cet enseignement et cette formation devraient être :
- considérés comme un investissement et non comme une dépense ;
 - diversifiés, couvrant tous les aspects de l'exploitation d'un port relatifs à la sécurité, notamment les besoins de préparation et d'intervention en cas d'urgence ;
 - offerts à un niveau approprié à la culture des destinataires ;
 - permanents et, notamment, être fournis à l'arrivée dans le monde du travail, lors d'un changement d'emploi, notamment lorsqu'il s'agit d'utiliser de nouveaux matériels et de nouvelles méthodes et lorsque de nouveaux dangers sont reconnus ;
 - accessibles aux employés de tous niveaux. A cet égard, il est particulièrement important que les cadres soient formés à la manipulation de substances dangereuses pour qu'ils puissent comprendre les problèmes connexes aussi bien que former et superviser leur personnel de façon adéquate ;
 - adaptés à la fonction, compte tenu de lignes directrices applicables au niveau international, comme les «UN Recommendations on the Transport of Dangerous Goods» (Recommandations des Nations Unies relatives au transport de marchandises dangereuses), huitième révision, 1993, Chapitre relatif au «Training of Dangerous Goods Workers» (Formation des personnes travaillant avec des marchandises dangereuses).

19. Compte tenu du fait que le rythme de travail dans les ports peut être irrégulier, avec des pointes qui entraînent le recours à une main-d'oeuvre moins qualifiée, il est nécessaire de prendre des mesures complémentaires pour faire en sorte que tout travailleur non qualifié reçoive une formation appropriée et soit correctement supervisé au cours de son travail.
20. Lors de la mise au point d'un programme de formation, il convient de déterminer au départ les groupes principaux/prioritaires à former. Pour faciliter ce processus, on insistera sur la «formation des formateurs».
21. Il convient d'établir un ensemble commun de paramètres acceptables au niveau international relatifs au fonctionnement sûr de navires entrant et manoeuvrant dans les ports. Ces paramètres devraient pouvoir s'appliquer au contexte particulier à chaque port. Toutes limitations propres à un port pour le transit ou les opérations de fret, comme des vitesses limitées en fonction du vent ou des prescriptions en matière de pilotage et de remorquage devraient être communiquées à tous les transporteurs concernés.
22. Les risques d'accident pourront baisser si l'on diminue les quantités totales de substances dangereuses conservées dans les ports et si l'on réduit au minimum les retards administratifs inutiles dans leur acheminement. C'est pourquoi des procédures pourraient être mises en place afin de faciliter le mouvement des cargaisons dans un port. A cet égard, les formalités de douanes et autres devraient être rationalisées en fonction des besoins légitimes de surveillance.
23. Il convient d'établir une norme internationale pour la notification obligatoire des points faibles d'un navire qui augmentent les risques d'accident. Il convient également de mettre au point des procédures pour que ces notifications soient communiquées aux autorités portuaires.
24. La pratique de comités de sécurité comprenant des représentants élus par les employés, comme le recommandent les Principes directeurs, peut s'appliquer aux ports, sans oublier qu'il faut tenir compte des problèmes particuliers aux zones portuaires (nombre élevé d'employés, par exemple). A cet égard, des dispositions devraient être prises pour mettre en oeuvre les recommandations des comités de sécurité.

Examen et évaluation des résultats en matière de sécurité

25. L'étude détaillée des évaluations de risques figurant dans les Principes directeurs s'applique aux zones portuaires. Il est utile de ne pas oublier que l'évaluation des risques doit s'effectuer aussi bien de façon régulière que lorsque des événements prévus risquent de modifier le niveau de risque. Cette évaluation de risques peut, entre autres, permettre de déterminer des risques particuliers aux ports, ainsi que les procédures pour les surmonter, et servir à apprécier l'efficacité de procédures, pratiques

et prescriptions en vigueur. Elle peut aussi aider à l'élaboration de plans d'urgence appropriés. L'évaluation des risques ne doit cependant pas être utilisée pour justifier une observance limitée des procédures de sécurité en vigueur, des pratiques industrielles normalisées ou des dispositions de sécurité prescrites au niveau national ou international. La catégorie et le niveau de complexité dépendront de ce à quoi doit servir l'évaluation de risques, ainsi que de l'échelle et de la complexité de la situation.

26. Compte tenu des problèmes considérables de mise en conformité, des efforts accrus doivent être consacrés à l'amélioration de la sécurité grâce à une mise en oeuvre plus complète des lois, réglementations et politiques nationales, ainsi que des conventions, codes et principes directeurs internationaux. Il faudrait, pour que ces efforts soient couronnés de succès, que les pouvoirs publics soient fermement résolus à surveiller la mise en conformité, tout en assurant une mise en oeuvre énergique.
27. Un système international de notification des conclusions établies par les services de surveillance de l'État du port devrait être mis en place afin de fournir aux autorités portuaires des informations sur la situation des navires en matière de sécurité et autres informations relatives à la sécurité. Ceci permettra une utilisation plus efficace des moyens d'inspection, en permettant aux autorités d'utiliser ces moyens là où ils sont le plus nécessaire et d'éviter des enquêtes inutiles.

Aménagement du territoire

28. La sécurité doit être un élément essentiel dans l'élaboration des politiques d'aménagement du territoire et lors de leur mise en oeuvre. La conception des ports est une importante question en matière d'aménagement du territoire et cet aménagement doit donc tenir compte, par exemple, des infrastructures, des bâtiments, des ressources terrestres et aquatiques nécessaires aux différentes activités portuaires, et de l'emplacement des substances dangereuses. A cet égard, la sécurité consiste non seulement à protéger le public des activités portuaires mais aussi à protéger le port du risque accru lié à des personnes ou à des organisations étrangères aux fonctions normales du port.
29. Les spécialistes de l'aménagement du territoire mettront au point des projets montrant comment des centres d'habitation (projets d'urbanisation, par exemple) seront incorporés aux ports ou en seront séparés.
30. Le processus d'aménagement du territoire devrait tenir compte de la participation des diverses parties prenantes.

31. La politique d'aménagement du territoire devrait tenir compte, entre autres, des éléments suivants :

- conséquences visibles du développement portuaire ;
- plans d'aménagement stratégique du territoire ;
- santé et sécurité ;
- intérêts sociaux et économiques ;
- flore et faune ;
- utilisation des espaces environnants ;
- sols et drainage ;
- transports et circulation ;
- participation de la collectivité ;
- qualité de l'air ; et
- incidences culturelles.

Information du public

32. Il est absolument nécessaire de rester en communication avec la population qui pourrait être affectée par un accident. Des efforts combinés doivent tendre à informer le public, aussi bien de la nature des activités portuaires, dangers potentiels notamment, que des mesures à prendre en cas d'accident. Dans les ports, il est particulièrement difficile d'identifier les groupes qui pourraient être affectés et de communiquer avec eux, par exemple, des passagers utilisant le port.

33. En plus des sources d'information usuelles (brochures par exemple), il convient de rechercher d'autres moyens novateurs pour atteindre le public, grâce, par exemple, à des visites et à l'utilisation des médias.

Préparation aux situations d'urgence et intervention

34. Etant donné qu'il existe probablement de nombreux plans d'urgence (notamment ceux qui concernent les navires et divers autres parties prenantes), l'autorité portuaire, ou une autre autorité compétente, devrait faire en sorte que chacun de ces plans fonctionne de façon harmonieuse. Il s'agit des différents plans concernant aussi bien le port lui-même que sa périphérie au niveau local, régional et national. Les dispositifs portuaires de préparation et d'intervention devraient, en outre, fonctionner en harmonie avec les dispositifs nationaux. La coordination indispensable des plans devrait être reconnue et respectée tout au long des activités de mise en oeuvre, de formation et d'exercice prévues par ces plans. Il faudrait surtout insister sur la nécessité d'identifier sans ambiguïté les personnes qui assumeront des responsabilités dans les diverses catégories d'incidents éventuels et de bien préciser leur rôle.

35. Les autorités nationales devraient prendre des mesures pour renforcer les arrangements d'assistance mutuelle établis entre les ports de leur pays et au niveau international. Les arrangements internationaux et régionaux doivent, lorsqu'ils existent, être incorporés à la planification au niveau national et local. Les gouvernements sont invités à ratifier les conventions internationales qui vont dans ce sens, par exemple, la Convention internationale sur la préparation, la lutte et la coopération en matière de pollution par les hydrocarbures.
36. Des efforts particuliers seront déployés pour informer les capitaines et les équipages des navires de la nature et de l'organisation des services portuaires d'urgence.
37. L'utilisation du manuel APELL dans le cadre des activités du port et des collectivités environnantes devrait continuer de se répandre grâce à une activité conjointe APELL/OMI, étant entendu qu'il faut convenir d'identifier les différentes parties qui doivent intervenir. Des activités conformes au manuel APELL pourraient être engagées à l'initiative des autorités portuaires.
38. Toute organisme d'intervention devrait être capable de prendre en charge : la conduite des opérations, la mise en place de plans opérationnels, la fourniture de soutien logistique, le financement et les relations avec le public/les médias. Ces organismes devraient également pouvoir disposer d'un personnel d'intervention suffisamment entraîné et équipé, et aussi avoir accès à des spécialistes de l'environnement.
39. S'agissant des relations public/médias, les médias au niveau local et national/international auront la possibilité de remplir des rôles différents lorsqu'ils communiqueront avec le public et cela doit être pris en compte pendant la planification et l'intervention. Lors d'une intervention, la communication d'informations doit se faire dans les deux sens, grâce aux informations fournies aux intervenants locaux et à celles qu'ils fournissent.
40. Les plans d'intervention doivent prévoir :
 - un dispositif permettant d'obtenir des conseils techniques particuliers ;
 - un mécanisme pour le règlement des différends ; étant entendu qu'un plan bien conçu réduira ces différends au minimum.
41. Le processus de planification devrait prévoir des communications régulières entre les différents partenaires qui pourraient participer ultérieurement à des activités d'intervention.

