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Basel Convention

**Guidance Document
on the
Preparation of Technical Guidelines
for the
Environmentally Sound Management of Wastes
Subject to the Basel Convention**

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Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention

This Guidance Document explains what is to be understood by the environmentally sound management of hazardous wastes. It is to be used as a reference document while developing strategies for the management of wastes within a country. The document also offers four sets of technical guidelines on various waste streams which Parties believed required priority attention. These documents have a special legal value since they were not only developed by highly specialized experts from various countries represented at the Technical Working Group, but were also later adopted by the Conference of the Parties to the Basel Convention.

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GUIDANCE DOCUMENT

Introduction

1. Preparation of these guidelines was undertaken in accordance with Resolution 8 as adopted during the Conference of Plenipotentiaries on the Global Convention on the Control of Transboundary Movements of Hazardous Wastes (Basel, March 1989). Entitled "Establishment of a Technical Working Group to Elaborate Technical Guidelines for the Environmentally Sound Management of Wastes subject to the Basel Convention", it called on the Executive Director of UNEP to establish a Technical Working Group to draft technical guidelines (including costs of the various disposal options) for the sound management of wastes subject to this Convention for consideration by the Parties at their first meeting, and eventual adoption.

2. The Guidance Document has been prepared in such a way as to address the need for guidance in developing national or regional hazardous waste management strategies as well as in managing such wastes in an environmentally sound way.

Its purpose is to:

(a) Provide information to the Parties to the Basel Convention on waste avoidance and the management of wastes, in particular hazardous wastes, produced within their national

territory;

(b) Provide guidance to the national Competent Authorities in making a decision whether to consent or reject a proposed transboundary movement of waste subject to the Basel Convention into, out of or through their country;

(c) Provide a framework for the further preparation of technical guidelines for the wastes subject to the Basel Convention.

2bis. The first meeting of the Conference of the Parties to the Basel Convention at its meeting in Piriapolis (Uruguay) in December 1992, decided to accept the draft technical guidelines presented to the Conference (doc. UNEP/CHW.1/20) as provisional technical guidelines and invited all States and interested organizations to provide written comments on these guidelines to the Secretariat of the Basel Convention with a view to their revision and distribution to States and interested organizations as soon as possible or, if necessary, consideration by the Technical Working Group (decision I/19 of the Conference of the Parties). The Technical Working Group reviewed the provisional technical guidelines at its meeting in Geneva in June 1993.

3. An essential feature necessary for the environmentally sound management of wastes subject to the Basel Convention generally, and hazardous wastes in particular, requires the establishment of a firm legal basis upon which to be able to regulate any operations concerned with wastes arising within or imported into the country. At the same time, for those countries which need to rely on the export of hazardous wastes, because they themselves do not have available adequate facilities to dispose of particular wastes in a manner which will safeguard health and the environment, a similar legal basis which controls such activities is required.

Note on Environmentally Sound Management

4. Whilst waste disposal has clearly been practised in various forms for milleniums, waste management is a much more recent activity. Indeed, even in industrially developed countries, legislation specifically addressing waste disposal has only emerged over the last 20 years. Controls prior to that were of a more general nature, related perhaps to public health issues or land-use planning. Waste management is a much more recent activity which is designed to identify and manage wastes throughout their entire life cycle with a strong emphasis in reduction, re-use and recycling activities.

5. Although the term 'Hazardous Waste' is often used in a loose and non-specific sense, the Basel Convention provides a classification of the categories of waste to be controlled. The Convention further provides that it should include as hazardous waste any wastes defined as, or considered to be hazardous waste by the domestic legislation of the Party of export, import or transit. Environmentally sound management of wastes is also described within the Convention, and is stated as being the 'taking of all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes'.

6. In the absence of stringent national legislation it is extremely difficult to expect effective technical control over the environmentally sound management of wastes and in particular hazardous wastes in any country.

7. Domestic legislation and a statutory regulatory framework are seen as essential prerequisites for controlling transboundary movements and disposal of wastes, and in particular hazardous wastes. Nevertheless, this should not prevent countries which are Parties to the Convention, even though national legislation is not yet in place, undertaking the obligations and measures necessary to control waste being produced currently within their national territory.

