



International
Maritime
Organization

Waste Assessment Guidance Training Set

Participants' Manual

Note: This is a review draft for the sections that have been contracted to date:
Introductory sections 1-3 and Step 4 of the 8 steps of waste assessment.

The Training Set also includes an Instructor's Manual, a set of overhead
transparencies and a set of 35 mm slides.

The Training Set has also been prepared in hypertext format.

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PREFACE TO THE TRAINING SET

What is included in the training set?

There are four parts to this manual, two of which are presented in the course. Part 1 contains three introductory sections; Part 2 contains the eight main steps in waste assessment and evaluation for ocean disposal. Two additional sections provide information on waste specific guidelines (Part 3) and other resources (Part 4).

The course contains information in several “layers” of detail. Part 1 outlines the basic elements of the Waste Assessment Guidelines. In Part 2, each section provides successively more detailed information, including:

- ❑ The relevant WAG clauses.
- ❑ An explanation of key issues.
- ❑ Examples and case histories showing how certain jurisdictions (Parties to the Convention) have dealt with disposal issues.

The course outline is shown in the following box:

Course Outline

Part 1: Context of Waste Assessment Guidance

1. Introduction to the Waste Assessment Guidance
2. The London Convention 1972 and its 1996 Protocol
The Basics of the London Convention 1972
The Basics of the 1996 Protocol¹
3. Relation between the London Convention and other international agreements

Part 2: Explanation of the Waste Assessment Guidance

- Step 1. Waste Characterisation
- Step 2. Waste Prevention Audit and Waste Management Options
- Step 3. Assess opportunities to re-use, recycle or treat the waste
- Step 4. Action List
- Step 5. Identification and characterisation of a disposal-site
- Step 6. Determination of potential impacts and preparation of Impact Hypothesis
- Step 7. Issuance of a permit (permits and permit conditions)
- Step 8. Monitoring of compliance and field monitoring of impacts

Part 3: Waste Specific Guidance

Part 4: Resource Materials

Numbering and Naming Conventions

Some IMO (International Maritime Organization, the agency that hosts the London Convention) documents are written in a hybrid style that mixes British and international English spelling conventions. This document follows British Conventions except when quoting those documents or using proper nouns (such as names of organisations and agreements). Also, Articles and Annexes to some documents are numbered with Roman numerals (I, II, III, IV, etc.) in some texts and with Arabic numerals (1, 2, 3, 4, etc.) in others. In this document we use Arabic numerals except when directly quoting the official documents.

How will it be presented?

Presentation: The instructor will use overhead transparencies, lectures, and examples of selected ocean disposal operations on 35 mm slides, to guide participants through their manual.

Schedule: This course is designed to be presented in three days; although the Instructor may vary the schedule according to circumstances.

Instructors: The Instructor will be a specialist in some aspect of the topic material, such as international law administration, national ocean disposal law administration and/or marine science.

Participant Preparation: Ideally, Participants will have been provided with their manuals prior to beginning the course and asked to read the introductory material. Participants should be asked to prepare questions for the Instructor that will reflect their particular situations. This will help the Instructor make a more meaningful presentation of the material.

Participants will be expected to study selected topics and answer a set of questions designed to help them evaluate their own comprehension of the topics during the first and second evenings.

Course and Instructor Evaluation: At the conclusion of the course, Participants will be asked to complete an evaluation form. This will assist the International Maritime Organization in improving the course content and presentation materials and in evaluating the performance of the Instructors.

Certificates of Completion: The Instructor may hand out *Certificates of Completion* to Participants who have successfully completed all of the course material.

Tests: Tests are not normally required in non-credit courses such as this. However, the Instructor has a set of examination questions, expected answers and evaluation criteria to administer, if required by the sponsoring agency.

PART 1: CONTEXT OF THE WASTE ASSESSMENT GUIDANCE

1 INTRODUCTION TO THE WASTE ASSESSMENT GUIDANCE

1.1 Learning Outcomes for the Introduction to the WAG

Participants will:

- ❑ understand waste disposal terminology
- ❑ be aware of international history of waste disposal regulation
- ❑ know why the Waste Assessment Guidance Training Set was developed
- ❑ comprehend general concepts of the Waste Assessment Guidance
- ❑ understand scope and applications of the Waste Assessment Guidance

1.2 Overview of the Waste Assessment Guidance

1.2.1 London Convention 1972

The disposal of wastes at sea is regulated worldwide under the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, or London Convention 1972. Its objective is to prevent, reduce and where practical, eliminate pollution caused by disposal or incineration at sea (see below for a summary of the London Convention). This Convention is one of several international agreements and laws aimed at preventing all sources of pollution and maintaining marine ecosystem health (see the section 3, Relation between the London Convention 1972 and Other International Agreements). Section 2.1 provides more information on the London Convention.