42. On s'efforcera d'analyser les risques par classe et par catégorie de navire, et de partager ces informations avec les ports, en vue de la mise au point de procédures normalisées pour la prise en compte des risques qui doivent être prévus dans les plans d'urgence des ports. La communauté internationale est invitée à collaborer à la réalisation de ces analyses et à la mise au point de ces procédures.
43. Les responsables d'activités d'intervention en cas d'urgence devraient être conscients des problèmes de sécurité et de santé auxquels le personnel d'intervention peut être confronté. Dès que la pression de l'intervention immédiate est retombée, des mesures devraient être prises pour éviter que ceux qui ont participé aux opérations d'intervention courent des risques inutiles.
44. Un système national d'intervention d'urgence devrait comporter un organe de coordination, avec des représentants de tous les services gouvernementaux chargés de préparation et d'intervention. Les ports devraient prendre part à la planification d'urgence au niveau de la zone portuaire, planification qui s'intégrerait au dispositif national par l'intermédiaire de la planification régionale.
45. Les plans d'intervention en cas d'urgence concernant les ports doivent tenir compte de l'éventualité d'incidents simultanés, ainsi que de la nécessité d'un nombre suffisant d'organismes d'intervention.

Déclaration et enquête en cas d'incidents

46. Au cours de l'intervention, il convient d'établir fréquemment des rapports opérationnels car ils constituent un outil précieux pour déceler les événements au fur et à mesure qu'ils se produisent et pour diriger les opérations. Ces rapports peuvent être utilisés en tant qu'archives de référence pour : améliorer la prévention, la préparation et l'intervention, revoir et améliorer la législation et les procédures et aider dans la comptabilité financière. Les sections appropriées de ces rapports seront largement diffusées aux parties intéressées, notamment les médias et les populations qui pourraient être touchées.
47. Des efforts devraient être consacrés à l'instauration d'un système international pour la collecte et la distribution de données relatives aux interventions d'urgence dans les ports. Il convient, lors de la mise au point d'un tel système, de comprendre les objectifs de la collecte de données et de faire en sorte qu'elle soit utile à ceux qui fournissent les données. A cet égard, ceux-ci doivent être convaincus qu'ils ont avantage à continuer de s'intéresser et de participer au système.

48. Il est nécessaire d'améliorer la déclaration des accidents et des quasi-accidents sérieux afin de renforcer les leçons tirées de l'expérience. Des enquêtes visant à identifier les causes d'un accident ou d'un incident sont indispensables à l'amélioration permanente des systèmes de prévention et d'intervention grâce au retour de l'information, étant entendu que les enquêtes pourraient être menées de différentes façons. Les sections ad hoc des rapports établis d'après les enquêtes doivent être réparties entre les ports, les navires, l'industrie chimique, etc.

Programmes d'aide bilatéraux et multilatéraux

49. L'aide aux pays en développement doit être un engagement à long terme. La mise en oeuvre d'un port sûr, compatible avec l'environnement est un processus à étapes successives. Puisque tous les aspects du fonctionnement d'un port ne peuvent être améliorés du jour au lendemain, il convient d'établir des priorités. A cet égard, le processus doit être conçu à partir d'une évaluation des risques, compte tenu des priorités du pays en développement. Les problèmes de formation sont particulièrement importants (voir les paragraphes 18 à 20) lors de la mise au point de tels programmes d'aide.

Définitions aux fins des conclusions

Cargaisons :

Substances dangereuses : couvre toutes les cargaisons dangereuses telles qu'elles sont définies par :

- (a) les normes ou réglementations locales, nationales ou régionales applicables aux différents modes de transport ;
- (b) les recommandations des Nations Unies relatives au transport des marchandises dangereuses (huitième révision, 1993) ;
- (c) la Recommandation de l'OMI relative à la sécurité du transport, de la manutention et de l'entreposage des substances dangereuses dans les zones portuaires.

Les conclusions indiqueront si référence est faite à des substances dangereuses, que ce soit en vrac ou sous emballage seulement, le cas échéant.

Vrac : on entend par vrac les cargaisons occupant sans aucune forme intermédiaire d'endiguement un espace de chargement qui est une partie structurelle d'un véhicule (ferroviaire, routier, ou maritime) ou d'une citerne fixée en permanence dans ou sur un tel véhicule. [Note : il est à noter que cette définition n'est pas totalement conforme à la terminologie utilisée communément dans toutes les réglementations relatives au mode de transport. Par exemple, conformément aux réglementations applicables en Europe aux modes de transport terrestres, le terme «vrac» est utilisé uniquement pour le transport de substances solides, alors que le transport de cargaisons liquides et gazeuses dans des camions-citernes, des wagons ou des conteneurs-citernes, est généralement désigné par le terme «transport en citerne».]

Ports :

«**Landlord port**» : les autorités portuaires se contentent de mettre en place, de fournir, d'exploiter et d'entretenir les infrastructures portuaires. Les superstructures et la main-d'oeuvre sont fournies par des entreprises privées.

«**Service port**» : les autorités portuaires mettent en place, fournissent, exploitent et entretiennent les infrastructures et les superstructures et, en outre, embauchent la main-d'oeuvre portuaire.

«**Tool port**» : les autorités portuaires mettent en place, fournissent et exploitent aussi bien les infrastructures que les superstructures, tandis que la main-d'oeuvre est fournie par des entreprises privées.

Infrastructure : comprend les bassins portuaires, les quais, et les zones portuaires terrestres. Des réseaux d'information, comme les communications télématiques utilisées pour les transmissions de données, pourraient aussi être considérés comme faisant partie de l'infrastructure.

Superstructure : comprend les grues, les hangars, les équipements de manutention de la cargaison, etc.

Autorité portuaire : toute personne ou groupe de personnes habilitée à exercer un contrôle effectif dans une zone portuaire.

Discussion Document: Chemical Safety in Ports

G.C. de Jong and H.B. Hanekamp

Port of Rotterdam
Directorate of Shipping
Department of Safety and Environment
P.O. Box 6622
3002 AP Rotterdam
The Netherlands

The authors wish to gratefully acknowledge the comments and contributions of Mr. G. van Staalduinen and Mr. F. Blaauw of the Rotterdam Fire Brigade and Mr. D. van den Brand of the Ministry of Housing, Physical Planning and Environment.

1. Introduction

This discussion document on port safety tends to provide a framework to deal with the sometimes startling complexity of port operations and port organisations with respect to chemical accident prevention, preparedness and response. In this regard, it is important to recognize that differences between ports can be considerable indeed. Furthermore, the concept of safety can be approached from a wide variety of angles and on different levels of abstraction.

This framework should be of some help in setting the stage for possible discussions during the workshop. It does not claim to be definitive or all-compassing, and it may be necessary to add to or modify it as a consequence of workshop discussions.

1.1 Types of port management

Ports may vary greatly in size and in the type of facilities they provide. Hence there is a great variation in type and size of port authorities, which range from the small private company to the giant groups.

Generally, most port authorities are composed of a single port embracing a complex of dock systems. An exception can be found in the UK, where the Associated British Ports (a statutory company) controls some 21 ports.

Another factor of difference is that port authorities can be of different institutional types. Port authorities can be part of a state or local authority structure like Antwerp and Rotterdam (both municipal), Singapore and Bombay (State-owned), or they can take the form of a public trust as exists in the Port of London Authority or a public limited company as exists in the port of Felixstowe.

In France, a number of ports are owned and operated on a government agency basis.

All this should be kept in mind when the problems of creating safety in port areas are discussed in general terms.

To prevent some misunderstandings, a classification seems in order:^(lit 6)

- Service port

In a service port the port authority develops, provides, operates and maintains the infra- and superstructure and also employs the port labour.

The port of Singapore would be classified as a service port.

- Tool port

In a tool port the port authority develops, provides, operates and maintains both the infra- and superstructure, whereas the labour is provided by private companies.

Antwerp could be considered an example of a tool port.

- Landlord port

In a landlord port the port authority only develops, provides, operates and maintains the port infrastructure. The superstructure and labour are provided by private companies.

The port of Rotterdam constitutes an example of a landlord port.

For this purpose, infrastructure may be defined as port basins, quays and port land areas. Information networks, such as the use of telematic data communication, could also be interpreted as being part of the infrastructure.

Superstructure is defined as cranes, sheds, cargo handling equipment, etc.

Both the type of port and the constitutional form of its port authority greatly influence the role of the port authority in safety and environmental matters.

1.2 Trying to find a definition of a port area

In trying to establish guidelines on chemical safety in port areas, several questions come to mind:

- What is a port area?
- Which activities in this port area should be addressed in these guidelines?

Finding an adequate definition of a port area for the purpose of chemical safety is a difficult matter. Internationally there is very limited agreement as to what should be considered part of the port area and what not.

In any commercial port one may define three, closely connected, processes:

- The Nautical Process
- The Cargo Transfer Process
- The Inland Process

It may be argued that a port is any given area in which these three processes interact. These processes interact in an economic, organisational, legal and sometimes even physical sense.