8. Legislation and measures adopted at the domestic level need to include provisions related to enforcement. Such provisions would outline procedures spelling out responsibilities of each person involved in the management of hazardous wastes. Domestic legislation need also to provide a framework for implementing international conventions and for ensuring that such agreements are being enforced in a way to protect the environment and health

that such agreements are being enforced in a way to protect the environment and health from the possible harmful effects of transboundary movements, treatment and disposal of hazardous wastes. In this regard, monitoring of measures taken represent an important way to aim towards environmentally sound management.

9. Environmentally sound management is defined in the Basel Convention as taking all practicable steps to ensure that hazardous wastes or other wastes are managed in a manner which will protect human health and the environment against adverse effects which may result from such wastes.

In this context, the criteria to assess environmentally sound management include the following:

- (a) There exists a regulatory infrastructure and enforcement that ensures compliance with applicable regulations;
- (b) Sites or facilities are authorised and of an adequate standard of technology and pollution control to deal with the hazardous wastes in the way proposed, in particular taking into account the level of technology and pollution control in the exporting country;
- (c) Operators of sites or facilities at which hazardous wastes are managed are required, as appropriate, to monitor the effects of those activities;
- (d) Appropriate action is taken in cases where monitoring gives indication that the management of hazardous wastes have resulted in unacceptable emissions;
- (e) Persons involved in the management of hazardous wastes are capable and adequately trained in their capacity.

Countries also have obligations to avoid or minimize waste generation and to ensure the availability of adequate facilities for their waste, so as to protect human health and the environment.

In this context, countries should, *inter alia*:

- (a) Take steps to identify and quantify the types of waste being produced nationally;
- (b) Use best practice to avoid or minimize the generation of hazardous waste, such as the use of clean methods;
- (c) Provide sites or facilities authorised as environmentally sound to manage its wastes, in particular hazardous wastes.

In addition, enforcement and monitoring could be enhanced through international cooperation.

Principles to be considered in the Development of Waste and Hazardous Waste Strategies

10. Below are a number of principles that many countries have used to varying extents in developing their waste management strategies. These principles are not absolute and are not meant to replace the principles agreed to in the Basel Convention, nor to define "environmentally sound management." They are presented as principles that merit consideration and that some countries have found useful.

- (a) *The Source Reduction Principle* - by which the generation of waste should be minimized in terms of its quantity and its potential to cause pollution. This may be achieved by using appropriate plant and process designs;
- (b) *The Integrated Life-cycle Principle* - by which substances and products should be designed and managed such that minimum environmental impact is caused during their generation, use, recovery and disposal;

(c) *The Precautionary Principle* - whereby preventive measures are taken, considering the costs and benefits of action and inaction, when there is a scientific basis, even if limited, to believe that release to the environment of substances, waste or energy is likely to cause harm to human health or the environment;

(d) *The Integrated Pollution Control Principle* - which requires that the management of hazardous waste should be based on a strategy which takes into account the potential for cross media and multi-media synergistic effects;

(e) *The Standardization Principle* - which requires the provision of standards for the environmentally sound management of hazardous wastes at all stages of their processing, treatment, disposal and recovery;

(f) *The Self-sufficiency Principle* (to be considered with (g) and (h)) - by which countries should ensure that the disposal of the waste generated within their territory is undertaken there by means which are compatible with environmentally sound management, recognizing that economically sound management of some wastes outside of national territories may also be environmentally sound;

(g) *The Proximity Principle* (to be considered with (f) and (h)) - by which the disposal of hazardous wastes must take place as close as possible to their point of generation, recognizing that economically and environmentally sound management of some wastes will be achieved at specialized facilities located at greater distances from the point of generation;

(h) *The Least Transboundary Movement Principle* (to be considered with (f) and (g)) - by which transboundary movements of hazardous wastes should be reduced to a minimum consistent with efficient and environmentally sound management;

Principles (f), (g) and (h) should be considered in relationship and balance. It should also be recognized that considerations for disposal may be different from those for recovery, which, if soundly managed, can provide environmental and economic benefits and should be encouraged;

(i) *The Polluter Pays Principle* - by which the potential polluter must act to prevent pollution and those who cause pollution pay for remedying the consequences of that pollution;

(j) *The Principle of Sovereignty* - under which every country shall take into account political, social and economic conditions in establishing a national waste management structure. A country may, for example, ban the importation of hazardous wastes into its territory in accord with its national environmental legislation;

(k) *The Principle of Public Participation* - under which States should ensure that in all stages, waste management options are considered in consultation with the public as appropriate, and that the public has access to information concerning the management of hazardous wastes.