1.2.2 1996 Protocol

By 1996, the knowledge of effects of marine pollution and effectiveness of control options had improved sufficiently to warrant updating some of the provisions of the London Convention. These improvements were embodied in a set of ocean disposal assessment procedures referred to as the 1996 Protocol (see the section summarising the 1996 Protocol, below). Its Annex 2 outlines the "Assessment of Wastes or Other Matter that may be Considered for Dumping". Annex 2 emphasises progressively reducing the need to use the sea for disposal of wastes. Furthermore, it recognises that avoidance of pollution demands rigorous controls on the emission and dispersion of contaminating substances and the use of scientifically based

Is it "Dumping" or "Disposal"?

When passed in 1972, the term "dumping" was used to mean the disposal of wastes at sea. However, in international trade parlance, "dumping" refers to the practice of a country or corporation selling commodities in another country for less than the cost of production. To avoid confusion with this and other uses of the term "dumping", the term "disposal" is preferred.

Both the Convention and the 1996 Protocol use the term "dumping", but they define it somewhat differently (see full text).

This document uses "disposal" in general reference to discarding material at sea and "dumping" when referring to specific clauses of the London Convention or Protocol.

The term, "discharge," usually means disposal directly to sea from land.

procedures for selecting appropriate options for waste disposal. Section 2.3 provides more information on the 1996 Protocol and its annexes.

1.2.3 Waste Assessment Guidance

To apply Annex 2 within a comprehensive waste management framework, "Guidelines for the Assessment of Wastes or Other Matter that May be Considered for Dumping", or in short, "Waste Assessment Guidance (WAG)" have been developed. These Guidelines complement and amplify the provisions in Annex 2 to the 1996 Protocol.

The WAG offers a general approach to pollution assessment and can be applied in many fields of waste management. In particular, it could help implement UNEP's Global Programme of Action for the Protection of the Marine Environment from Land-based Activities agreed upon in 1995. The WAG is intended for use by national authorities responsible for regulating disposal of wastes. It contains procedures to guide these authorities in evaluating applications for disposal of wastes in a manner consistent with the provisions of the London Convention 1972 and the 1996 Protocol¹.

The London Convention:

Prohibits disposal of wastes or other matter specified in Annex 1, requires special consideration of wastes listed in Annex 2, and outlines provisions to consider in issuing permits in Annex 3.

The 1996 Protocol:

Prohibits disposal of waste or other matter except for those materials specified in Annex 1, and outlines waste assessment requirements in Annex 2. Annex 3 deals with arbitration procedures.

1.2.4 Waste Assessment Guidance Training Set

The Contracting Parties to the London Convention 1972 agreed to develop training material to guide implementation of the 1996 Protocol to the London Convention 1972. Hence, this '*Waste Assessment Guidance Training Set*', or, '*WAG Training Set*', has been developed with financial support from the Governments of Canada, the Netherlands and the United States of America with assistance and input from London Convention Contracting Parties and from the United Nations system.

The WAG Training Set demonstrates the general concept of the Waste Assessment Guidance and primarily addresses national administrations responsible for waste management. It explains key components of the WAG and offers access to experience of Contracting Parties during the last 20 years in regulating sea disposal practices.

1.3 Marine Pollution and Degradation in Context

1.3.1 Need for WAG in Changing Times

Changing circumstances, better information, and a broader global perspective have increased appreciation of the relative severity of threats to the marine environment posed by various human activities. Continuing environmental degradation of our oceans

¹ In this training set, "the London Convention" will be taken to mean the convention itself and its 1996 Protocol, unless otherwise made clear from the context.

and coastal areas is detrimental to human health, economic development, and our planet's store of biodiversity. Many answers to the oceans' environmental problems lie in expanded public and institutional environmental awareness and integrated, sustainable management based on sound scientific information. The Waste Assessment Guidance and this Training Set offer tools to assist in achieving just that.

1.3.2 Marine Pollution Defined

"Pollution" means the introduction, directly or indirectly, by human activity, of wastes or other matter into the sea which results or is likely to result in such deleterious effects as harm to living resources and marine ecosystems, hazards to human health, hindrance to marine activities including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities. (LC 1972/1996 Protocol Annex 1 sec. (10))

Human threats to the marine environment can also result from fishing, coastal restructuring, disturbance (caused, for example, by recreational and commercial boat traffic) and degradation of habitats, particularly those in sensitive shoreline and coastal environments. Marine pollution prevention, therefore, is most effective when integrated with broadly defined marine (especially coastal) ecosystem management plans.