These processes are covered by different bodies of law. The Nautical Process is regulated by international maritime legislation. The Inland Process is mostly regulated by national legislation. The Cargo Transfer Process is a bit of a grey area, since in many respects both international and national legislation are applicable.

Each of these processes interacts with the surrounding areas in terms of safety and environment. Though the surrounding areas mostly are not considered to be part of the port as such, they are influenced by the port process. Also the surrounding areas have a certain influence on the port. In some cases this influence can be considerable indeed.

For discussion purposes, the area in which the guidelines should be considered applicable therefore might be defined as:

That zone which can be potentially affected by activities and/or incidents connected with the port,

as well as:

That zone in which activities and/or incidents can potentially affect the port.

This area probably does not correspond with many definitions of a port area. A better term may be "sphere of interest".

Within this sphere of interest, the OECD Guidelines should address the following aspects:

- The safety of each of the port processes
- The interaction between the port processes
- The interaction of the port processes with the surrounding areas

1.3 Activities in ports

In discussing chemical safety in ports, a distinction should be made between several types of operation.

The Cargo Transfer Process

In discussing loading and unloading of dangerous goods, a large distinction should be made between the handling of bulk and of packaged goods (including containers). There are large operational and regulatory differences, which makes it almost impossible to combine these two in the same discussion.

Another distinction should be made between gases, liquids and solids. For the handling of bulk there are operational differences. For the handling of packaged goods this distinction is useful because of the difference in consequences of accidents.

Also it should be taken into account that there are two basic types of loading-unloading operations: ship to shore and ship to ship (the last with or without the use of land-based facilities).

It also is useful to differentiate between the possible types of ship.

However, apart from loading and unloading there are a number of other aspects which have to be taken into account in discussing port safety:

The Nautical Process

- Transport

Collisions (between ships or with fixed objects like locks, bridges or jetties) as well as groundings (not unthinkable in tidal ports) can cause serious safety problems. As far as this type of incident can occur in port basins or inland waterways, transport safety should be considered an integral part of port safety.

The inland transport can cause problems as well (car and rail accidents, leakage from pipelines, etc.).

- Repairs

Especially when involving the use of open fire, for instance in welding operations. Major accidents have been recorded because of unsafe repair arrangements.

(A good Rotterdam example is the explosion of the *Agios Ioannes* in 1981, resulting in the loss of life of the repair crew of six, two wounded of the ship's company and extensive structural damage to the ship itself.)

- Cleaning operations

The cleaning and washing of tanks deserves attention, as well as fumigation.

- Bunkering

Primarily an environmental problem (because of a high spill frequency), bunkering can cause safety problems when combined with other operations like repairs and loading/unloading.

- Problem ships

Occasionally substandard ships, damaged ships or ships with cargo problems may request to enter the port. These ships constitute a larger risk than the normal shipping traffic. Provided the port has adequate facilities and the appropriate extra precautions are taken, there seems to be no reason to deny entrance to the port.

The Inland Process

It is possible to make a distinction between ports based on the type of Inland Process.

Historically, most ports started out as transit ports. Nowadays many ports try to develop into user ports and are succeeding. This has led to changes in the Inland Process. The traditional picture of a port as a dockland is rapidly becoming obsolete. Refineries, industrial plants and chemical industry are more and more becoming elements of the port system.

This development presents the port management with many challenges. Historically, port management has concentrated on the nautical and the cargo transfer process. The port management was an affair of seafarers.

The development towards user ports has led to large investments in the Inland Process. This has led to more emphasis on the management of the Inland Process. Accordingly port management is becoming more and more an affair of landmen.

With regard to the aspect of safety, this development has introduced new problems into the port area, such as the necessity of land use planning. Moreover since in a port there is an interaction of three processes, this land use planning leads to something which might be described by the term *water use planning*.

1.4 Levels of abstraction

In discussing safety in port areas, a distinction should be made in the following levels:

- Strategic level

This level would include port planning and land use planning, decisions on which services to provide, etc.

- Tactical level

This level would include the regulating of operations within the framework of the strategic decisions. Mostly this takes the form of imposing restrictions and/or limitations on operations.

- Operational level

This level would include aspects like the establishment of operating procedures, training requirements of personnel, technical standards, etc.

The distinction in these levels may be a bit theoretical, but is useful in discussing regulations and safety measures. The distinction also may be of use when discussing safety standards, and objectives of safety policies.

1.5 Definition of safety

It should be recognized that the term safety can be given a multitude of interpretations. Partly this may be caused by the fact that cultural and emotional factors play a large role. Sometimes these emotional factors conflict with some of the more objective or scientific approaches.

Getting a good objective definition of the term safety is an important first step in safety management. It is the basis for safety monitoring and the setting of certain types of safety goals and safety standards, especially on a strategic and tactical level.

In a general sense, safety may be defined as the non-occurrence of undesirable consequences:

- harm to human life (death, injuries, health hazards)
- harm to the environment (water, air, soil)
- nuisance (noise, stench)
- economic harm (damage, delays)

Traditionally, the field of safety has concentrated on the human and economic consequences. As environmental awareness grows (along with environmental regulation), it becomes more and more necessary to take environmental factors into account.

In defining the concept of safety, it should be realised that for different levels of abstraction different definitions are (and possibly should be) used.

Most definitions of strategic and tactical use involve the frequency or probability of occurrence, and/or the (possible) consequences of such an occurrence. This gives us three definitions to choose from:

- Safety = the frequency or probability of occurrence, for instance the number of accidents of a certain type in a given period.
- Safety = the (possible) consequences of occurrences, for instance the number of days absent caused by accidents in a given period.
- Safety = a function of both probability and consequences. In this case, the term safety is usually replaced by the term "RISK".

In a port one may find any or all definitions in use, depending on the subject.

On an operational level safety is often defined as the adherence to rules, regulations and procedures and the use of the correct technical means:

- Safety = doing things the right way.

This is a simple but workable definition. From an operational point of view there seems to be little need to explore possible other definitions.

It is important to note that this definition is very different from those used on a tactical and strategic level. When this approach is used, safety is closely connected with efficiency.

1.6 Some remarks on regulations

Ports have to deal with a great deal of international, national, regional and local regulation. This regulation has not always been created to suit the needs of ports and port operations.

The port authority should have the possibility to issue more specific rules, using these general regulations on the basis of local circumstances and local knowledge. These rules could be materialised in the form of Port Bye-laws wherein a translation and extension of the international and national legislation is described, accounting for local variables.

Example: transport regulations

Almost by definition, a port is an area where different modes of transport meet and interact. These modes of transport are governed by different regulations. A basic difference in these regulations is the purpose they are meant to achieve.

Inland transport regulation is created for the purpose of protecting the general public from harm. Seagoing transport regulation is created for the purpose of protecting the ship from harm. This fundamental difference shows markedly in the difference in treatment of flammable and toxic packaged goods.

In the absence of population, at sea the fire hazard is much more a cause for concern than the toxic hazard. The issue here is the safety of the ship. For inland transport, the toxic hazard is much more threatening to the public safety than the fire hazard. The possibility of escape and the availability of firefighting services make a large difference here.

This fundamental difference makes harmonisation of inland and seagoing transport regulations very problematic, if not counterproductive.

It is therefore safe to assume that there always will be a co-ordination problem between seagoing and inland transport. Efforts should be directed to minimising this co-ordination problem.

2. The Port of Rotterdam

2.1 General description

The Port of Rotterdam is controlled by the Rotterdam City Council. The municipal port operation includes the planning, construction and operation of dock basins, quays and sites.

The City Council has entrusted the management of the port to the Rotterdam Municipal Port Management.

The RMPM is a provider of port infrastructure (port basins, quays and port land areas) and is responsible for the design, construction and maintenance.

The Port Management is not engaged in cargo operations. This activity is left to private enterprise completely. They are equipped to undertake these activities on land leased from the port management.

Port labour is provided by private companies as well. Pilotage and mooring-unmooring services are also provided by private companies. The Port of Rotterdam can therefore be qualified as a landlord port.

With its annual throughput of 293 million tonnes in 1992, Rotterdam is the largest port in the world. Approximately 45 per cent of the total cargo in tonnes is classified as hazardous.

Annually more than 30,000 seagoing ships (76,000 ship movements) and 120,000 inland barges (260,000 ship movements) visit the port. Around 50 per cent of the seagoing ships entering the port (over 15,000 a year) carry dangerous goods. Ships may have more than one destination in the port, and visiting five terminals in different basins during one stay is not unusual. The duration of a stay may vary from several hours to several weeks.

Virtually all types of operation are to be found in the Rotterdam port area.

The transport of dangerous goods in bulk is concentrated in the Maasvlakte/Europoort (84 per cent in tonnes) and to a smaller extent (12 per cent in tonnes) in the Botlek area. At the Maasvlakte/Europoort this means in most cases crude oil, whereas in the Botlek area a wide variety of chemical products are handled. In the Waalhaven/Eemhaven/City area predominantly packaged dangerous goods, containers included, are handled.

Around 40 per cent (in tonnes) of the unloaded dangerous goods are carried inland by pipeline, and around 25 per cent by inland barge. The remainder is used locally or transported by road or rail.

Number of seagoing vessels which entered Rotterdam in 1990

Type	Number	%
Dry bulk carriers	1,891	5.9
Combination carriers	275	0.9
Crude oil tankers	1,246	3.9
Tankers	4,417	13.7
LPG/LNG carriers	399	1.2
General cargo	15,648	48.7
Full container ships	3,143	9.8
Ro-ro	2,301	7.2
Passenger ships	1,138	3.5
Others	1,697	5.3
Total	32,155	100

2.2 The role of the Rotterdam Municipal Port Authority

The Rotterdam Municipal Port Management has three key functions:

- manager of port infrastructure
- provider of nautical services
- co-designer of port development

The Directorate of Shipping is among others responsible for the second key function: providing nautical services.