It is recognized that the application and formulation of these principles will vary from country to country. It is also recognized that cost and economic efficiency are considerations in developing a waste management strategy. Furthermore, many countries will, where possible, relate the level of control over wastes to the amount of risk posed by a waste.

Wastes Controlled Under the Basel Convention

11. Article 1 of the Convention states that the following wastes that are subject to transboundary movement shall be "hazardous wastes" for the purpose of the Convention:

(a) Wastes that belong to any category contained in Annex I, unless they do not possess any of the characteristics contained in Annex III; and

(b) Wastes that are not covered under paragraph (a) but are defined as, or are considered to

be, hazardous wastes by the domestic legislation of the Party of export, import or transit.

Wastes that belong to any category contained in Annex II that are subject to transboundary movement shall be 'other wastes' for the purposes of this Convention.

Excluded are wastes which, as a result of being radioactive, are subject to other international control systems, including international instruments applying specifically to radioactive materials, and wastes which derive from the normal operations of a ship, the discharge of which is covered by another international instrument.

12. Technical guidelines for recovery and disposal operations and for specific wastes will be produced for wastes subject to the Basel Convention.

Responsibilities of Parties in Managing wastes and Hazardous Wastes

Of priority importance, obligations of the Parties include hazardous waste avoidance through clean production methods. In this respect:

Prevention and minimization of the generation of hazardous wastes and other wastes

A basic principle is highlighted, the Integrated Life-cycle Principle, i.e. the management or design of substances and products should be conducted so as to attain the longest life, and cause minimum environmental impact during their production, use and disposal.

New facilities

Establishment of new production facilities should be designed taking into consideration criteria for the application of cleaner production techniques.

Existing facilities

Waste prevention audits should be promoted to qualitatively and quantitatively identify hazardous inputs, wastes and products and the corresponding cleaner production techniques with a view to minimize and eliminate where possible the generation of waste; as well as a waste prevention strategy. To this end, the following should be considered:

Assessment of practicable substitutes in order to avoid, to the extent possible, generation of hazardous wastes or to reduce the toxicity of such wastes;

Application of best available technologies and cleaner production methods.

The following elements should be given due consideration:

Identification of existing information on cleaner production methods for the prevention of the generation of hazardous wastes;

Assessment of available substitutes in order to avoid the use of hazardous substances to the extent possible;

Best available technology and cleaner production techniques on selected production processes;

Obsolescent technologies;

Integrated pollution control, and management plans for production facilities.

13. Hazardous waste management is an integrated activity in which waste generators, carriers, disposers and other handlers in the chain share responsibility for ensuring that the job is done well. It is important not to think of waste management only as a matter of concern to waste disposal contractors; waste generators in particular have the major role in providing information on which proper disposal decisions can be taken and for ensuring that environmentally sound choices are made.

Technical guidelines for disposal or recovery operations shall have the following elements as appropriate:

- (a) Preamble;
- (b) A description of the purpose, scope and definition of the operation and a description of technologies as well as a description of the efficiency of the operation;
- (c) A description of environmental hazards;
- (d) The identification of the suitability of wastes for the operation;
- (e) The identification of opportunities for waste avoidance;
- (f) The identification of opportunities for recovery;
- (g) A description of criteria for the sound operation of technology and related safety aspects; to include, as appropriate, for information purposes, examples of national and international standards and regulations;
- (h) The establishment of principles for assessment of the predicted environmental impacts of establishing and operating the facility, site selection parameters, technology options, construction/design and management plan;
- (i) Guidance on monitoring, and when required, appropriate corrective action;
- (j) Guidance on closure plans and aftercare;
- (k) A comment on the economic aspects of the disposal or recovery operation;
- (l) A glossary of terms.

Technical guidelines for the management of specific waste streams shall have the following elements as appropriate:

- (a) Preamble;
- (b) A preamble describing the waste and industry that generates the waste;
- (c) A description of environmental hazards;
- (d) The identification of opportunities for waste avoidance;
- (e) The identification of opportunities for recovery;
- (f) A description of treatment and disposal technologies;
- (g) A comment on the economic aspects of suitable waste management options;
- (h) A description of criteria for the sound operation of technology and related safety aspects;
- (l) A glossary of terms.

