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Number 7

Report of the Special Session on Environmental Consequences of Chemical Accidents, Paris, France, 28 November 2000

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Series on Chemical Accidents

No. 7

Report of the Special Session on Environmental Consequences of Chemical Accidents

Paris, France, 28 November 2000

IOMC

INTER-ORGANIZATION PROGRAMME FOR THE SOUND MANAGEMENT OF CHEMICALS

A cooperative agreement among UNEP, ILO, FAO, WHO, UNIDO, UNITAR and OECD

Environment Directorate
ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT
Paris 2002

REPORT of the SPECIAL SESSION on ENVIRONMENTAL CONSEQUENCES of CHEMICAL ACCIDENTS

(Paris, France, 28 November 2000)

Some other OECD publications related to chemical accident prevention, preparedness and response:

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* (1992) [Under Revision]

International Directory of Emergency Response Centres (first edition, 1992) [prepared as a joint publication with UNEP-IE; under revision]

Report of the OECD Workshop on Strategies for Transporting Dangerous Goods by Road: Safety and Environmental Protection (1993)

Health Aspects of Chemical Accidents: *Guidance on Chemical Accident Awareness, Preparedness and Response for Health Professionals and Emergency Responders* (1994) [prepared as a joint publication with IPCS, UNEP-IE and WHO-ECEH]

Guidance Concerning Health Aspects of Chemical Accidents. *For Use in the Establishment of Programmes and Policies Related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances* (1996)

Report of the OECD Workshop on Small and Medium-sized Enterprises in Relation to Chemical Accident Prevention, Preparedness and Response (1995)

Guidance Concerning Chemical Safety in Port Areas. *Guidance for the Establishment of Programmes and Policies Related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances. Prepared as a Joint Effort of the OECD and the International Maritime Organisation (IMO)* (1996)

New OECD Series on Chemical Accidents:

No. 1, Report of the OECD Workshop on Risk Assessment and Risk Communication in the Context of Chemical Accident Prevention, Preparedness and Response (1997)

No. 2, Report of the OECD Workshop on Pipelines (Prevention of, Preparation for, and Response to Releases of Hazardous Substances (1997)

No. 3, International Assistance Activities Related to Chemical Accident Prevention, Preparedness and Response: Follow-up to the Joint OECD and UN/ECE Workshop to Promote Assistance for the Implementation of Chemical Accident Programmes (1997)

No. 4, Report of the OECD Workshop on Human Performance in Chemical Process Safety: Operating Safety in the Context of Chemical Accident Prevention, Preparedness and Response (1999)

No. 5, Report of the OECD Workshop on New Developments in Chemical Emergency Preparedness and Response, Lappeenranta, Finland, November 1998 (2001)

No. 6, Report of the OECD Expert Meeting on Acute Exposure Guideline Levels (AEGLs) (2001)

Internet Publication, Report of CCPS/OECD Conference and Workshop on Chemical Accidents Investigations (2002)

Special Publication, International Directory of Emergency Response Centres for Chemical Accidents (2002)

About the OECD

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation in which representatives of 30 industrialised countries in North America, Europe and the Pacific, as well as the European Commission, meet to co-ordinate and harmonise policies, discuss issues of mutual concern, and work together to respond to international problems. Most of the OECD's work is carried out by more than 200 specialised Committees and subsidiary groups made up of Member country delegates. Observers from several countries with special status at the OECD, and from interested international organisations, attend many of the OECD's Workshops and other meetings. Committees and subsidiary groups are served by the OECD Secretariat, located in Paris, France, which is organised into Directorates and Divisions.

The work of the OECD related to chemical accident prevention, preparedness and response is carried out by the Working Group (formerly Expert Group) on Chemical Accidents, with Secretariat support from the Environment, Health and Safety Division of the Environment Directorate. The objectives of the Chemical Accidents Programme include exchange of information and experience, analysis of specific issues of mutual concern in Member countries, and development of guidance materials related to chemical accident prevention, preparedness and response. As a contribution to meeting these objectives, over a dozen Workshops have been held since 1989.