The main objective of the Directorate of Shipping is: supporting the economic process by realisation of efficient navigation in the port, under the conditions of a sufficient safety level and limited environmental effects.

This objective is strived for by operating an optimal nautical infrastructure, and by means of an effective information process.

Further, all the activities connected to shipping traffic in a port should have assurance to be executed quickly and safely.

This implies in the first place the loading and unloading of cargo. However, the same applies to other services such as waste disposal, garbage collection and bunkering.

The port authority is not the only party responsible for safety and environment. Rotterdam being a landlord port, the private companies have their own responsibilities. It also is not the only regulatory authority in the port.

Other local authorities (police, fire brigade), regional and national authorities play an important role on a strategic, tactical and operational level, even though they have in some cases delegated their operational responsibilities to the port management.

The Rotterdam port management has the following operational safety means at its disposal:

- Vessel Traffic Management System
- patrol vessels (enforcement, incident response)
- motorized inspection teams (enforcement)

Pilotage, tug service and linesmen are centrally co-ordinated by the Harbour Control Centre. The traffic of dangerous goods is handled by a special branch of the HCC, the Dangerous Goods Bureau.

3. Safety Policy in Port Areas

3.1 Introduction

Ports are often a decisive factor in a nation's or region's economy. Ports have to compete against each other to attract business. Therefore the main function of a port authority is mostly an economic one: promoting and facilitating the economic process. In the light of this economic process, safety should be seen as a commodity in the sense that it can be described in terms of quality and cost.

Both quality and cost can have an effect on the economic competitiveness of a port. Therefore it is clear that safety is not a goal in itself, but has to be evaluated together with other interests. This might imply that a certain degree of risk has to be accepted. The key question is: which level of risk is acceptable?

The appropriate framework for answering this question should be found in a safety policy.

This safety policy should address all levels of abstraction.

3.1.1 Strategic level

A port consists of many systems – transport systems like seagoing traffic, inland shipping, road and rail, other systems like terminals, several kinds of industry, warehousing and offices, and possibly, surrounding a port, residential areas.

In a port all these systems interact. From a regulation point of view, these systems are mostly approached separately. The regulations often do not cover the interaction between these systems.

A good guiding principle may be to keep these systems separate. This can only be achieved by long-term planning. Even if strategic planning is mostly a matter of economics, safety and environmental factors should be important considerations (or even restraints) in this long-term planning.

This may not quite be incompatible with economic considerations. Poor long-term planning may lead to the need to impose restrictions on operations to maintain safety or environmental standards (which influences profitability).

In the Port of Rotterdam this guiding principle has led to a separation of the shipment and trans-shipment of bulk and packaged goods. The chemical industry is separated from the oil refining and bulk terminal industry, and inland shipping is separated from seagoing traffic (up to a point) by way of the construction of the Hartelkanaal.

3.1.2 Tactical level

On this level, a safety policy should regulate activities in such a way that they meet safety and environmental standards. Mostly this takes the form of imposing demands, restrictions and limitations on operations, for example:

- restrictions on type of substances handled or type of operation
- restrictions on working hours
- limitation of quantities handled or stored.
- compulsory notification and administration of goods handled

In general, these may be described as preventive measures.

Also the matter of incident response should be addressed.

It should be recognized that often, besides the port authority, several other authorities, each representing a different interest, are involved in making a safety policy.

There might even be a strong tendency for each authority to make its own policy. This should be avoided since it may create a very confusing situation. Co-ordination between authorities should be an important part of making a port safety policy.

3.1.3 Operational level

On a strategic and tactical level a safety policy can be made nationally or even locally. Operational arrangements and standards often have to be dealt with internationally. Even though ports may try to influence these international standards, practically they have to deal with them as they are. This is the case with transport regulations.

3.2 Setting safety standards

Safety standards can take many forms. On an operational level, they tend to state which technical means should be used, which procedures should be used, etc. On a strategic and tactical level, they may take the form of defining an acceptable level of unsafeness. Basically, there seem to be two different approaches to the setting of safety standards (even though they often are used in combination):

- permanently reducing risk (one can always do better)

When this option is chosen, there is no need to set safety standards which take the form of an acceptable level of unsafeness. Rather than a weak point, this may be its strength. Getting accepted safety standards can be quite a problem in some cases. It is widely in use, for instance, in traffic safety (safety = the number of accidents).

In port areas this often takes the form of "best practice" or ALARA (as low as reasonably achievable).

However, below a certain level of risk, in terms of probability of an accident it becomes unproductive to reduce this probability even further.

- the setting of absolute safety standards (good is good enough or your best is not sufficient)

This would involve the setting of safety standards with the objective to reach a certain level of safety or, if you wish, unsafeness.

Once this level is reached, no further effort is necessary. Best practice and ALARA should be dropped.

Efforts should then be directed to maintaining the chosen level.

Most ports consider that they have reduced the probability of accidents to such an extent that there is no necessity to use the approach of permanently reducing risk.

Safety standards may be set on a strategic, tactical and operational level. Strategically and tactically, these standards are used to determine the acceptability of operational arrangements. Section 5 of this paper will discuss one way of setting such standards, which is based on QRA (Quantitative Risk Analysis).

This section will confine itself to the operational level.

Safe and efficient transport and trans-shipment is a matter of good management. Since several parties (let's say ship, terminal operator and port authority) are involved, the following aspects are essential to achieve this good management:

- It should be clear what the responsibilities are of the parties involved.
- There should be a good information process between the parties involved.

Tools for this end may be:

- Standardisation of operation arrangements
- Establishment of standard written procedures
- The exchange of information on loading and unloading planning should start well before the ship's entrance into the port. This gives all parties time to react and make preparations.
- In case of communication problems caused by language barriers, a person should be put aboard with sufficient technical and operational knowledge who is able to communicate in any common language with the ship's management.

3.3 Maintaining safety standards

Maintaining safety standards should be an integral part of a safety policy. It may be argued that standards which cannot be maintained or enforced should be regarded as "paper tigers". In formulating safety standards, the highest degree of attention should be given to this aspect.

Maintaining safety can be seen as consisting of three activities:

- monitoring
- evaluation
- corrective action

Together, these form the basic steps of a management cycle. Maintaining safety standards seems to be a subject which can be successfully approached as a management problem. Tools like steady state models seem to have possibilities.

Strategic and tactical level

On this level, monitoring often takes the form of gathering statistical information on port operations. Evaluation generally takes the form of safety studies in which this statistical information is evaluated. Corrective action may take many forms.

Operational level

On an operational level, maintaining safety standards is often a matter of enforcement. Inspections are a very useful tool. Monitoring takes the form of observing the technical arrangements and the degree to which procedures are followed, evaluation takes the form of judging whether standards are met, corrective action (taken immediately) may range from discontinuation of operations to no action at all.

It should be recognized that a well organised information process is essential in maintaining safety standards. Good information is the basis for efficient monitoring, the first step of the management cycle.

3.4 The safety policy of the Port of Rotterdam

The Port of Rotterdam sees safety as divided into four aspects:

1. safety of the shipping traffic
2. safety in the transport of dangerous goods
3. safety of the (marine) environment
4. occupational safety

As the RMPM has no authority in regard to the last type of safety – this is the working field of the Labour Inspectorate – just the first three items will be explored further.

3.4.1 General objectives of the safety policy

In accordance with the overall objective of the Rotterdam Municipal Port Management of promoting activity in the port and in industry, three safety objectives are defined:

- to maintain a sufficient level of safety inside the port

This objective is aimed at the internal safety of the port and its industrial area. The intent of this objective is to ensure that all activities can take place unhindered by accidents and their effects.

- to maintain an acceptable level of risk to the public outside the port and industrial area

It is the responsibility of the authorities to protect the quality of life in the region from the hazards inherent in port activities. These activities must be conducted in such a way that all reasonable precautions are taken to protect the safety and health of the public as well as the quality of the environment outside the port.

- to maintain water quality in the port such that the sludge can be dredged out of the harbour basins without any restrictions

If the water in the port is polluted due to shipping or industrial activities, extra (costly) precautions have to be taken in order to handle the dredged materials.

Polluted water and/or sludge threaten the long-term survival of the port. It is the responsibility of the authorities to ensure that (industrial) activities still will be possible in the future.

The safety in shipping traffic can be seen as the internal safety of the system, the transport of dangerous goods as determining the external safety. Protection of the environment means safety for the system in the long term.

4. Specific Issues

4.1 The zoning regulations in the Port of Rotterdam

4.1.1 Definitions used

This is an example of regulation on a tactical level. Historically the Waalhaven and Eemhaven area handles a great deal of packaged goods, including containers. Because of the concentrations of population in this area, restrictions on the handling of dangerous goods were called for.

Trans-shipment of dangerous goods in bulk is not allowed in this area.

The safety goal was formulated as creating a situation of negligible risk for the public. Two definitions of safety were used:

- safety = the probability of accidents

This was used to determine the relative risk of trans-shipment vs. storage.

- safety = the consequences of such an accident

This was used to determine which substances in what quantities may be handled in each zone.

The term accident was defined as any event resulting in a loss of content (spill).

The third definition was not used (safety = a function of both probability and consequences).