14. Generators of hazardous waste should, in most circumstances, be best placed to know the composition, nature and problems associated with their waste and thus to take appropriate source reduction measures. It is their duty to contain, package and store waste in a proper fashion, and to ensure that all information concerning it is passed to those involved in its subsequent transportation, treatment, recovery or disposal. Some legislative systems require waste generators to hold licenses or permits governing the storage and disposal arrangements for their wastes.

15. Carriers, or transporters of waste, have an important role to play in ensuring that waste is safely delivered to its proper destination. Transportation of all dangerous goods requires care, and the observance of professional practices and standards as set out in various International Recommendations, Codes and Conventions. Not all of these agreements explicitly address the question of hazardous wastes, but they specify good practice and requirements such as labelling, vehicle and package design, training of drivers, emergency information, etc., which are equally applicable to waste movements.

16. In respect of transboundary movements of hazardous wastes, there may be a requirement to conform to one or more of the international recommendations and agreements regulating the transport of dangerous goods (refer to Annex A for details).

17. All waste management facilities, whether concerned with recovery, transport, storage, treatment or disposal need to be conceived and operated on the principles of chemical process activities. Generally, this means that the specific waste activity should not be viewed in isolation, but should be provided with the back-up technical and support resources necessary to ensure that it is able to operate consistently and effectively. It also means the provision and operation of pollution abatement measures, and the establishing of emergency plans specifying the steps to be taken in the event of occurrences such as fire, explosion and spillage.

18. The concept of the Duty of Care, which in some countries has been placed on a statutory basis, requires all parties in the waste management chain to have regard for the proper observance of good waste management practice throughout the chain. The concept, whether voluntary or statutory, is of value in focusing the attention of all concerned on the overall activity. In particular, it can draw attention to the question of whether or not other persons in the chain appear competent, credible, or possess the equipment, machinery or facilities to do what they claim!

Strategic guidelines

19. Taking into account the principles described above it is possible to establish a basis upon which legislation can be provided and regulations promulgated. However, in doing so it is necessary to consider also, the strategy needed to be adopted in providing the controls necessary to achieve the objectives of preventing or minimizing the risk of damage to human health and the environment which can be caused by all wastes and in particular by hazardous wastes.

A strategy is a coordinated programme of separate but complimentary initiatives by government, business and industry, service and public sectors, academia and associations. Incremental approach starting with basic controls and building upon experience is obtained through a strategical hierarchy of preferable or practicable management options. In this context, legislation must provide the framework for various initiatives as well as specifying standards for important or priority operations from where further guidance will be sought.

20. Essentially, a strategy for the control of wastes and in particular hazardous wastes and their environmentally sound management should take into account the following guidelines:

(a) Promote waste prevention and minimize its generation through the use of cleaner production methods. Avoid the use of hazardous substances where less hazardous materials could be substituted without significant detrimental effects or other risks on product quality or economic costs. Whenever possible promote the adoption of environmentally sound methods of resource recovery by direct reuse, alternative use, reclamation or recycling;

(b) Promote the gathering together of knowledge and information on the impacts of waste such that their socio-economic effects can be considered, particularly in respect of prevention versus management;

(c) Give consideration to the problems created by contamination of the environment, particularly by hazardous wastes in respect of their environmental and health effects in both the short and long term;

(d) Develop and maintain a database of the environmental effects of hazardous wastes in the

(d) Promote education at all levels on the adverse effects of hazardous wastes in the environment, including the provision of institutions for the dissemination of such information;

(e) Promote and continue to strengthen the effectiveness of international co-operation in the field of wastes management, particularly that involving the transboundary movements of hazardous wastes, including its control and monitoring to accord with international legal instruments.