1.3.3 Successful Pollution Control

A myriad of pollution control initiatives has improved protection of the marine environment in several areas. These include:

- ❑ Better regulation of industrial pollution sources by countries through domestic laws and internationally through instruments such as the Basel convention (see section 3.4);
- ❑ Improved treatment of sewage before discharge, led by the need to protect human consumers from contamination of shellfish;
- ❑ New technology that has enabled regulators to greatly reduce emissions of certain elements, such as mercury from certain industrial processes and lead from automobile exhaust;
- ❑ Better control of discharges (mainly oil but also chemicals and litter) from shipping through the MARPOL 73/78 treaty (see section 3.3);
- ❑ Bans on atmospheric testing of nuclear bombs and ocean disposal of radioactive waste and more stringent controls on radionuclide-contaminated discharges;
- ❑ Banning by most industrial countries of certain persistent organic contaminants such as DDT and polychlorinated biphenyl (PCB); and
- ❑ Prohibiting the ocean disposal of entire categories of waste including industrial waste and radioactive materials.

These initiatives have resulted in safer seafood and bathing waters, cleaner beaches, and healthier coastal habitats in many localities. World-wide, 2.35 million tonnes of oil entered the marine environment from all sources in 1991, compared to 3.2 million tonnes in 1981 and 6.1 million tonnes in 1973; and total floating tar observed in 1985 declined by 75% from 1971-72 to 1985.¹ Seabird populations previously decimated by pesticides have recovered and in some places levels of contamination in marine life have fallen.

1.3.4 Current Pollution Threats

Notwithstanding the progress noted in the previous section, pollution continues to damage the marine environment. In 1990, the main sources of the potential pollutants in the oceans were estimated as follows: ² run-off and direct land-based discharges (44%); discharges through the atmosphere, mostly with a land-based origin (33%); maritime transportation (12%); and sea disposal (10%). Offshore exploration and exploitation contributes 1%.

When analysed by source, however, the relative inputs of each category vary greatly. About half of the oil entering the marine environment is from sea-based sources.³ These include accidental spills, which are usually reported and recorded in various databases; natural seeps (15% of total); and innumerable small discharges and leaks which are not well inventoried. Shipping accounts for about 24% of total inputs, and offshore oil production accounts for 2%;⁴ and this proportion has remained constant during the past decade.⁵

Today, most (89% to nearly 100%, depending on the compound) persistent organic pollutants (POPs) and approximately 95% of mercury and lead reach the global ocean from atmospheric input.⁶ In the coastal zone, however, land-based sources (industrial and municipal effluents) of organic and inorganic contaminants are dominant. For most contaminants, a relatively small fraction is delivered to estuaries and the coastal zone by rivers.

The most recent global review lists the following as the most serious pressures on the marine environment:⁷

- ❑ Destruction and alteration of habitats (ocean disposal can contribute by altering the sea bottom);
- ❑ Over-fishing and the effects of fishing on the environment;
- ❑ Effects of sewage and chemicals on human health and the environment (ocean disposal of sewage has been banned since 1996 and land-based discharges are now the major source, but some countries still allow ocean disposal of sewage sludge; ocean disposal can contribute by the deposit of trace amounts of contaminants that are still permitted);
- ❑ Eutrophication, caused mainly by nutrients from sewage and riverine inputs from agriculture (ocean disposal has been a source of sewage as noted above, and ocean disposal of fish offal can contribute if improperly managed); and
- ❑ Changes in hydrology and the flow of sediments.

The UNEP National Programme of Action for the Protection of the Marine Environment from Land-based Activities (1995) identifies the following highest-priority contaminants:

- ❑ sewage
- ❑ persistent organic pollutants
- ❑ radionuclides
- ❑ heavy metals
- ❑ oils/hydrocarbons
- ❑ nutrients

- ❑ contaminated sediments
- ❑ litter

No comparable assessment for strictly sea-based activities such as ocean disposal exists. The international community has, however, responded to similar priorities by prohibiting sewage, mercury, cadmium, organohalogen compounds, persistent plastics and other synthetic materials, crude and refined petroleum products and radioactive materials from ocean disposal (see section 2.2.2).

1.4 **Assessing Waste Impact: London Convention 1972 or 1996 Protocol?**

When applying the WAG to waste with uncertain impact on the marine environment, these uncertainties must be approached very cautiously. Acceptance of disposal under certain circumstances does not remove the obligation to make further attempts to reduce the necessity for disposal.