As part of its work on chemical accidents, the OECD has issued several Council Decisions and Recommendations (the former legally binding on Member countries), as well as numerous Guidance Documents and technical reports (see partial list on page 5 and 6). Publications include the OECD's *Guiding Principles for Chemical Accident Prevention, Preparedness and Response*; *Guidance Concerning Chemical Safety in Port Areas* (a joint effort with the IMO); *Guidance Concerning Health Aspects of Chemical Accidents*; the joint IPCS/OECD/UNEP/WHO publication, *Health Aspects of Chemical Accidents*; and the joint OECD/UNEP *International Directory of Emergency Response Centres* (currently being revised by the OECD, UNEP-TIE and the Joint UNEP/OCHA Environment Unit).

The Environment, Health and Safety Division produces publications in seven series: **Testing and Assessment**; **Good Laboratory Practice and Compliance Monitoring**; **Emission Scenario Documents, Pesticides**; **Risk Management**; **Harmonisation of Regulatory Oversight in Biotechnology**; and **Chemical Accidents.** More information about the Environment, Health and Safety Programme and EHS publications is available on the OECD's web page.

This publication was produced within the framework of the Inter-Organisation Programme for the Sound Management of Chemicals (IOMC).

The Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and the OECD (the Participating Organisations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. UNITAR joined the IOMC in 1997 to become the seventh Participating Organisation. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organisations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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FOREWARD

This report presents the main output of the OECD Special Session on Environmental Consequences of Chemical Accidents, which took place in Paris, on 28 November 2000. This one-day session was organised by the Working Group on chemical Accidents and prepared with the assistance of the Finnish delegation.

Thirty-five experts attended the special Session, representing fourteen Member countries, the European Commission (EC), UN Environment Programme (UNEP), the Joint Environment Unit of UNEP and UN Office for the Co-ordination of Humanitarian Affairs (OCHA), and the Business and Industry Advisory Committee to the OECD (BIAC).

The Special Session had the following objectives:

- improving understanding of environmental consequences of chemical accidents, and exchanging experience;
- providing input for the on-going revision of the OECD Guiding Principles on Chemical Accident Prevention, Preparedness and Response;
- helping identify areas where further research and future OECD activities are needed.

The Working Group on Chemical Accidents, who met immediately after the Session, on 29th November to 1st December 2000, reviewed the draft report of the Session, endorsed it and recommended that it be published.

The present document includes the following:

- the introduction and an overview of the Session;
- the section "Conclusions and Recommendations";
- the Background Document prepared by Finland to set up the context and initiate discussions (Annex 1);
- the List of Participants (Annex 2); and
- the Session Agenda (Annex 3).

The OECD' Working Group on Chemical Accident recommended that this report be forwarded to the Joint Meeting of the Chemicals Committee and Working Party on Chemicals, Pesticides and Biotechnology, for consideration as an OECD publication. The Joint Meeting agreed that it should be made available to the public. It is published under the authority of the Secretary General of the OECD.

INTRODUCTION

At its 8th Meeting in 1998, the OECD Working Group on Chemical Accidents agreed that a project should be initiated related the assessment of environmental consequences of chemical accidents. This was in response to one of the recommendations of the 1995 OECD Workshop on Risk Assessment and Risk Communication.

A questionnaire was circulated in September 1998 to gather information concerning related activities in Member countries and other international organisations. Following a review of the responses to this questionnaire, the 9th Meeting of the Working Group (October 1999) agreed that a one-day Special Session be held in conjunction with its 10th Meeting in order to:

- improve understanding of this issue, and exchange experience;
- identify "best practices" in assessing and using data on environmental consequences for prevention, preparedness and response to chemical accidents;
- provide input into the second edition of the OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response (to be published in 2002);
- suggest areas where further research is needed; and
- recommend future activities at the OECD, if appropriate.

It was agreed that the Session would not address human health aspects of chemical accidents in order to focus on those environmental issues where there is substantial lack of knowledge (although it was recognised that humans are part of the environment). Particular attention was paid to accidents affecting ground and surface water. The Session did not consider issues related to long-term clean-up, nor to the effects of non-accidental (chronic) releases of chemicals.

It was recognised that accidents with environmental consequences could have significant economic and social impacts. For example, there could be major adverse effects on fishing and agricultural industries, on tourism, and on the availability of drinking water supplies. However, these related issues were not discussed in any detail.