21. Countries may seek, in collaboration with industry and other waste producers, to:

(a) Where practicable, economically feasible and environmentally sound, aim at avoiding the generation of any wastes in the first place;

(b) Where (a) is not practicable, economically feasible and environmentally sound, to reduce to a minimum the wastes nevertheless generated by any waste generating activity;

(c) Recover, reuse and/or recycle the greatest possible quantity of those wastes which are generated nevertheless and are amenable to reprocessing;

(d) Destroy or convert to a stable form any wastes not amenable to (c);

(e) Finally there is a need for appropriate final disposal of the residuals of treatment and recovery. Disposal of wastes may include incineration, pyrolysis, aerobic or anaerobic digestion of suitable wastes. In such instances energy recovery should be a material consideration.

22. The activities described above may be carried out within the framework of environmentally sound management of the wastes subject to the Basel Convention and in particular hazardous wastes. Legislation therefore, may seek to reflect these objectives. For their part, industry and other waste generators could collaborate between themselves and with governments in a cooperative approach to promote the environmentally sound management of wastes. Programmes could include means to be used in testing, identifying, characterizing and handling wastes, its safe storage, its transportation, treatment and disposal including environmental monitoring against agreed standards.

Control for Ensuring Environmentally Sound Management of Waste and Hazardous Waste

23. A comprehensive control system over the movement, recovery, treatment, and disposal of the wastes is required to minimize the possibility of their causing damage to human health or harm to the environment. The degree of control needed can best be decided initially on a domestic basis in a form which can be translated locally to take account local circumstances in relation to the properties of the waste. Controls and management regimes could be applied uniformly by countries in respect of hazardous wastes. The control systems required should seek to provide controls over the storage of wastes produced, its movement from the generator to the site of its eventual storage, recovery or disposal. The concept of a "Duty of Care" could be provided under which waste generators and others that manage the waste maintain a responsibility for the environmentally sound management of all wastes he produces from their generation to their eventual recovery, disposal and post disposal management of residuals.

24. Consequently, the following elements are seen as being required for the management of wastes and in particular hazardous wastes in a manner which can be justified and defensible:

(a) Generators of wastes, subject to the Basel Convention and particularly of hazardous wastes, should be responsible under the Convention for management of their wastes from their generation until they have been accepted at a facility to be recovered or disposed of in a manner which is environmentally acceptable to the competent authority; in addition, generators have obligations under Article 8 of the Convention to re-import the wastes when the transboundary movement to which the consent of the States concerned has been given, cannot be completed in accordance with the terms of the contract, the State of export shall ensure that the wastes in question are taken back into the State of export, by the exporter, if

alternative arrangements cannot be made for their disposal in an environmentally sound manner.

(b) Governments of countries which are Parties to the Basel Convention may provide a regulatory environmental infrastructure with the ability to monitor, control and regulate, as necessary, all activities concerned with Basel wastes and particularly hazardous wastes;

(c) Those involved in the practical waste management, including packaging, collection, transport, treatment and disposal of all wastes must operate according to standards imposed by their country's competent authorities and must be able at all times to demonstrate that their activities comply with domestic laws and international agreements or arrangements, entered into by their country, particularly in the areas of environmental concern such as storage, transport, emissions or discharges to air and water, and disposal on land;

(d) Those involved in the management and disposal of wastes must be able to demonstrate that they possess within their organization appropriate equipment and employ staff technically qualified to undertake the management and disposal of waste in a manner which safeguards human health and the environment.

25. In the absence of domestic legislation controlling the disposal of wastes, particularly hazardous wastes, the importation of waste from another country should not be permitted.

General Considerations Concerned with Wastes and Hazardous Wastes

26. In many instances wastes consists of a heterogeneous mixture of materials. It could be expected that the generator of the waste would have knowledge of its constituents, and hence its hazard properties. Sometime the generator of the waste may consider a waste as non-hazardous. Therefore, before any waste is permitted to be removed from the premises of the generator of the waste there should be knowledge (as indicated in paragraph 27 below) of the constituents present in the waste. The degree of characterization needed will depend on the choices being made for subsequent management. In turn, this knowledge will then dictate the packaging requirements to ensure that the waste can then be transported in a secure manner and the labels to be affixed to each package or container in accord with the relevant national and international transport rules and standards and internationally recognized practices.

27. With a knowledge of the constituents present in the waste it is then possible to provide a description of its properties. There exist many ways in which the problem of identifying initially whether or not a waste should be regarded, at the one extreme as innocuous, and at the other as extremely hazardous. Generally, the constituent present at greatest concentration is used to describe the waste. However, this may not be the constituent which has the potential to be most hazardous or cause most harm. At the same time there is a need to recognize whether or not a particular waste contains constituents which ideally should be reused, recycled, processed and/or disposed of.