Provisions of the London Convention 1972 and the 1996 Protocol are not the same, but the Waste Assessment Guidelines can apply to both. For example, the WAG can be used in situations when a country is a Party to the London Convention, but has not yet acceded to (or signed) the 1996 Protocol.

Annex I to the 1996 Protocol identifies materials that may be considered for marine disposal, and the WAG applies to these materials. The 1996 Protocol prohibits disposal of all other wastes or matter. The London Convention 1972, however, prohibits the disposal of certain wastes or other matter allowed in Annex 1 and, in these cases, following the WAG will satisfy the requirements for dumping these wastes. When applying the WAG under the London Convention 1972, it should not be viewed as a tool for the reconsideration of disposal of wastes or other matter in contravention of the Convention's Annex 1.

Wastes that may be considered for dumping

Annex 1, paragraph 1, of the 1996 Protocol reads as follows:

"The following wastes or other matter are those that may be considered for dumping being mindful of the Objectives and General Obligations of this Protocol set out in Articles 2 and 3:

- .1 dredged material;
- .2 sewage sludge;
- .3 fish waste, or material resulting from industrial fish processing operations;
- .4 vessels and platforms or other man-made structures at sea;
- .5 inert, inorganic geological material;
- .6 organic material of natural origin; and
- .7 bulky items primarily comprising iron, steel, concrete and similarly unharmed materials for which the concern is physical impact, and limited to those circumstances where such wastes are generated at locations, such as small islands with isolated communities, having no practicable access to disposal options other than dumping."

1.4.1 Steps in Issuing a Permit

Figure 1, the Waste Assessment Framework, shows the important decision stages in WAG application. Use of the return loops built into the WAG depends on the nature and quality of the information received. In general, national authorities should consider all

stages in Figure 1 before deciding to issue a permit. Other matters may also enter into the decision at the discretion of the regulatory authority.

Figure 1 illustrates the relationship between the operational components of Annex 2 of the 1996 Protocol and contains the following elements:

1. characterise waste (chemical, physical and biological properties);
2. consider waste prevention audit and waste management options;
3. compare contaminants in waste with Action List;
4. identify and characterise disposal site;
5. determine potential impacts and prepare impact hypothesis(es);
6. decide whether project can proceed;
7. implement project (permit and permit conditions); and
8. monitor compliance and environmental impacts.

1.5 WAG Process Based on Precautionary Approach

The WAG constitutes a precautionary approach as well as a practical procedure for managing waste in compliance with London Convention 1972 and the 1996 Protocol. It also applies to all point sources of marine pollution such as those land-based sources covered by the GPA and integrated ocean and coastal zone management programmes.

The WAG recognises that avoidance of pollution demands rigorous controls over the emission and dispersion of contaminating substances and the use of scientifically based procedures for selecting appropriate methods of waste disposal.

It requires a precautionary approach to the introduction of substances into the environment and actively pursues measures that will reduce contamination where there is reason to believe that wastes or other matter introduced into the marine environment are likely to cause harm even when there is no conclusive evidence to prove a causal relation between inputs and their effects.

Incorporation of monitoring of both compliance and environmental effects into the decision process provides important feedback that strengthens the precautionary approach. Monitoring of compliance reveals aspects of permit requirements with which operators may be having difficulty. As well as providing information to support enforcement, is also provides an opportunity to improve the practicability of permit conditions in subsequent situations. Monitoring of environmental effect provides critical information on what permit conditions are successful in protecting the environment, and where improvements are warranted. The experience of ocean disposal authorities has been that, as more permits are issued and more operational and environmental problems are encountered and solved, the waste assessment process becomes more efficient and effective.

The precautionary approach also recognises that pollution of the sea and other sectors of the environment will be prevented only by reducing the quantity and variety of waste produced.