OVERVIEW OF THE SPECIAL SESSION

The delegation of Finland took the lead in organising the Special Session, and Harriet Lonka (Finnish Environment Institute) prepared a Background Document (see Annex 1) setting the stage for discussions and analysing the responses to the 1998 questionnaire.

There were 35 participants (see Annex 2) at the Special Session, representing 14 Member countries, the European Commission (EC), UN Environment Programme (UNEP), the Joint Environment Unit of UNEP and UN Office for the Co-ordination of Humanitarian Affairs (OCHA), and the Business and Industry Advisory Committee to the OECD (BIAC).

The agenda (see Annex 3) had two substantive parts:

- **Prevention and Preparedness** (focussing on risk assessment methods and practices used to identify and evaluate environmental aspects of potential accidents); and

- **Response and Post-Accident Aspects** (focussing on accident response, reporting and post-accident studies and their impact on the environmental aspects of risk assessments).

During each of the parts, there were three presentations and substantial discussion among all participants.

- The first part of the Special Session provided the opportunity to learn more about three national initiatives in developing methodologies for environmental risk assessments, including the "Proteus" Programme in the Netherlands, the "Environmental Accident Index" in Sweden, and the "source, pathway, receptor" risk assessment model in the UK.

- During the second part, there were presentations concerning the work of the EC Technical Working Group on Substances Dangerous to the Environment, as well as the experience of the UNEP Balkans Task Force, and the Baia Mare Task Force.

Other relevant initiatives were identified, such as:

- the Finnish research projects in this area;

- the German classification scheme for substances toxic to water;

- the German aid projects to help countries affected by the Baia Mare accident to develop safety measures for hazardous installations, particularly those measures that can be implemented in the short term at low cost;

- the work of the International Commissions on the Rhine, Elba and Danube River to collect accident information and develop classification systems and guidance materials[1];

[1] The German delegate provided further documentation on the index being developed by the Elba Commission, which will divide toxic properties into three classes.

- the US-Russia initiative on the "Global Disaster Information Network" (GDIN), using satellite technology to identify contaminated areas as well as areas posing a threat of an imminent natural or technological disaster;[2]

- the UNEP efforts to develop APELL for the mining industry;

- the effort to develop a "cyanide code" by UNEP, ICME and the Gold Institute; and

- the EC Commission Communication related to the safe operation of mining accidents.

[2] Representatives of a number of countries requested further information about this initiative.

CONCLUSIONS AND RECOMMENDATIONS OF THE SPECIAL SESSION[3]

CONCLUSIONS

Assessing Environmental Consequences

1. The Special Session noted that the issues associated with assessing environmental consequences of accidents, and identifying appropriate prevention, preparedness and response actions, are very complex. This is due, in large part, to the lack of sufficient data and tools to assess environmental consequences of accidents and to identify means to prevent and mitigate such consequences. The participants identified a number of reasons why assessing environmental consequences is so difficult, including:

- the large number of possible environmental receptors (e.g., flora, fauna), and the lack of understanding about how each of these are affected by exposure to chemicals;
- the large number of possible pathways (e.g., soil, ground water, surface water, air);
- the limited understanding of how chemicals could move, disperse, react, and transform in the environment; and
- failure to collect sufficient data about the environmental aspects of past accidents.

2. The participants noted that the fact that the task of assessing environmental risks is complex is not a reason for avoiding it; rather, efforts should be made to tackle the problem, starting with simple models. Over time these can be further developed and gaps can be filled in.

3. The Session welcomed the presentations on the tools being developed to improve environmental risk assessments, which should provide a basis for improved prevention and preparedness for chemical accidents. Such tools can also help to identify priorities for further activities and focus resources on the areas of greatest need. Participants recognised that the tools are not perfect, but should provide a good starting point for tackling the problem, and it is expected that the tools will be refined and improved based on experience.

4. It was agreed that efforts should be made to share experience among countries with respect to the development and application of methods and tools for the assessment of environmental risks. In this regard, it was noted that, in addition to the ongoing research projects, there will be substantial experience gained over the next year in connection with the review of safety reports submitted pursuant to the "Seveso II" Directive in European Union (EU) countries and the risk management plans in the US.