28. Preliminary means of identifying a potentially suitable disposal route for a particular waste controlled under the Basel Convention were considered by the Technical Working Group which developed for that purpose two matrixes which are annexed (Annex B) to this paper. It must be noted that the matrixes only serve to identify the most common methods of disposal (as indicated in Annex IV to the Convention) currently employed. They should not be interpreted as indicating a preferred or possibly accepted method of disposal, and are not intended to be employed by Competent Authorities in isolation to select the most appropriate method of management.

29. In this respect the Technical Working Group wishes to bring to the attention of the Parties the need for caution in attempting to simplify the description of wastes as presenting only one hazard classification. For example, Gypsum waste (CaSO_4), depending on the process from which it is produced as a waste, can be extremely acidic, extremely alkaline or near neutral. Likewise many wastes can have two descriptors. For example, is phenyl mercuric chloride waste a mercury bearing waste or an organo-halogen waste? To those not practised in the management of wastes and particularly hazardous wastes, such problems could cause extreme difficulties, in particular, when it comes to deciding on appropriate labelling, packaging, storage, transport, treatment, disposal or recovery.

labelling, packaging, storage, transport, treatment, disposal or recovery.

30. The above considerations present, also, the possibility to mislabel wastes. While it has been indicated that the UN Class hazard classification system given at Annex III (Code H) of the Convention will take into account wastes, it is considered likely that many wastes will fall into more than one classification.

Interim Measures

31. For those countries which do not have at present facilities to recover, treat or dispose of hazardous wastes in an environmentally sound manner, two options are possible.

These are:

(a) Store the waste for a minimum reasonable period under conditions which will prevent its release to the environment until appropriate recovery, treatment or disposal facilities are provided;

(b) Suitably package and transport, according to international rules and standards, the waste to a country which has approved facilities to recover, treat or dispose of the waste in a proper manner.

32. Countries which do not yet have facilities of the most sophisticated type may find that less complex facilities are adequate to provide environmentally sound management and can achieve significant environmental benefits.

Options for the Management of Hazardous Wastes

33. In general, there will be a number of options available for managing hazardous wastes, and choice of method may be guided by strategic considerations. Strategic assessment of waste management options have been carried out by many organizations with responsibility for environmental policy, and the conclusion is invariably a table of strategic priorities which produce a hierarchy of preference to aid selection. In its simplest form, that hierarchy is:

- Waste avoidance/minimization;

- Recovery

- Disposal

34. The notion of waste avoidance and minimization incorporates several measures which can lead to beneficial change in waste generation. Whilst the ideal solution may be the introduction of new technologies and methods which drastically reduce - or avoid altogether - the generation of waste, it is recognized that although these sort of changes will take many years to implement, some could be implemented immediately. It is clear, however, that careful attention to the details of even well-established processes, can identify relatively simple measures to assist waste minimization. Changes in operating conditions may reduce the quantity or improve the nature of the waste, and segregation of waste streams may render them recoverable when the mixture was not.

35. Where waste avoidance is not possible, re-use, recycling and recovery becomes, in many cases, a preferable alternative to final disposal.

36. Although some incinerators and treatment plants did exist a century ago, it is only within the last 30-40 years that large scale use has been made of incineration and treatment as an effective hazardous waste disposal option for some waste. Prior to that, dumping or tipping, usually in largely uncontrolled and unplanned operations, provided the only major option available.

37. Engineered landfill sites must meet rigorous selection criteria in terms of geological and hydrogeological suitability, as well as general access and amenity considerations. Following that, stringent requirements will have to be met for the preliminary and preparative

engineering work, and for the development of operational and infill procedures in the form of an operational plan. Modern landfill sites can be operated to extremely high standards, and can provide satisfactory disposal option for selected categories of waste.

38. The reduction of transboundary movements of hazardous waste is a clear goal of the Basel Convention, although any such reductions must occur within the framework of environmentally sound management. Reductions in movements should occur if less waste is being produced, or because of an increased capability for environmentally sound management within the country of origin.