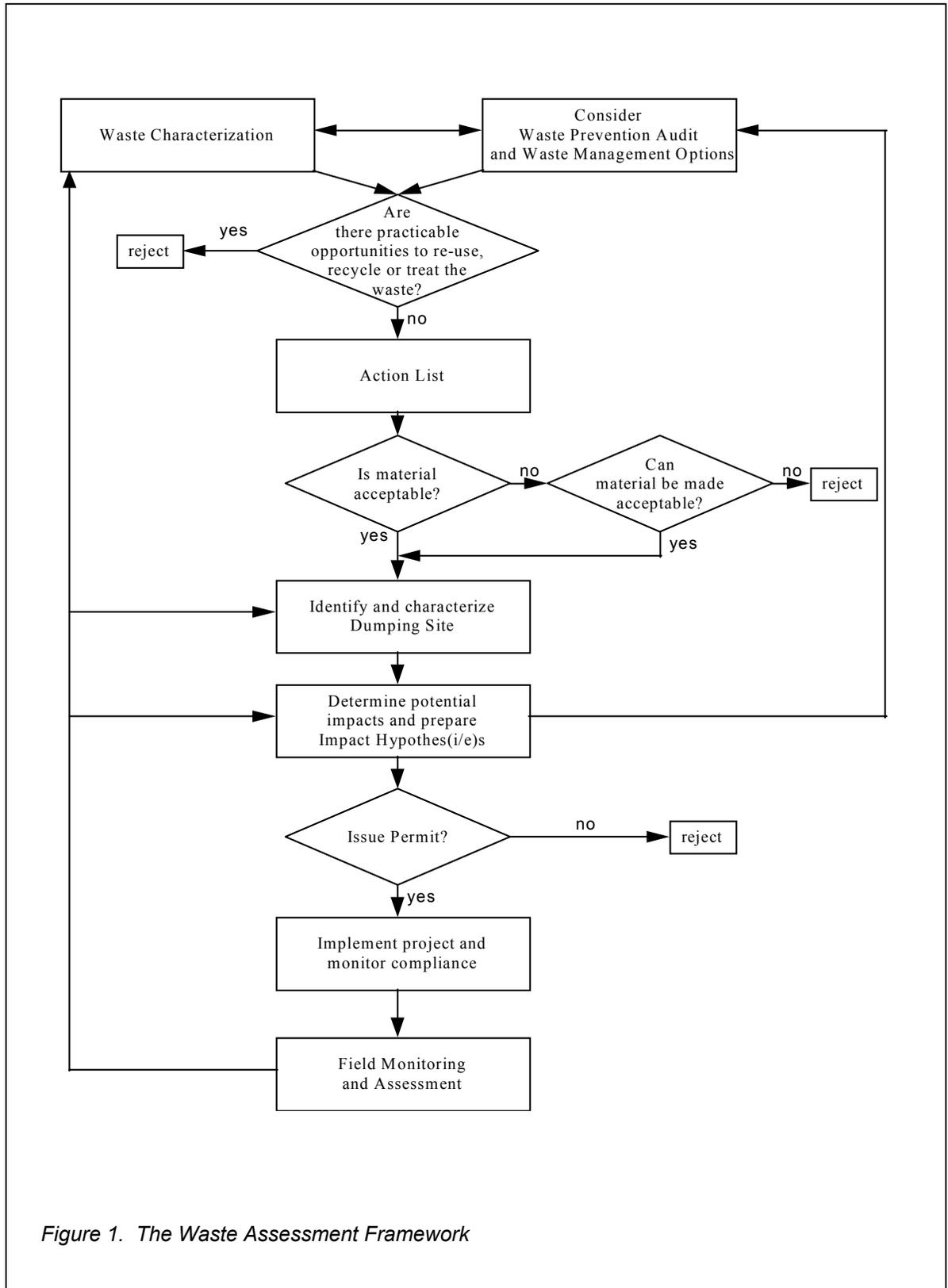


Figure 1. The Waste Assessment Framework

1.6 *Waste-Specific Guidance*

In addition to the generic Waste Assessment Guidance presented in this course, separate guidance documents have been developed for the specific types of waste listed in Annex 1 of the 1996 protocol (wastes that may be considered for ocean disposal):

- ❑ dredged material;
- ❑ sewage sludge;
- ❑ fish waste, or material resulting from industrial fish processing operations;
- ❑ vessels
- ❑ platforms or other man-made structures at sea;
- ❑ inert, inorganic geological material;
- ❑ organic material of natural origin; and
- ❑ bulky items primarily comprising iron, steel, concrete and similarly unarmful materials for which the concern is physical impact, and limited to those circumstances where such wastes are generated at locations such as small islands with isolated communities having no practicable access to disposal options other than dumping.

Additional guidance to help implement the WAG is being developed. New guidance documents will be announced and posted on the London Convention Web site, www.LondonConvention.org, as they are approved by the Office for the London Convention.

While not covered during the presentation of the course, these documents are included in the reference material, Part 4. A brief explanation of each is given in Part 3. Participants are encouraged to review these before the course and the instructor will be prepared to answer questions about them. They are also available for on the London Convention Web site.