5. The participants stressed the importance of being proactive, in trying to develop the ability to anticipate and prevent future accidents with environmental consequences. In this regard, it was noted that often substances that are not expected to be hazardous to the environment could transform and create

[3] This text incorporates a limited number of comments made by the 10th Meeting of the Working Group, 29 November - 1st December 2000.

significant hazards, or that there could be synergistic effects involving small quantities of chemicals, causing significant impacts.

6. Participants recognised that, in addition to the development of scientific information and technical tools, it is important to provide decision-makers and response personnel with guidance in a form and language that they can understand.

- The meeting also noted that, in developing laws, regulations and guidance, it is important to strike an appropriate balance between the benefits of additional environmental protection and administrative feasibility (i.e., the ability to implement and enforce any such requirements). The example was given that if the EC sets the threshold levels for chemicals dangerous to the environment too low, it will result in such a large number facilities being included that it would not be practical to implement; if the threshold levels are set too high, then facilities that pose significant risks will not be included.

- In addition, participants mentioned the value of using the "precautionary principle" in developing policies related to the environmental consequences of chemical accidents, in light of the uncertainties involved (e.g., due to the limited information and tools available to predict and assess such consequences.)

7. The Session recognised the value of "product stewardship" in order that chemicals potentially harmful to the environment are monitored throughout the supply chain.

Response to Accidents with Environmental Consequences

8. The Session recommended that further efforts be undertaken in all countries to improve the training and education of response personnel, in order that they understand how to minimise the environmental consequences of accidents, and to be able to improve gathering of information concerning any adverse effects on the environment.

9. The Session emphasised the need to be able to generate assessments of the environmental consequences immediately after an accident occurs. In this regard, it was suggested that:

- protocols be developed that identify the types of measurements that should me made, and how to undertake the appropriate assessments (recognising that differences in approaches exist between countries);

- training of individuals involved in field missions be improved, for example with respect to collection of samples and understanding possible environmental impacts;

- further use be made of new technologies such as satellite and other remote sensing systems (e.g., the "GDIN") to identify contaminated areas, as well as to improve early warnings of areas where there is a significant risk of a chemical accident; and

- consideration be given to the application of the "polluter pays principle", in order that adequate resources and personnel are available to assess the environmental consequences of accidents.

10. There was a suggestion that public authorities and industry should meet the challenge of providing information to the public concerning the environmental consequences of accidents, as quickly

as possible. Furthermore, it is important to take into account not only the actual consequences, but also the perceived impacts when communicating with the public.

Improving Understanding Environmental Consequences

11. The participants recognised a number of areas where efforts could be made to improve understanding of the environmental consequences of accidents. In this regard, it was suggested that:

- relevant parties should document the adverse impacts on the environment of any significant accidents, and to publish the results;
- countries should share data that is available related the environmental consequences of accidents, and an international effort be made to collectively review and assess such data;
- an attempt should be made to improve reporting of environmental data related to past accidents to databases such as the one being managed by the Major Accident Hazards Bureau (MAHB) on behalf of the EC, the OECD and the UN/ECE;
- efforts be made to improve the collection of geographical and geological information in the areas around potential sources of accidents;
- monitoring should be in place for areas of particular environmental concern, and in order to establish "base-line" information concerning these areas before an accident occurs; and
- areas affected by chemical accidents should be monitored to determine if there are any long-term or delayed consequences of acute exposures.

RECOMMENDATIONS FOR FUTURE WORK

The Special Session made the following recommendations concerning future work:

(1) Member countries should share information and experience on a continuing basis and, to this end, a network of experts should be established. It was noted that during the next year a number of countries will be in the process of developing and testing models for assessing environmental risks. In addition, countries will be reviewing safety reports and related information pursuant to e.g., the Seveso Directive in the EU and the Clean Air Act in the US. Therefore, it would be valuable to have a means for the regular tracking of activities and exchange of ideas and experience.

(2) The OECD should prepare a review of the experience of Member countries, international organisations and others in using the Internet to share information in the context of accident prevention, preparedness and response. In this respect, reference was made to the experience of the Balkans Task Force that had used the Internet to gather information about the environmental impacts of the conflict, and the Baia Mare Task Force that used the Internet to facilitate sharing of information with the public. In addition, the EC Joint Research Centre has an interactive website to collect event reports and produce reports on lessons learned (i.e., NEDIES which can be found at http://nedies.jrc.it).