39. There is considerable controversy and concern over the extent to which each country could or should seek to provide suitable, environmentally sound options for all its waste. There is fairly broad acceptance that developed, industrialized countries such as are reflected by membership of the OECD, should generally be expected to be self sufficient in waste disposal, insofar as doing so is environmentally sound and economically efficient. For other, and particularly developing countries, the position is different. The question is one of judging the extent to which it is possible or necessary to provide a full range of facilities, when the need for at least the more specialized options may be very limited, and out of all proportion to the cost and resource implications of providing it. The more specialized plant and equipment is invariably the most expensive in capital and operating cost terms, and the largest consumer of skilled and trained personnel. Given fiercely competing demands on limited resources, the decision could be that the investment cannot be justified, and that transboundary movement to a suitable facility elsewhere represents the most appropriate, environmentally sound option on a short, medium or long-term basis.

Good Management Practices

40. The management and control of all hazardous waste treatment, recovery and disposal facilities, need to be carried out to environmentally sound standards. The management and supervision of the facility must be in the hands of experienced, technically competent persons, and everyone employed at the site should be properly trained for the tasks and duties they are required to perform. All the training necessary should be carried out on a properly structured basis, records of training should be kept, and the content of training programmes reviewed and updated on a regular basis.

41. All facilities should be operated pursuant to written standards or procedures. Particular attention should be given to recording in this way, operating methods for plant and equipment, systems for the management and control of site activities, and site safety rules and requirements and the methods for ensuring their observation. All written systems and procedures should be coordinated into an overall operating/systems/safety manual and preferably subjected to external quality assessment and verification.

42. The environmental aspects of properly designed and operated waste management facilities, are essentially no different to those of any other well-run process activity handling similar materials. Waste treatment is not materially different to other forms of processing and manufacture in terms of its potential to cause environmental pollution. Nevertheless, often held public perceptions to the contrary may lead operators of waste management facilities handling sensitive substances such as PCBs to undertake additional environmental monitoring so as to provide assurance that the activities are not contributing to adverse environmental impact. Such monitoring could include regular on and off-site sampling of soil, foliage, ambient air, dust and surface wipes. In addition, health screening programmes on employees, which are used in some cases, may provide additional useful information.

43. Post closure supervision of hazardous waste management sites is a feature particularly relevant for landfill activities. Post closure monitoring of landfill sites, particularly involving analysis of leachate or borehole abstracts located near the site should, as a matter of course, periodically investigate the presence of contaminants or specific hazardous constituents. Treatment and disposal sites of engineered design and construction should be designed to prevent releases to the environment. Such sites will also provide for the collection and treatment of spillages, and the run-off of contaminated rainwater. In such cases, decommissioning of an activity can incorporate cleaning of plant, equipment and hardstanding areas, sumps. etc., and this should minimize the likelihood of any future detection of significant contamination. In the case of facilities not enjoying the benefit of

such protective and precautionary measures, decommissioning activities should include more extensive sampling to detect the presence and possible extent of any contamination. Requirements will tend to be site specific, but periodic retesting may have to be considered.

Annex A

Recommendations on the Transport of Dangerous goods have been elaborated by the United Nations Committee of Experts on the Transport of Dangerous Goods. They are addressed to governments and international organizations concerned with the regulation of the transport of dangerous goods (including hazardous wastes). Among other aspects, the recommendations cover principles of classification and definition of classes, listing of the principal dangerous goods, general packing requirements, testing procedures, marking, labelling or placarding, and shipping documents.

The main instruments regulating the international transport of dangerous goods and hazardous wastes on the basis of the United Nations recommendations are as follows:

SEA TRANSPORT

Legislative Framework: International convention for the safety of life at Sea, 1974 (SOLAS 74) and International convention for the prevention of pollution from ships, modified by the Protocol of 1978 relating thereto (MARPOL 73/78)

Practical Instruments: (published in English, French and Spanish by the International Maritime Organization, 4 Albert Embankment, London SE1 7SR)

International Maritime Dangerous Goods Code (IMDG Code)

Code of Safe Practice for Solid Bulk Cargoes (BC Code)

International Code for the Construction and Equipment of Ships carrying dangerous chemicals in Bulk (IBC Code)

AIR TRANSPORT

Legislative Framework: Annex 18 to the Convention on International Civil Aviation (Chicago Convention)