1.7 *Regulatory Aspects of the WAG*

1.7.1 *Regulatory Regime*

The Waste Assessment Guidelines are but one component of a regulatory regime, prescribed in the London Convention and 1996 Protocol, which includes:

- **Prohibition of disposal of any wastes except by permit**, in accordance with the London Convention 1972 and/or the 1996 Protocol,
- **Designation of a national authority** to fulfil the administrative responsibilities and oversee the obligations of the London Convention, including its application for waste management purposes,
- **Development of adequate enforcement procedures** to prevent and, if necessary, punish acts contrary to the provisions of the London Convention, and
- **Establishment of consultation networks** for regional co-operation, technical co-operation and assistance, and scientific and technical research to help all parties to the London Convention play a role in meeting their obligations.

1.7.2 Regulatory Procedure

The WAG itself is part of a regulatory procedure in which information is generated, consultations are organised, and options are developed and lead to a choice for managing a particular waste. Each step must be planned in advance and in accordance with applicable national practice. As a first step, the national licensing authority should develop a standard list of questions which an applicant for a permit or planning licence (industry, port authority, regional planning authority, etc.) needs to answer in detail as part of the application and before the WAG procedure commences. For instance, an applicant should be required to submit an assessment of all alternative options for a planned operation.

In general, applicants must provide all information requested before applications can be admitted in the procedure. If the information available at any stage of the WAG is insufficient, the regulatory authority will have to ensure that the missing information is provided before moving to the next Section. The WAG (paragraphs 10 and 37) prescribes that any ocean disposal application be rejected if the consequences cannot be determined, for instance due to lack of essential information.

1.7.3 Regulatory Authority

The regulatory authority will need to have access to expertise necessary to assess the application and to administer the permitting procedure. It is often useful to discuss the requirements of the WAG with applicants prior to submission of their applications. This will contribute to a relationship of trust and recognition of the role of each stakeholder in the licensing procedure, and will prevent misunderstanding that would prove more difficult and costly to correct after submission. Other legal requirements, such as compensation for damage to the environment arising from disposal or incineration at sea (Article 15 of the 1996 Protocol), settlement of disputes (Article 16 of the 1996 Protocol) and third party access to the application process should also be considered at the time of submission of the application.

Who is the regulatory authority?

Parties to the Convention and to the 1996 Protocol have agreed to abide by the articles of these international agreements. Governments of these countries normally do this by establishing national laws that set up a waste assessment and permit issuing process and an inspection and enforcement regime. The department or ministry that is charged with administering these laws is referred to as the issuing authority (see section 2.5).

1.7.4 Learning from Rejected Applications

Should an application to dump wastes at sea be rejected for whatever reason, it is important to learn from the results of the option that is chosen instead. For instance, in case land-based treatment is chosen, many of the criteria in the WAG can be applied to protect the marine environment from land-based sources of pollution under the UNEP-GPA (see the section 3). Over time, the expanding knowledge base of consequences of decisions taken can be used to refine and improve the decision process.

1.8 Self-Assessment Exercises on the Introduction

1.8.1 Questions on the Introduction

1. The London Convention 1972 and the 1996 Protocol are the only international conventions dealing with protection of the marine environment. True or False?
2. “Dumping” and “disposal” mean the same thing in international diplomatic parlance.
3. The Waste Assessment Guidance does not apply to the 1996 Protocol. True or False?
4. If a waste disposed of in the ocean contains a contaminant that will not cause any harm to marine organisms but may present a health hazard to human consumers, is it “pollution”?
5. The London Convention 1972 did not have any measurable effect on marine pollution; that is why the 1996 Protocol was needed. True or False?
6. Name three major threats to the world’s oceans.
7. Name three of the highest priority contaminants, according to the United Nations Environment Programme.
8. What are three types of waste that may be considered for ocean disposal?
9. What regulatory authority enforces the provisions of the London Convention in each country?

1.8.2 Answers to Self Assessment Questions on the Introduction

1. False. It is one of many international conventions dealing with protection of the marine environment.
2. False. “Dumping” means disposal of wastes from ships at sea and has other connotations in international diplomatic parlance; disposal means discarding waste from land or sea.
3. False. The Waste Assessment Guidance was developed to guide implementation of both the London Convention 1972 and the 1996 Protocol.
4. Yes. If a waste disposed of in the ocean contains a contaminant that will not cause any harm to marine organisms but may present a health hazard to human consumers, or a threat to any other legitimate uses of the sea such as fishing, it is “pollution.”
5. False. The London Convention 1972 and other international agreements significantly reduced the damage to marine environments caused by pollution. Examples are cleaner beaches, safer seafood and healthier seabirds.
6. Major threats to the world’s oceans are listed in section 1.3.4.
7. The highest priority contaminants, according to the United Nations Environment Programme, are also listed in section 1.3.4, Current Pollution Threats.
8. Types of waste that may be considered for ocean disposal are given in section 1.4.
9. Governments of countries that are Party to the London Convention are responsible for establishing national laws that set a waste assessment and permit issuing process and an inspection and enforcement regime.