Performing a Quantitative Risk Analysis (QRA) for the transport of packaged dangerous goods would require a vast number of data on transport and accidents:

- transport frequency per type of packing (gas flasks, small tanks (= < 1000 l) and tank containers for gases, drums and tank containers for liquids) for each separate UN number;
- the locations where these cargo flows were handled;
- the accident rate for each of these types of packing.

Based upon these data, the effects and – when population densities are known – also the consequences can be calculated.

Especially the first group of data mentioned above is lacking here. This group, however, is crucial. Even a simplified method for a transport QRA is impossible to use.

Quantifying the risk is one thing, but the most important is to have an insight regarding how packaged dangerous goods can be handled without causing an unacceptable risk.

4.1.2 Description of the zoning regulations

Based upon extensive QRAs, the Port of Rotterdam has developed a zoning system for the handling of packaged dangerous goods. On one hand this system has been implemented in the Allowances of the Nuisance Act for stevedoring companies, on the other hand in the Rotterdam Port Bye-laws.

A first study indicated that only the substances of classes 2,3,6.1 and 8 of the IMDG code can cause lethal effects over distances of more than 100 metres. Subsequently, for all UN numbers of these classes the effect distances have been calculated with a standard scenario for all types of packing that are allowed according to the IMDG code.

Research on accident rates for standardized packing showed that the following general fail frequencies apply:

drum	10^{-4} per handling
box container/drums	10^{-6} per handling
tank containers/liquids	10^{-6} per handling
gas containers	10^{-8} per handling

The loading or unloading of the ship has been taken as the determining moment in the trans-shipment cycle. Consequently, a fall from a height of 12 metres has been chosen as the maximum credible accident. Drums and box containers with drums are as a rule damaged such that the complete contents of the single drum or of a number of drums are lost. Tank containers for liquids suffer such damage that the contents flow out in between half an hour and one hour. Small gas containers will release the gas in seconds, whereas for the larger types this takes approximately half an hour.

Comparison with the accident rates for storage and on-land transport showed that the unloading and loading activity was the dominant risk factor.

The result of the calculations was a table with a maximum distance over which fatal concentrations could occur for each possible combination of the type of packing and UN number.

Five zones were defined for the distance to housing areas:

Zone	Distance in metres
A	= < 100
B	> 100, = < 300
C	> 300, = < 500
D	> 500, = < 1500
E	> 1500

For each combination of packing and UN number, it was determined in which zone handling was allowed: the effect distance must be smaller than the lower zone distance.

In the A, B and C zones there are restrictions on what types of packing and quantities of groups of UN numbers are allowed to be handled. In the D zone there are no limitations on what packing is allowed to be handled, but there are some limitations as to quantities. In the E zone there are no limitations.

This approach meets the European criterion that due to the transport, handling or processing of dangerous substances the individual risks for those not involved in these processes must not exceed 10^{-6} per year (Post Seveso Directive).

The zoning system has the advantage that it is clear beforehand what the *possibilities* are. A QRA gives insight into what the risks are, but gives no direct answer how to reduce or manage them. Another strong point of this system is that it is possible to plan ahead, whereas a QRA for a future situation is hard to carry out because a terminal cannot know what dangerous goods will be handled in, for example, the next year.

4.2 Emergency preparedness and response

Level of abstraction: tactical, maybe operational.

4.2.1 The scaling of the incident response organisation

Incident response should not be a matter of improvisation but a matter of organisation, pre-planning and training.

Everything that can be arranged beforehand should be arranged.

For this aspect, safety is usually defined as the possible consequences of occurrences.

By means of hazard identification, Maximum Credible Accidents can be defined. This can be used as a basis to develop the incident response organisation.

Of course there is a relation to the preventive measures that have been taken. Preventive measures reduce the frequency of incidents or limit the possible consequences of incidents (or both). Up to a point, preventive measures and incident response seem to be interchangeable. Extensive preventive measures can lead to a relatively small incident response organisation, minimal preventive measures to a large one.

It should be kept in mind however that reductions in frequency alone should not automatically lead to a reduction in the incident response arrangements.

In the balancing of prevention and response, economic considerations play a large role. Generally both the total cost and the distribution of the cost over the parties involved determine the outcome of this balancing.

This balance may be different for different types of incidents:

- High frequency-small consequence incidents

For this type of incidents, prevention (with the objective to reduce the frequency of incidents) seems to be the most cost-effective approach. Firstly because the high frequency leads to heavy (therefore costly) demands on the incident response organisation, secondly because of the disruptive influence of these incidents on the economic process.

- Low frequency-major consequence incidents

This type of large scale accident seems to be the basis on which the incident response organisation should be scaled.

Prevention (with the object of limiting the consequences) can also be used. In dealing with this aspect, land use planning may also be considered a preventive measure.

- Catastrophes

Generally it is not possible to scale the incident response organisation on this type of incident. Therefore the only option open is prevention, to reduce both the probability and the consequences.

The matter of cost-effectiveness is a very difficult one for this type of incidents. It enters the subject of risk acceptance; whether the economic benefits of activities which may cause catastrophes outweigh the risks involved.

This, however, is a discussion on a strategic level.

4.2.2 Emergency response

More often than not, emergency response involves the co-ordination of several organisations like police, medical services, fire brigade, terminal operators, etc.

The basis of emergency response should be a balanced emergency plan.

This emergency plan should cover:

- General management

The tasks and responsibilities of the parties involved should be clearly stated, and the command and communication structure should be established.

Arrangements should be such that quick decision-making is possible.

The scale of the incident should determine the scale of the emergency response. Criteria for this purpose and standard procedures should be established.

- Co-ordination

Depending on the scale of the incident, several levels of co-ordination may be necessary. In any case there should be an on-scene command team in which all "core parties" are represented.

- Response plans

It is generally useful to develop response plans for different types of emergencies. In a port area such plans should be developed for both on-land and marine emergencies.

Marine emergencies may include spills, gas releases, fire and/or explosions on ships, and nautical accidents like collisions or groundings in the port area.

Emergencies never become routine. Even with excellent planning, improvisation plays a large role in emergency response. Therefore a great deal of training and regular exercises are a necessity. People and organisations should be prepared to deal with unexpected situations.

4.2.3 Technical means

Fire and/or explosions on ships

Standard land-based appliances generally are insufficient for dealing with ship-related emergencies, even when approachable from land (which is not always the case).

The size and especially the height of ships calls for more powerful tools. This means heavy and unwieldy machinery.

It is very practical to put this kind of machinery aboard boats. There are several advantages to be gained from this:

- easy transport
- the ability to approach an incident from the water
- in some cases, even a shortening of response time may be achieved

For incidents on land, these boats may be used in a supportive role. For instance, their ability to deliver large quantities of water may be very useful, permitting environmental considerations.

Spills

The incident response organisation should also be equipped with the means to handle spills on water. This may involve the capability to place oil booms to restrict the spreading of pools or, depending on the nature of the substance spilled, the capability to cover the pool with foam to prevent evaporation.

(This may lead to the use of several types of foam, or the use of an expensive all-purpose type.)

Gas releases

Handling gas releases often takes the form of predicting and monitoring the dispersion of the gas cloud, and evacuating (if feasible) the people in the dispersion area. In urban areas evacuation is often ineffective, a more effective procedure being to inform the inhabitants and try to get them to stay indoors.

Fighting the source in case of a gas leak and dealing with it is often very difficult or impossible. Difficult because of the high risk to personnel, sometimes impossible because of the speed of events.

Technical means necessary are gas detection teams, a good communication system, and well prepared evacuation arrangements.

Large spills of strongly evaporating highly toxic or flammable fluids are also handled this way. Gas detection may also be necessary in case of fires when toxic combustion products may be formed.

Collisions and groundings

These events can also take place with ships carrying dangerous cargo. Even when not resulting in a loss of containment, these incidents should be handled carefully.

In general it should be stated that any personnel involved in dealing with chemical incidents should have adequate personal protection (respiratory aids, gas protection suit and chemical protection suit) as well as the ability to use these protective devices.

4.2.4 Information

In incident response the availability of adequate information at all levels is crucial:

- operational personnel
- specialists
- decision-makers

The information process in a normal situation should therefore include the necessary information for incident response. At all times this kind of information should be available and accessible to the incident response organisation.

Therefore compulsory notification of dangerous goods to a central authority is highly recommended. This notification should include the following items:

- name of the ship (call sign or Lloyd's number);
- ETA (estimated time of arrival);
- ETD (estimated time of departure);
- Berth #1 (#2, #3,);
- name (address) of the ship's agent;

For every substance:

- correct technical name;
- UN number (+ proper shipping name);
- IMO classification;
- secondary labelling (if required in the IMDG code);
- flash point (range), in degrees C (if applicable);
- packing group;

- number and type of packing, only for packaged goods;
- total quantity, in kg or m³;
- stowage location;
- action intended at berth (loading/unloading/transit).

(In some cases, additional information may be required.)

In case of damaged or contaminated packing, or if the ship has any damage which may affect the safety of the ship or the port area, this has to be reported.

It seems advisable to centralize this information in order to make central co-ordination and control possible. In a large port this may mean that computerized databanks have to be used to keep track of the enormous quantity of data. If this is not the case, the possibilities for central control are limited. Mostly this leads to decentralized port management.

Once an incident has occurred, this type of information is vital. It forms the basic input for an incident response information system. This incident response system should give quick estimates on the nature of the hazard to the public and the extent of the threatened area.

A system like this may take the form of a handbook or be automated.

It should be able to give a very quick first estimate based on limited data, with the possibility of improving estimates as more information becomes available.