Practical Instrument: Technical Instructions for the Safe Transport of Dangerous Goods by Air (published in English, French, Spanish and Russian by the International Civil Aviation Organization, 1000 Sherbrooke Street West, suite 400, Montreal, Quebec, Canada H3A 2R2)

Note: A commercial field reference, entitled IATA Dangerous Good Regulations, based on the ICAO Technical Instructions, is also published in English, French, Spanish and Russian by the International Air Transport Association, 2000 Peel Street Montreal, Quebec, Canada H3A 2R4 (also available from IATA Centre Route de l'Aéroport 33, P.O. Box 672, CH-1215 Geneva 15 Airport, Switzerland).

RAIL TRANSPORT

Legislative Framework: Convention concerning international carriage by Rail (COTIF)

Practical Instrument: Regulations concerning the international carriage of dangerous goods by rail (RID) (published in French and German by the Central Office for International Railway Transport (OCTI), Thunplatz CH-3006 Bern, Switzerland; an English version is available from HMGO Publications Centre, PO Box 276, London SWG 5DT, Great Britain).

ROAD TRANSPORT

European Agreement concerning the International Carriage of Dangerous Goods by Road

Available from the United Nations, Sales Section, New York or Geneva.

INLAND WATERWAY TRANSPORT

European Provisions concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (available in English, French and Russian from the UN/Economic Commission for Europe, Transport Division, United Nations, Palais des Nations, 1211 Geneva 10, Switzerland).

Regulations for the Carriage of Dangerous Substances on the Rhine (ADNR) (published in French and German by the Central Commission for Navigation on the Rhine, Palais du Rhin, 2, place de la République, F-67082 Strasbourg CEDEX, France).

Note: The United Nations Recommendations on the Transport of Dangerous Goods are available in English, French, Spanish, Arabic, Chinese and Russian from the United Nations, Sales Section, New York or Geneva. The current edition (1991/1992) i.e. the seventh revision (GT/SBIAC.10/1/Rev.7). An eight revision should be prepared and published in 1993. An additional document entitled "United Nations Recommendations on the Transport of Dangerous Goods, Tests and Criteria" is also available from the United Nations.

Annex B

Explanatory note

The tables 1 and 2 only serve to identify the most common methods of recycling and disposal currently employed. They should not be interpreted as indicating a preferred or possibly accepted method of disposal, and are not intended to be employed by competent authorities in isolation to select the most appropriate method of management.

Y LIST	D OPTIONS											
(Annex I)	1	2	3	4	5	6	7	8	9	10	11	12
1					X			X	X	X		
2			X		X			X	X	X		
3			X		X			X	X	X		
4			X		X			X	X	X		
5			X		X			X	X	X		
6			X		X			X	X	X		
7			X		X			X	X	X		
8			X					X	X	X		
9			X					X	X	X		
10								X	X	X		
11					X				X	X		
12			X		X			X	X	X		
13			X		X			X	X	X		
14												
15								X	X			
16			X		X			X	X	X		
17			X		X			X	X	X		
18					X			X	X	X		
(Annex II)												
46	X	X			X			X	X	X	X	
47	X			X	X				X			

Table 1 indicates the possible disposal option(s) for the wastes listed in Annex I (Y1-Y18) and II (Y46-Y47).

R Options

Annex I	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
1	X			X						
2	X	X	X	X	X	X	X	X		
3	X		X							
4	X	X	X			X		X		
5	X	X	X	X		X	X	X		
6	X	X					X	X		
7	X			X	X	X	X			
8	X		X				X		X	
9	X		X				X		X	
10	X	X	X	X			X		X	
11	X		X			X	X			
12	X	X	X	X		X	X			
13	X	X	X			X	X	X		
14										
15		X								
16	X	X	X	X		X	X			
17	X	X	X	X	X	X	X			
18	X			X	X	X	X			X
Annex II										
46	X			X						X
47				X			X			

Table 2 indicates possible options for recovery of the waste streams listed in Annexes I (Y1-Y18) and II (Y46-47). However, the majority of the hazardous wastes subject to a transboundary movement, and indeed the majority of such wastes submitted for recovery operations are sent to those specific operations listed under paragraph 15 (R1, R2, R4, R6 and R9).