2 THE LONDON CONVENTION 1972 AND 1996 PROTOCOL

2.1 Learning Objectives for this Section

Participants will:

- ❑ Understand the origin and purpose of the London Convention 1972 (section 2.2.1).
- ❑ Be familiar with the structure of the London Convention 1972 (section 2.2.2).
- ❑ Understand the purpose and scope of the 1996 Protocol (section 2.3.1).
- ❑ Be familiar with the structure of the 1996 Protocol (section 2.3.2).
- ❑ Comprehend the relationship of the 1996 Protocol's Annex 2 to Waste Assessment Guidance (section 2.3.3).

2.2 The Basics of the London Convention 1972

2.2.1 Background

Prior to 1972 many industrialised countries (virtually all coastal states) carried out the dumping at sea of waste generated on land and loaded on board specialised dumping vessels. In 1972 the London Convention set out international rules to prevent marine pollution from this practice world-wide, coming in to force in 1975 when a sufficient number of countries had acceded to it. The Oslo Convention, with similar objectives for the Northeast Atlantic, entered into force in 1974. At present, there are 78 Parties to the London Convention (see list in section 18.4.1) ⁱⁱ.

These were followed by several similar regional agreements. Unregulated dumping has largely been halted since then. Most of these conventions share a so-called “black list and grey list” approach. The black list contains substances, the dumping of which is prohibited. The grey list contains substances, the dumping of which is only permitted under strict control and provided certain conditions are met (see section 6).

London Convention 1972

Article IV

“1 In accordance with the provisions of this Convention Contracting Parties shall prohibit the dumping of any wastes or other matter in whatever form or condition except as otherwise specified below:

(a) the dumping of wastes or other matter listed in Annex I is prohibited;

(b) the dumping of wastes or other matter listed in Annex II requires a prior special permit;

the dumping of all other wastes or matter requires a prior general permit.”

ⁱⁱ August, 2001; from www.imo.org

2.2.2 The Structure of the London Convention, 1972

The London Convention 1972 takes the approach of banning everything except in accordance with a permit and then sets out the requirements for and factors to consider in granting permits. Articles 1 and 2 commit Parties to general principals for preventing pollution of the marine environment and co-operating with other Parties to do so. Article 3 defines the terms, including what “dumping” does and does not mean. Article 4 established the basic prohibition including references to:

- Annex 1, a list of prohibited substances (the “black list”);
- Annex 2, a list of dangerous substances (the “grey list”) that requires a special permit (also included is a set of regulations for ocean incineration of wastes which are banned by the 1996 Protocol; see section 2.3); and
- Annex 3, a list of factors to consider in issuing a special permit, including prior studies of the characteristics of the dumping site.

Article 5 gives exceptions to the usual permit requirements, for example, in emergencies when human life or property are at risk.

Article 6 requires Parties to establish a regulatory regime. Articles 7 to 22 deal mainly with administrative, enforcement and procedural issues.

Trends in disposal volumes of various waste categories resulting from the Convention are available at <http://www.LondonConvention.org>.

2.3 The Basics of the 1996 Protocol

2.3.1 Background to the 1996 Protocol

Almost as soon as the London Convention 1972 came into force, problems with its implementation became apparent. One of the first involved the “black list” of prohibited substances. Several of these are elements (e.g., mercury, cadmium) or mixtures of complex, natural compounds (e.g., petroleum hydrocarbons) that are nearly ubiquitous in natural materials such as dredged sediments. The absolute prohibition of these would have virtually halted industrial operations such as harbour dredging without environmental benefit.

A confounding problem was the measurement. Analytical chemistry is precise only to a point that point being called the detection limit (usually measured as a concentration of the contaminant in parts per million or parts per billion). The detection limit varies with the analytical equipment, the skill and care exercised by the technician, and the presence or chemical characteristics of other substances in the material being tested. At concentrations near the detection limit, chemists can often discern the presence of a contaminant without being able to measure its concentration. These are reported as “traces”. At lower concentrations the contaminant may be present but not detected; these are reported as “not detected” or “less than the detection limit” (laboratory results usually express these results in the form, “< x” where “x” is the detection limit).ⁱⁱⁱ Therefore, regulators needed some way to deal with contaminants at levels that were either too low to be detected, or too low to be of environmental significance (more

ⁱⁱⁱ Some chemists use the terms “quantitation limit”, the level below which concentration can not be reliably quantified, and the “detection limit”, the level below which even traces can not be detected.

discussion of this issue will be found in Part 2, Action Levels). See section 18.2 for additional information on analysis, quantification of contaminants and statistical design of sampling programs for sediment contamination.