4.3 Land use planning

In land use (planning) the following items should be considered:

- the quantities, packing, type and nature of dangerous goods that are intended to be handled and transported;
- the probability of the occurrence of an accident in handling these materials and the possible effects on health and environment;
- other hazardous installations in the area;
- the availability of emergency procedures and services;
- population vulnerability and density in the area that might be affected;
- possibilities of evacuation or other measures to be taken;
- environmental pollution (air, water, soil).

In Quantitative Risk Analysis all these items may be taken into account. However, it should be recognized that other approaches may produce excellent results. Land use planning based on the possible effects of maximum credible accidents is a very good alternative, even though this may lead to a less intensive use of land.

4.4 Education and training

On this subject a differentiated approach seems to be in order. A distinction should be made between countries with a relatively high general standard of education and countries with a low general standard of education. If the workforce is largely illiterate, operations are organised on different lines. Supervision of the workforce then becomes very important, which leads to more levels in hierarchy, with corresponding educational requirements.

As a rule any worker should have knowledge and education befitting his responsibilities. If the educational standard of dock labour is high, it may be possible to make a worker responsible for his own safety. The worker then should be able to determine the risks of chemicals for his safety and health. The minimum requirement for this purpose is an understanding of labelling.

If this not the case, close supervision becomes a necessity.

In every labour unit someone (mostly the foreman) should have the ability to deal with small incidents. For this purpose he needs a higher level of education to determine which action should be taken. Basic chemical knowledge and basic training in incident response seem to be minimum requirements, apart from a sound knowledge of operating procedures.

First aid training may be necessary if such services are not provided centrally.

On a terminal level, one person should have a more extensive knowledge of regulations, chemicals and operating procedures. This may be the EEC prevention officer.

4.5 Quality of ships and crew

Ships and their crews are vital elements in port operations. They have a large contribution to make to the safety and environment in port areas. This has been recognized by both industry and authorities.

Both have launched programmes to set for both the technical quality of ships and the quality of crews and management. During the workshop these will be addressed.

An initiative from the authorities worth mentioning is the Green Award System.

The Green Award is a procedure for quality certification carried out by the Green Award Bureau, an independently validated organisation. Initially this certification is meant for crude oil tankers with a dead weight capacity over 50,000 tonnes.

In due course this will be extended to other categories of vessels such as product and chemical tankers, bulk carriers, ro-ro ships and ferries.

Apart from technical provisions, basic requirements are formulated for the quality of crew and management. Depending on the degree of meeting these requirements, a Green Award Certificate is granted.

Part of the Green Award scheme is creating benefits for carrying the Green Award Certificate.

5. Risk Analysis in Port Planning and Port Operations

Risk analysis seems best used as a decision supporting tool on a strategic and tactical level of abstraction. Operationally, its added value seems limited.

A risk analysis study can be a very complex (and expensive) process, even though there is a development towards easy to use and simplified methods.

Basically, a risk analysis process consists of three activities:

- Calculating risk levels in an acceptable way to all parties involved. It must be stressed that the results of these calculations are very much dependent on model parameters and the chosen input. If decisions have to be made based on calculation results, the input may become part of a negotiating process.
- It must be decided whether or not there is a need to reduce the risks. Practically, this can only be done by comparing the calculated risk to some sort of risk criteria.
- A course of action should be decided upon. This is the most important activity in a risk analysis. Inevitably in reaching this decision other factors, such as economic and social considerations, have to be taken into account.

5.1 Defining an acceptable level of risk

In the Netherlands (as in other countries, notably the UK, which has a leading role in this field) the use of Quantitative Risk Analysis (QRA) is well established as a method of managing the risk of major hazard activities.

The Dutch government, especially the Ministry of Housing, Physical Planning and Environment, have developed criteria to determine the acceptability of such risks.

For the purpose of QRA, risk is defined as a combination of the probability of the occurrence of an unwanted event and the possible extent of that event's consequences. This risk is expressed by two parameters:

- individual risk, defined as the chance per year that an unprotected person located at a specific position relative to the risk source is affected by the consequences of an event

- societal risk, defined as the relationship between the number of people killed in a single accident (N) and the chance (F) that this number will be exceeded. The use of this criterion makes it possible to take into account the size of the group of people that can be simultaneously victims of an accident.

These parameters differ fundamentally. The individual risk by definition is solely dependent on the activity itself. The societal risk results from the activity in relation to the population density around it.

The starting point for determining these criteria was the statement by the Advisory Committee on Major Hazards (appointed in the United Kingdom as a consequence of the Flixborough incident in 1974) that the risk from a hazardous activity to a member of the public should not be significant when compared to the risk in everyday life.

In the Netherlands, the maximum level of individual risk has been taken as the risk level which increases the risk of death from all other causes by a maximum of one per cent. The individual "natural death" risk run by the population group of ten to 14 years old (the most healthy population group), which is 10^{-4} per year, has been taken as the basic risk.

The maximum acceptable individual risk has thus been established at 10^{-6} per year.

Risk exposure levels of 10^{-8} a year are considered to be negligible.

For the maximum level of societal risk, a chance of 10^{-5} per year of an incident with 10 or more deaths has been set. A chance of 10^{-7} for ten or more deaths has been taken as the negligible level. Furthermore, the larger the possible number of deaths the lower the acceptable chance must be. In the Netherlands it has been decided that the consequence of "n" times greater must correspond to an acceptable chance n^2 smaller. (On a log scale this means a slope of -2.)

Initially developed for industrial plants, these criteria are more and more being applied to transport, trans-shipment and storage. For individual risk there is little technical difficulty in doing this.

At the moment, the Dutch government is studying the ways in which societal risk criteria may be applied to these activities.

(It must be noted that the Dutch approach to this subject is rather different from the UK approach, especially on societal risk. In the UK a more differentiated view is taken, by the use of concepts like Maximum Tolerable Societal Risk and National and Local Scrutiny Levels.)

5.2 Risk analysis in ports

Several studies have shown that the use of QRA techniques in port areas is technically feasible. The risk analysis study of the HSE on British ports is a good example. In the Netherlands, the Rotterdam Municipal Port Authority has made a study of the risks involved with the transport and trans-shipment of dangerous goods by seagoing vessel. In combination with the QRAs performed by local companies, a fairly comprehensive insight has been gained into the risk levels in the Port of Rotterdam and its surrounding areas.

A specific problem in the case of transportation-related activities such as those in ports is that the handled substances are classified according to international transport codes and these codes do not relate directly to parameters that are indicative of the actual risk to man or the environment of these substances. Therefore a method has been developed that enables the conversion of transport categories into categories suited for performing risk analyses.

On the basis of these analyses, the following conclusions were drawn:

Strategic conclusions:

No activity exceeds the levels set for individual and societal risk. This rather satisfactory situation can be explained by the fact that the port area and its present layout dates only from after World War II, and that from the start zoning policies were based on possible effect distances of maximum credible accidents. In combination with local regulation (like the zoning regulations; see 4.1 above), this leads to an acceptable situation.

Although at present no additional measures are required, a preventive policy is necessary to avoid future problems. Two developments are relevant in this regard:

- the expected growth of both petrochemical and harbour activities
- the need to create new urban developments in this area

Both developments need to be accommodated in the same area of land (about 20 km by 50 km). Therefore careful planning is needed to avoid an unnecessary increase in the number of people exposed to industrial risks.

Tactical conclusions:

The overall risk to the public is dominated by the transport in bulk of flammable and toxic liquid substances. This is caused by the high transport volume combined with the fact that these substances are transported in single hull tankers, which makes these ships relatively (as compared with double hull ships or gas carriers) vulnerable in case of collision.

The contribution to the overall risk of the transport of gases is considerably lower. This is caused by the relatively low transport volume, combined with the very solid construction of gas carriers. The probability of loss of containment in case of a collision is appreciably lower.

Frequency of spills in port basins is dominated by loading and unloading accidents. The average volume spilled is much smaller than the volume spilled due to collisions.

Collisions in port basins are not to be neglected, even though speeds are lower than outside the basins. Collision frequency in port basins is higher than on the waterways, even if the extent of damage seems to be lower.

Literature

1. "Agios Ionannis"
Reportage van gebeurtenissen met betrekking tot het incidentschip "Agios Ioannis"
Rotterdam Municipal Port Management
August 6, 1981
2. Resultaten onderzoek van het Incident "Energy Concentration"
Rotterdam Municipal Port Management
July 1981
3. H.B. Hanekamp
The handling of dangerous goods
(to be published)
4. H.B. Hanekamp
Effect and risk estimation for contingency planning
1992
5. Alan E. Branch
Elements of port operation and management
Chapman and Hall, 1987
6. Types of port management in the Netherlands
Technical and Managerial Port Assistance Office (TEMPO)
Rotterdam Municipal Port Management
1993
7. L. Goossens, P.V. Heimplaetzer, W. Heins
Gebruikerseisen Risico-effect model
University of Delft
March 1990
8. Incidentenregeling Haven van Rotterdam
Kring van veiligheidsfunctionarissen voor de haven van Rotterdam
June 1983

9. Green Award
Information leaflet
Green Award Bureau
1993

10. 1987 Rotterdam Port Bye-laws
The Council of the Rotterdam Municipality

11. The Port regulations on dangerous substances
The Council of the Rotterdam Municipality

12. Risico Vervoer Gevaarlijke Stoffen Zeevaart
In the series "Safety as a Product"
Rotterdam Municipal Port Management
July 1992

13. Major hazard aspects of the transport of dangerous substances
Health and Safety Commission
HMSO, London
1991

14. The implementation of the Seveso Directive in the Netherlands,
with emphasis on transportation related establishments
C.J. van Kuijen
Ministry of Housing, Physical Planning and Environment
1993

Background Document: The Port Legal Environment

J.L. Alexander

Docks National Interest Group Leader
Health and Safety Executive
United Kingdom

Why do we need legislation? In a perfect world we should not, but we all know we do not live in a perfect world. Of necessity ports employ people and people make mistakes and mistakes lead to accidents. In fact it is generally recognised that 80 per cent of accidents involve human factors. Legislation is therefore necessary to set standards. Legal standards are minimum standards, necessarily lagging behind current best standards in any industry. Like anything else in life, standards and legislation are not static but develop and therefore require updating from time to time

A commercial port can be defined as a particular type of intermodal transfer point where one of the modes of transport is marine. Any other mode of transport, including road, rail, inland waterway, air or pipeline, may also be involved. All are likely to be different and subject to their own particular domestic regulatory regimes. In many cases they may also be subject to international Conventions, Recommendations and Agreements. Further legal requirements may also relate to matters such as land use planning, the storage and use of chemicals at major hazard installations, and environmental pollution, to name just a few.