(3) In light of the need to improve both the quality and quantity of data related to the environmental consequences of accidents, consideration should be given to how to improve the collection and sharing of data, and how to collectively review and assess such data.

(4) The Working Group should consider organising a follow-up meeting of experts in 2002 to exchange experience in this field. At that time, countries should have experience in reviewing the environmental aspects of safety reports and risk management plans, and there will be additional experience in the application of environmental risk assessment methodologies (such as those described from the Netherlands, Sweden and the UK).

(5) All Member countries should enter their environmental risk assessment methodologies and case studies in the OECD CARAT database, in order to facilitate the understanding of similarities and differences in approach.

(6) The results of the Special Session be published, including these Conclusions and Recommendations, the Background Document, and the presentations of speakers. It was agreed that the Session provided a large amount of useful information that should be shared world-wide.

The Tenth Meeting of the OECD Working Group on Chemical Accidents (immediately following the Special Session) reviewed the then draft "Conclusions and Recommendations." The Working Group endorsed the text.

The Working Group also discussed several related issues that were not addressed in detail during the Special Session. In particular, the Working Group identified two potential sources of accidents that might pose a risk of significant environmental consequences and, therefore, should be further considered, in particular:

- off-shore installations; and
- small and medium-sized enterprises.

ANNEX 1

BACKGROUND DOCUMENT

for the OECD Special Session on
ENVIRONMENTAL CONSEQUENCES OF CHEMICAL ACCIDENTS
28 November 2000, OECD Headquarters

by Harriet Lonka, Finnish Environment Institute

BACKGROUND

The issue of how to take environmental impacts into account when preparing risk assessments related to hazardous installations was considered at the OECD Workshop on "Risk Assessment and Risk Communication" that was held in 1995, in Paris. In particular, one conclusion of that workshop stated the following: *"… currently most risk assessments tend to focus on lethal effects, but this is strongly influenced by the context in which the assessment is done (e.g., relating to health effects, major accidents, etc.) It is accepted that the risk assessment process should also take account of possible health (sub-lethal) and environmental consequences (e.g., as recognized in environmental impact studies). Further work is needed to develop or adapt appropriate criteria, approaches and methodologies to take account of sub-lethal and environmental consequences"* (Conclusion 15).

The 1995 workshop also recommended "*that a Workshop be held to consider issues related to the use of environmental and non-lethal health consequences in risk assessments*" and that "*the OECD should also undertake efforts to improve the quantity and quality of data on the environmental and non-lethal health consequences of accidents (…)*" (Recommendation 21).

The OECD Working Group agreed that further work should be undertaken related to the use of environmental consequences in risk assessments. As a starting point for this work, a questionnaire was circulated in September 1998 to OECD Member countries on how potential environmental impacts, and environmental consequences of accidents, are considered in laws and procedures related to risk assessment of hazardous installations or transport of dangerous goods. Only eight answers were received and the responses did not provide guidance on how to proceed with this issue (the responses are summarized in the Appendix to this document).

Furthermore, since 1998, there have been a number of relevant developments, such as the entering into force of the "Seveso II Directive" and the UN/ECE Convention on Transboundary Effects of Industrial Accidents. In addition, there is on-going co-operation between the UN/ECE Industrial Accidents Convention and the UN/ECE Convention on the Protection and Use of Transboundary Watercourses and International Lakes.

Therefore, at their October 1999 meeting, the Working Group agreed that further efforts should be undertaken to improve understanding of this issue, and to identify possible future activities. They decided to arrange for this Special Session, which will allow experts to discuss experience, and reach recommendations and conclusions on best practices and project proposals. Finland offered to take the lead in organising such a session.

INTRODUCTION

Definition

The development of environmental risk assessment has gained growing attention during recent years all over the world. Yet, defining the terms "environmental risk" and "environmental risk assessment" is still somewhat an open question. The EEA (European Environment Agency) published in 1998 a comprehensive overview on the issue titled "Environmental Risk Assessment - Approaches, Experiences and Information Sources".

EEA defines "environmental risk assessment (ERA)" as the "examination of risks resulting from technology that threaten ecosystems, animals and man". It is noticeable that EEA takes man as one receptor in the environmental risk assessment. On the other hand they use term "ecological risk assessment" to mean assessment of risks posed by "the presence of substances released to the environment by man, in theory, on all living organisms in the variety of ecosystems which make up the environment".