Where should we start to consider such a complex range of topics? So far as chemicals are concerned, I suggest we can consider five topics – land use planning, manufacture, storage, use, and cargo in transit. Of these the most difficult is cargo in transit, as this may affect many people as it passes along the transport chain, which will often pass through the jurisdiction of two or more countries.

Legislation relating to land use planning, the manufacture and use of chemicals in port areas, and the storage or warehousing of chemicals in port areas needs to be no different from that applying to such premises elsewhere in a port state and should therefore be subject to its normal domestic legislation.

Cargo in transit

Cargo in transit is another matter. Such cargo may include both packaged and bulk dangerous goods which will be loaded and unloaded in ports. Packaged dangerous cargoes may also be present in ports for short periods for consolidation or dispersal. Most ports wish to be in the business of handling any cargo offered, often at short notice. Whilst safeguards are clearly required, they need to be practicable and proportionate to the risk. They should

cause the minimum necessary impediment to legitimate trade. Unnecessary or lengthy bureaucratic requirements are likely to be ignored or result in trade being lost to ports in other regions or countries.

Let us consider a typical load of dangerous goods such as a freight container of chemicals passing through a port. It may have been packed at an inland depot a considerable distance from the port from which it will be shipped. Clearly the cargo should be packed and secured so as to withstand the most arduous part of the journey, often the sea leg. How should it be marked and placarded during its journey to the port? Should this be in accordance with the domestic road transport legislation or the IMDG Code which will govern its marking and placarding once it is on board ship? If it goes to the port by road it will of course be subject to the relevant domestic legislation during the journey to the port, but how far should that legislation extend? Should it only apply on the public road or also apply in the port area? If it applies in the port area, when should it cease to apply? This needs to be considered in connection with cargo in vehicles driven directly onto ro-ro ships in the port and cargo which is temporarily stood down in the port area for consolidation purposes prior to the arrival of a ship. On the ship the cargo is likely to be subject to relevant maritime legislation, not only of the flag state of the ship, but also that of both the originating and destination port states whilst it is in one of their ports. On arrival and discharge, the cargo is likely to be subject to port and domestic road transport legislation of the destination country or countries.

Uniform standards

The scope for confusion and need for internationally agreed standards is obvious, and this has been recognised for individual transport modes for many years. The relevant requirements of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), the Regulations concerning the International Carriage of Dangerous Goods by Rail (RID), the International Maritime Dangerous Goods Code (IMDG) and the Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO) are well known to those in the transport industry. The last two are better known globally. For historical reasons the different modal requirements have all been developed independently and the current move to harmonise them with the Recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods is considered by many to be long overdue. Common general principles and requirements for classification, packing and labelling with detailed mode specific requirements in the individual international modal codes will be welcomed by all. It is pleasing to note that a large measure of harmonisation will have been achieved shortly. Increasingly, domestic dangerous goods legislation is being harmonised with international standards and contains derogations from domestic requirements if international shipments fully comply with recognised international standards.

Temporary keeping of cargo

Whilst harmonisation of legal requirements with the United Nations Recommendations is increasingly providing seamless standards for cargo actually in transit, what standards should be applied to cargo that is temporarily stood down in a port? Problems will not generally arise in connection with bulk cargoes as these tend to be handled at berths associated with manufacturing or storage premises which will be subject to a relevant domestic legislation, including, perhaps, that relating to major industrial accident hazards, and

recognised international guidance, such as the International Safety Guide for Oil Tankers and Terminals (ISGOTT).

What standards should be applied to packaged dangerous cargo which is temporarily present in a port for consolidation or dispersal? The intrinsic hazards of the dangerous cargo will of course be unaltered but what of the risks associated with it? There will be none of the risks associated with the manufacture or use of the dangerous substances and other risks may well be reduced by the fact that they are properly packed, for example in UN packagings, in a freight container. The main risks are from loss of containment which is likely to be due to inadequate packing and securing, which will normally have been undertaken outside the port, or accidental damage which may be due to a traffic accident or mishandling. It is appropriate to consider the likelihood of traffic accidents on a public road, possibly in an urban area, and in a port and their respective potential consequences. Consider the similarities and differences between the consequences of an accident in an urban lorry park, a motorway service station, a ro-ro port lorry park and a dedicated port container park where freight containers are temporarily stood down.

It has been estimated that dangerous goods represent about 10 per cent of freight container traffic. How should such goods be segregated? On board a ship there is no doubt it should be in accordance with the IMDG Code. What principles should be adopted ashore? Is it good enough, as some would contend, to position the container randomly on the principle that the much larger quantities of non hazardous cargoes will act as a buffer? Should such containers be segregated on the basis of IMDG Code, with which the port will already be necessarily working, or on the basis of some other principle?

Are there other matters that should be considered? Should any restriction be placed on the stacking of tank containers? Should additional requirements or limitations be placed on any specific dangerous substances such as explosives, radioactive materials, infectious substances etc.?

The interaction and interrelation of different modes of transport in ports and the international dimension, including many of the matters mentioned above, have been recognised by the International Maritime Organization. As long ago as 1973 the Organization circulated a Recommendation on the Safe Practice on Dangerous Goods in Ports and Harbours. A revised version of the current Recommendations to Governments on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas will be considered by the Organization's sub-Committee on the Carriage of Dangerous Goods in January 1994. In revising the recommendations it has been borne in mind that the infrastructure, resources and legal systems of countries vary considerably. The Recommendations have therefore been drafted flexibly to enable them to be implemented by different legal systems in different countries but still be complementary.

Enforcement

Legal requirements by themselves are of little use unless they are implemented by those in control of operations and enforced. By whom should they be enforced? At first sight or in general principle, there would seem to be little problem and it might seem obvious that matters relating to dangerous cargoes on ships should be dealt with by the relevant marine enforcement agency and those relating to dangerous cargoes on shore should be dealt with by the shore side enforcement agency. Oh that real life was so simple! Enforcement bodies

and the extent of their authority vary widely. A Captain of the Port may be responsible for all that happens in the port or only certain matters. He may have no powers in connection with road or rail vehicles which are not to travel by sea and no control over the activities of container packers outside the port. Water police may deal with dangerous cargoes, but not with other dangerous substances in a port. Shore authorities may belong to national or local enforcement bodies, port authorities or even insurance organisations. Often shore based employees such as stevedores will work both on shore and on board ships. What enforcement authority should be responsible for their health and safety, or should more than one be involved? The matter is further complicated when one considers matters such as land use planning and environmental pollution which can also be associated with the handling of dangerous cargoes. Additional enforcement authorities are likely to be involved, possibly including the port authority itself, who could be faced with enforcing legislation against its own clients. Does this result in a conflict of interests?

On what basis should the legal requirements be enforced? Should there be a licensing or an approval system? Is such a system liable to lead to complacency and be seen as transferring responsibility from those in control of hazards to the enforcing authority? Should enforcement be by routine or random checking or by some other system? To what extent should this include management systems as well as physical precautions?

The elusive interface

Too often policy makers and others seek to identify an interface with clearly defined responsibilities on either side of a line. But where should the line be drawn? The reality is that there are few such clear interfaces. In practice, there are usually overlaps and when one considers the function of an intermodal transfer point it should be clear that this is necessarily so. It should be acknowledged that the movement of cargo through ports is often part of an international transport operation, and that domestic legal requirements should therefore be compatible with the international requirements and that the standards required by the various regulatory authorities throughout the transport chain should be both consistent and complementary. It is also essential that there is close liaison between enforcing authorities in a country to ensure consistency on a day to day basis. I particularly welcome the increasing international liaison between enforcing authorities in different countries.