The terms environmental risk assessment and ecological risk assessment are often used as equivalents to each other. In many cases the use of both terms is restricted to focus on assessing the risks of chemical substances and Genetically Modified Organisms (GMOs).

The Special Session may wish to discuss:

- *is the EEA definition appropriate and useful?*
- *is there a need to develop additional definitions to facilitate understanding and communication?*

Current use of Environmental Risk Assessments

Environmental risk assessments are currently being used more and more in the process industry, where legislation demands assessment of risks to the environment at least in cases of "Major Hazards". In the European Union, industry that might cause major hazards is regulated by the "Seveso II directive". In these cases the use of ERA is applied in cases of non-routine industrial releases, in particular to water bodies. The new EU directive on Integrated Pollution Prevention and Control (IPPC) may enhance the development of ERA also for routine industrial releases.

The methodology used in environmental risk assessments in process industry is very diverse. It is mostly based on engineering risk assessment techniques, which examine plant or process engineering risks. In general the techniques to assess the risks to human health from non-routine industrial releases are far more advanced than those addressing ecological risks.

The Special Session may wish to discuss:

- *what experience with ERA has been gained thus far with the implementation of the Seveso II Directive provisions related to accidental releases to water?*
- *what methodologies and techniques are available/used in ERA worldwide?*
- *what actions can be taken to improve sharing of information and experience?*

Lack of knowledge on the consequences

In the field of environmental risk assessment, one clear obstacle is the lack of knowledge concerning the environmental consequences of accidents. Risk can be defined as combination of probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence (EEA 1998). In developing the management of the environmental risk of chemical accidents the two components of risk should be kept in mind. The probability of environmental accidents can be lowered with general process safety measures. But from the environmental risk management point of view more crucial is, how to lower the magnitude of consequence parameter of environmental accidents. Here further knowledge on environmental consequences of chemicals and chemical accidents and knowledge on how to effectively restrict these consequences is urgently needed.

The Special Session may wish to discuss:

- is there experience available, e.g., from studies of chronic pollution, that could aid in understanding the environmental consequences of chemical accidents?

- can an international project be defined (for the OECD or another organisation) which could help reduce the information gaps that restrict the use of ERA?

ENVIRONMENTAL CONSEQUENCES OF CHEMICAL ACCIDENTS

Scope

For the purposes of the Special Session, the term "environmental consequences" is defined as consequences of an accidental release of hazardous substances to the natural environment, i.e.,. to surface water, ground water, soil and air as well as to organisms living in this environment (individuals, populations and ecosystems). Consequence should be defined as a measurable parameter, e.g.,. amount, spreading capacity of a chemical in, and its interaction with, the environment, and harmful effects this is causing to the environment and its compartments. Both short-term and long-term consequences should be considered.

The primary focus of this Session is on environmental consequences of release of hazardous substances to water. This is reasonable restriction since the consequences of an accident to water are wide spread and have most importance to human communities living in the surroundings. The economic consequences of such accidents are often of large value. Furthermore, it is a useful starting point for discussions since there is more experience related to pollution of water from accidents, than from other types of environmental consequences. It should be recognized that post-accident clean-up will not be covered in the session.

What do we need to know?

The issue of environmental consequences of chemical accidents needs to be further studied because of the considerable lack of knowledge existing in this field. The main flaws of information can be grouped in the following categories:

1) Knowledge of chemicals:

- hazard capacity,
- movement in different media,
- effect of combinations of different chemicals,
- changing of substances to others in the environment.

2) Knowledge on the environment:

- physical environment forming the spreading ways and circumstances for chemicals,
- biological environment in interaction with chemicals i.e. ecotoxicological effects on different species,
- populations and ecosystems.

3) Technical knowledge on prevention, response and post-accident measures, which take effectively into account potential environmental consequences of accidents:

- developing environmental risk assessment methods and preventive measures to be based on these assessments,
- developing response methods which take into account restriction of potential environmental consequences of accidents.

In the whole chain of activities in prevention, preparedness, response and cleanup, information from the past accidents and lessons learned should be on hand. It is essential to ensure correct data collection from accident sites after the accident has happened and this need to be started while response efforts are still going on.