An example

The British situation can serve as an example of the complexity of real life. All work activities are covered by the general requirements of the Health and Safety at Work Act. This may be enforced by the Health and Safety Executive or by local authorities, but in dock premises will be enforced by the Health and Safety Executive. Land use planning is generally a matter for local authorities, but the major industrial accident hazard aspects of the manufacture, storage and use of chemicals is a matter for the Health and Safety Executive. Legislation relating to the carriage of dangerous goods by road and rail is also enforced by the Health and Safety Executive and extends into a port area until the dangerous goods are unloaded from a vehicle. Once a vehicle is loaded onto a ship, however, Merchant Shipping Regulations will apply and be enforced by Department of Transport. The loading of dangerous goods on the ship will be subject to legislation implementing International Labour Office Convention 152, the Docks Regulations enforced by the Health and Safety Executive so far as stevedores are concerned and complementary Merchant Shipping Regulations enforced

by the Department of Transport in connection with the activities of the crew. The International Maritime Organization's Recommendations on the Safe Transport, Handling and Storage of Dangerous Substances in Port Areas have been implemented by the Dangerous Substances in Harbour Areas Regulations, which are enforced by the Health and Safety Executive and Statutory Harbour Authorities, whilst the International Maritime Dangerous Goods Code is implemented on ships by the Merchant Shipping (Dangerous Goods and Marine Pollutants) Regulations which are enforced by Department of Transport. Pollution matters are variously enforced by the Departments of Transport and the Environment, local authorities, and the National Rivers Authority.

Overlaps between the various legal requirements are often necessary and considerable efforts are made to ensure that requirements are consistent. In several cases legislation has been drafted to be complementary, so that the same standards are required in practice by the various enforcement authorities. Formal Liaison Committees between several enforcement authorities have been set up at national level, and day-to-day liaison at local level is encouraged to ensure consistency.

Sometimes, however, interests can conflict and it may be necessary to agree a pragmatic compromise. For instance there is concern in a number of quarters that European Community proposals for requiring vapour emission control systems for volatile organic compounds on large ships should not result in a minor environmental hazard being replaced by a major explosion hazard to both the ship and shore installation.

IMO's Strategy for Port Interface

We should also note the International Maritime Organization's recent initiative in setting up in 1992 a Working Group on Strategy for Port Interface (SPI). The Working Group acknowledged the considerable number of inter-governmental and non-governmental organisations undertaking activities in connection with various aspects of port operations and had no wish to duplicate the work of such bodies. The Working Group is therefore seeking to identify existing information which is available and work in hand to identify topics needing further consideration prior to its next meeting in December 1993.

Handling

Finally we need to remember that in many ways chemicals are no different from any other cargo handled in ports, and loss of containment can occur due to mishandling or failure of equipment such as a ship's derrick. As ever, prevention is better than cure and in the case of chemicals clean-up costs may far outweigh the value of the cargo.

Heads of Delegations to the OECD Expert Group on Chemical Accidents

ALLEMAGNE
GERMANY

Dr. Hans-Jürgen PETTELKAU
Federal Ministry for Environment,
Nature Conservation and Reactor Safety
Schiffbauerdamm 15
D-10117 Berlin

AUSTRALIE
AUSTRALIA

Mr. Leo CRUISE
Deputy Permanent Representative
Delegation of Australia to the OECD

AUTRICHE
AUSTRIA

Dr. Margareta STUBENRAUCH
Federal Ministry for the Environment, Youth
and the Family
Untere Donaustraße 11
A-1020 Wien

BELGIQUE
BELGIUM

M. Jan GORIS
Service du génie sanitaire — Installations à risques
Ministère de la santé publique et de l'environnement
Bvd Pachéco, 19 boîte 5
B-1010 Bruxelles

CANADA
CANADA

Mr. J.E. SLATER
Director, Environmental Emergencies Branch
Environmental Protection Service
Environment Canada
Ottawa, Ontario K1A 0H3

DANEMARK
DENMARK

Mr. Hans Christian ELLEHAUGE
Head of Division
National Agency of Environmental Protection
Strandgade 29
DK-1401 Copenhagen

ESPAGNE
SPAIN

Mr. Francisco J. RUIZ BOADA
Dirección General de Protección Civil
Quintiliano, 21
28002 Madrid

ETATS-UNIS
UNITED STATES

Mr. Jim MAKRIS
Director
Chemical Emergency Preparedness and
Prevention Office (5101)
Environmental Protection Agency
401 M Street, S.W.
Washington D.C., 20460

(Chairman)

FINLANDE
FINLAND

Mr. Esko ULVELIN
Assistant Director
Technical Inspection Centre
Department of Safety Technique
PO box 44
SF-00811 Helsinki

FRANCE
FRANCE

Mme Odile GAUTHIER
Délégation aux risques majeurs
Ministère de l'environnement
20, avenue de Ségur
75007 Paris

ITALIE
ITALY

Mr. Sebastiano SERRA
Ministry of Environment
SIAR
Via della Ferratella, 33
00184 Roma

JAPON
JAPAN

Mr. Yasuo TAKAHASHI
First Secretary
Delegation of Japan to the OECD

NORVEGE
NORWAY

Mr. Gunnar HEM
Head of Corporate Legal Affairs,
The Norwegian Directorate for Fire and
Explosion Prevention
P.O. Box 355
Nedre Langgt. 20
3101 Tønsberg,

PAYS-BAS
NETHERLANDS

Mr. Gerard LOMMERS
Ministry of Housing, Physical Planning
and the Environment (IBV 655)
PO BOX 30945
2500 GX The Hague

PORTUGAL
PORTUGAL

Mr. Rui Figueiredo SIMOES
Secrétariat d'Etat à l'Environnement
Direction générale de l'Environnement
Av. Alm. Gago Coutinho, 30-6
1000 Lisboa

ROYAUME-UNI
UNITED KINGDOM

Mr. Alan V. JONES
Head, Hazardous Installations Policy Branch
Health and Safety Executive
Magdalen House
Stanley Precinct
Bootle, Merseyside L20 3QZ

SUEDE
SWEDEN

Mr. Ulf BJURMAN
Deputy Assistant Under Secretary
Ministry of Defence
S-10333 Stockholm

SUISSE
SWITZERLAND

M. Hans Peter HAURI
Chef de la Division Sécurité des installations
et sites contaminés
Office fédéral de l'environnement,
de la forêt et du paysage
Département fédéral de l'intérieur
Hallwylstrasse 4
CH-3003 Bern

TURQUIE
TURKEY

Mrs. Lale ÜLKE
Permanent Delegation of Turkey to the OECD
9, rue Alfred-Dehodencq
75116 Paris

COMMISSION EUROPEENNE (CE)
EUROPEAN COMMISSION (EC)

Mr. Timotheos SMYRNIOTIS
European Commission
Directorate General XI
TRMF 174 04/72
200 rue de la Loi
B-1049 Brussels

COMMISSION ECONOMIQUE EUROPEENNE (CEE)
ECONOMIC COMMISSION OF EUROPE (ECE)

Mr. G. DE BELLIS
Chief, Environment Section
Environment and Human Settlement Division
Palais des Nations
CH-1211 Geneva
Switzerland

PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT (PNUE)
UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

CENTRE DES NATIONS UNIES POUR L'ASSISTANCE ENVIRONNEMENTALE
D'URGENCE (CNUAEU)
UNITED NATIONS CENTRE FOR URGENT ENVIRONMENTAL ASSISTANCE (UNCUEA)

Mr. Alain CLERC
Director
United Nations Centre for Urgent
Environmental Assistance
15, chemin des Anémones
1219 Châtelaine — Geneva

CENTRE RÉGIONAL MÉDITERRANÉEN POUR L'INTERVENTION D'URGENCE CONTRE
LA POLLUTION MARINE ACCIDENTELLE
REGIONAL MARINE POLLUTION EMERGENCY RESPONSE CENTRE FOR THE
MEDITERRANEAN SEA (REMPEC)

M. J.C. SAINLOS
Directeur
Manoel Island
Malta

CENTRE D'ACTIVITÉ DU PROGRAMME INDUSTRIE ET ENVIRONNEMENT (IE/CAP)
INDUSTRY AND ENVIRONMENT PROGRAMME ACTIVITY CENTRE (IE/PAC)

Mme Jacqueline ALOISI DE LARDEREL
United Nations Environment Programme
Industry and Environment Programme Activity Centre
Tour Mirabeau
39-43 quai André-Citroën
75739 Paris Cedex 15

UNEP/IRPTC

Mr. Burkhard WAGNER
UNEP/IRPTC
Case postale 356
15 Chemin des Anémones
CH-1219 La Châtelaine Geneva
Switzerland

PROGRAMME INTERNATIONAL SUR LA SECURITE DES SUBSTANCES CHIMIQUES (PISSC)/INTERNATIONAL PROGRAMME ON CHEMICALS SAFETY (IPCS)

Dr. M. MERCIER

Director
International Programme on Chemical Safety
(UNEP, ILO, WHO)
World Health Organization
CH-12 Geneva 27
Switzerland

ORGANISATION MONDIALE DE LA SANTE (OMS)
WORLD HEALTH ORGANISATION (WHO)

PACO

Mr. Tuomo ESKELINEN

Environmental Hygienist
World Health Organization
Pan American Health Organization
Pan American Centre for Human Ecology
and Health (ECO)
Apartado Postal 37-473
06696 Mexico, DF

ORGANISATION DES NATIONS UNIES POUR LE DEVELOPPEMENT INDUSTRIEL
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION (UNIDO)

Dr. B. SUGAVANAM

UNIDO
P.O. Box 300
A-1400 Vienna
Austria

ORGANISATION MARITIME INTERNATIONALE (OMI)
INTERNATIONAL MARITIME ORGANIZATION (IMO)

Mr. David EDWARDS

Head, Environment Programme Division
Marine Environment Division
4, Albert Embankment
London, SE1 7SR
United Kingdom

BUREAU INTERNATIONAL DU TRAVAIL (BIT)
INTERNATIONAL LABOUR ORGANISATION (ILO)

Mr. Seiji MACHIDA
Occupational Safety and Health Branch
ILO-BIT
Ch-1211 Genève
Switzerland