The Special Session may wish to discuss:

- how can countries improve collection of data related to environmental consequences of accidents?
- should there be any changes to the OECD accident reporting scheme to encourage improved environmental data collection and sharing of experience?
- *what* should be the next steps within the OECD with respect to the subject of ERA?

APPENDIX to Background Document

"Environmental Consequences" in OECD Countries

Answers to the OECD questionnaire (1998)
on the use of "environmental" and/or "non-lethal consequences"
in risk assessments of hazardous installations or transport of dangerous goods

I. Definitions and criteria for "environmental consequences"

The questionnaire first asked whether countries/organizations

(i) had or used definitions/criteria for "environmental consequences" (for purposes of risk assessments of hazardous installations or transport of dangerous goods), and

(ii) were aware of other relevant definitions/criteria (e.g. used by private enterprises or research institutions).

Responses provided some indication on how "environmental consequences" are defined in different countries.

- In **Germany,** the Hazardous Accidents Ordinance distinguishes between the danger for human life and health and the danger for the environment. The Federal Emission Control Act defines that the operation of installations subject to licensing must not involve harmful effects on the environment or other hazards.

- In **Hungary,** no specific definition/criteria for the term "Environmental consequences" exists when risk assessment of hazardous installations or transport of dangerous goods is concerned. Yet according to the provisions given in the Act on Environmental Protection, the company is obliged to prepare an Environmental Emergency Plan in case of operation with dangerous technologies. There is also an obligation for performing environmental impact assessment for licensing new installations.

- In **Korea** no definition for the term "Environmental consequences of accidents" exists.

- In **Sweden** definition of the term environmental consequences has not been established for purposes of risk assessments of hazardous installations or transport of dangerous goods. On the other hand, before the establishment of a hazardous installation, an Inquiry on Environmental Consequences (Environmental Impact Assessment) must be done.

- In **Turkey,** according to the definition. the off-site effects of a major accident on environment (or environmental units) create environmental consequences. "On-site" is understood as inside of plant's boundary, "off-site" is accepted as vice-versa. The Ministry of the Environment is responsible for off-site environmental consequences of major accidents.

- In the **United States** the term "environmental consequences" is not defined specifically for the purposes of risk assessments of hazardous installations or transport of dangerous goods.

From the answers above, it is clear that while the term "environmental consequences" is most often not defined in the law, it is on the other hand implicitly defined in the legislation of many countries.

II. Countries' requirements for risk assessments, experience with risk assessments, and post-accident analysis.

In their answers, countries described in what way environmental consequences might be taken into account in risk assessments and in licensing procedures in general.

- In **Germany**, the IKSE (International Commission for the Protection of the Elbe against Pollution) recommends to carry out a risk analysis from the point of view of hazards to water. Research is undertaken in the field of environmental effects of chemicals. There exists a limiting value for the pollution of water and soil.

- In **Hungary** the existing installations are audited in case they impose risk to the environment. The Government Degree on Environmental Impact Assessment gives further provisions for giving information on the expected environmental consequences of an accident. There is no detailed guideline for the methodologies applied in such assessments.

- In **Korea**, KISCO (Korean Industrial Safety Corporation) and Labour Department use terms of worst case scenario and alternative case scenario. Their definitions are the same as in the RMP (Risk Management Program) Rule used in US-EPA. KISCO has also been constructing IRMS (Integrated Risk Management System), which is based on GIS, to prepare measures for minimising damages from chemical accidents. KISCO has been building the accident analysis program which is based on the database of chemical accidents, including major accidents from BARPI/MARS databases.

- In **Sweden** a simple model has been developed that gives guidance as to the identification and quick ranking of what kinds of assessment to perform. A report *"Environment-Accident-Index, a Validation of a Model"* has been published on this subject.

- In **Turkey**, the Ministry of the Environment is planning to require risk assessment to be done for certain hazardous installations via *"Guidelines for Environmental Assessment Following Chemical Emergencies"* published by UNEP/DHA Environmental Unit in 1996.

- In the **United States**, regulations published on June 20, 1996 for risk management plans to prevent chemical accidents, include definition of hazard assessments, including offsite consequence analysis, covering both environmental and human receptors.

- [The United States elaborated further the question on, how and to what extent environmental consequences could be taken into account in these procedures.]

- In the U.S. regulations concerning prevention of chemical accidents, there is no requirement for risk assessment per se, but all facilities subject to the regulations must perform a thorough hazard assessment to assess the potential effects of an accidental release on any regulated substance. This assessment includes estimate of potential release quantities and a determination of downwind effects, including potential exposures to

affected populations (some of these consequences could be non-lethal effects). Such assessment includes a previous release history of the past 5 years. Many U.S. companies perform risk assessments on a voluntary basis when evaluating their environmental and health risk in business context. The U.S. is leading an effort on establishing Acute Exposure Guideline Levels (AEGLs). These are to be established for a variety of endpoints for acute exposure to toxic chemicals.

- In the U.S. also, criteria for quantification of damage to individual environmental receptors (plant species etc.) could be enormously varied, and such data are not established in cases for many specific receptors or classes of receptors. Definition of environmental receptors is implicitly included in the regulations. It should be noted that there is little information on environmental endpoints and specific receptors.

- Finally, **UNEP** pointed out that the question of including an indicator for environmental damage in the "selected list" of chemical accidents should be taken into consideration.

ANNEX 2

SPECIAL SESSION ON ENVIRONMENTAL CONSEQUENCES OF CHEMICAL ACCIDENTS
OECD, PARIS - 28 November 2000

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ANNEX 3

OECD Special Session on

"ENVIRONMENTAL CONSEQUENCES OF CHEMICAL ACCIDENTS"

Tuesday 28 November 2000, starting at 9.30 am (Paris, OECD Headquarters)

AGENDA

1. Welcome and Introduction

- Objectives and scope of the session, by Session Chair: **David Speights**, US-EPA.

Note: All participants are encouraged to actively engage in discussions and share experiences in their countries and organisations.

2. General introduction to the subject

- Scope and terminology

- Presentation of the Background Document (i.e. introduction to concept of environmental risk and environmental consequences) by **Harriet Lonka**, Finland.

Initial discussion among participants

3. Part I: PREVENTION and PREPAREDNESS aspects of environmental consequences of accidents

This Part will address risk assessment methods and practices used to identify and evaluate environmental aspects of potential accidents as they relate to:

- prevention of accidents; and
- preparation of response measures.

- **Gerard Harmsen**/Netherlands/RIZA (State Institute for Waste Water Treatment)
  Position of environmental risk assessment in risk analysis and safety policy developments in the Netherlands (possible presentation of the PROTEUS programme).

- **Åsa Scott**/Sweden/Swedish Rescue Services
  Developing the Environmental Accident Index - a useful approach in prevention and preparedness for chemical accidents.

- **Ian James**/UK/Environment Agency
  Assessing the environmental consequences of potential major accidents.

Discussion among participants

4. Part II: RESPONSE and POST-ACCIDENT aspects of environmental consequences

This Part will address response to accidents, accident reporting and post-accident studies and their impact on the environmental aspects of risk assessments. It will include consideration of the following issues:

- How to improve our understanding the environmental consequences of chemical accidents (including consideration of response, follow-up actions and investigations);

- Data that is available for environmental risk assessment: lessons learned from the response stage (during which environmental effects are often neglected); and

- Use of environmental data:
  - Quality and quantity of data;
  - Developing/improving the methods: reporting, measuring, evaluating former accidents; and
  - International co-operation in creating such data and methods.

- **Stuart Duffield**/European Commission/JRC-MAHB
  Review of major accidents with environmental consequences.

- **Pekka Haavisto**/Finland and UNEP Balkans Task Force
  How to handle environmental consequences of war and major accidents - experiences of the role of the UN, in particular at the time of the Baia Mare cyanide spill.

- **Wanda Hoskin**/UNEP-DTIE
  - Follow-up actions and recommendations after the Baia Mare accident.
  - APELL process (brief presentation).

Discussion among participants

5. Conclusions and Recommendations

The Special Session will seek to reach some general Conclusions, as well as to develop Specific Recommendations for:

- input into the second edition of the *OECD Guiding Principles*;
- 'best practices' in assessing and using data on environmental consequences of past chemical accidents;
- areas where further research is needed; and
- future activities at the OECD level, if appropriate.