During the decade after the London Convention 1972 came into force, scientific assessments led to a deeper understanding the environmental damage caused by some pollutants that were approved for ocean disposal. Examples are sewage, radionuclides and certain classes of synthetic organic compounds. At the same time, new technology was being developed to treat them more effectively, and the international community was reaching agreements to limit their discharge to the marine environment.

In early 1991, incineration at sea operations came to a halt, ahead of the agreed global deadline of 31 December 1992. In 1991, Parties also agreed to apply the so-called "precautionary approach in environmental protection" within the framework of the London Convention (resolution LDC.44(14)). In 1990, Parties to the London Convention 1972 agreed to phase-out sea disposal of industrial waste effective 1 January 1996 (Resolution LDC.43(13)).

In 1992, Agenda 21 (negotiated at the United Nations Conference on Environment and Development, UNCED) encouraged Parties to complete this new orientation. In 1993, Parties started a detailed review of the London Convention, leading to the adoption of amendments to Annexes I and II to the London Convention as a first step. These amendments consolidated in a legally binding manner the prohibition of dumping all radioactive wastes, effective 1 January 1996, and the prohibition of incineration at sea of industrial wastes and of sewage sludge. In 1996, this review was completed with the adoption of the 1996 Protocol to the London Convention 1972, which, when entered into force, will replace the London Convention. The 1996 Protocol currently (August 2001) has 15 member states (see list in section 18.4.2).

2.3.2 Structure of the 1996 Protocol

The preamble acknowledges the past accomplishments of the London Convention 1972 and declares the Contracting Parties' conviction that further action must be taken to protect and preserve the marine environment. It referred to the need to manage human activities so that marine ecosystems can sustain legitimate use of the sea, using the language of sustainable development adopted at UNCED 1992.

The definitions, which have been modified, are consolidated in Article 1. Article 2 states the objectives of the Protocol. Article 3 outlines general obligations of the Contracting Parties.

As in the London Convention 1972, Article 4 establishes the basic prohibition, but instead of listing wastes or other matter that are prohibited from ocean disposal, it prohibits everything except specific, listed substances (Annex 1). Article 4 states that any ocean disposal of Annex 1 substances requires a permit, and requires the Contracting Parties to adopt administrative or legislative measures to ensure that issuance of permits and permit conditions comply with waste assessment procedures outlined in Annex 2.

Article 5 prohibits incineration at sea of wastes or other matter. Article 6 prohibits the export of wastes to other countries for dumping or incineration at sea.

Article 7 requires that countries either apply the provisions of the Protocol or adopt other effective measures to control ocean dumping and ocean incineration in marine *internal*

waters (i.e., those waters under national jurisdiction and outside of international jurisdiction).

Article 8 establishes exception to permit requirements in the case of defined emergencies and outlines procedures to be followed in such cases.

Articles 9-29 deal with mainly administrative, enforcement and procedural issues.

The 1996 Protocol includes the following Annexes:

Annex 1 – Wastes or other matter that may be considered for dumping

Annex 2 – Assessment of wastes other matter that may be considered for dumping

Annex 3 – Arbitration Procedures

Annex 2's 18 clauses outline an 8-step process to determine whether other suitable options may be available, assess the physical and biological properties of the waste, select an appropriate disposal site, assess potential effects, monitor the dumping operation and resulting effects, and develop suitable permit conditions. Subsequently, the International Maritime Organisation approved the *GUIDELINES FOR THE ASSESSMENT OF WASTES OR OTHER MATTER* (or Waste Assessment Guidelines, WAG) to guide Contracting Parties in the implementation of Annex 2.

2.3.3 Where and to Which States Does it Apply?

International conventions normally become operational in two stages. The first stage is when a certain number of countries sign the convention, signalling their intention to become “parties” to it. The London Convention is therefore dated 1972, the year that the countries sponsoring it completed negotiations and agreed to its terms.

Most democratic countries, however, must submit international agreements to their parliaments or other governing institutions for approval, and then pass domestic laws to implement the international conventions within their countries. When these steps have been taken, the country may then “accede to” the convention, i.e., formally signify to the convention officials that it is ready to begin implementing the convention’s requirements. The second stage of becoming operational is when a sufficient number of states have acceded to the convention. For the London Convention, this occurred in 1975. The 1996 Protocol has not yet entered into force in international law, but the countries that have acceded to it have passed domestic laws to enforce it.

The London Convention applies to marine waters world-wide other than the internal waters of States. The term “internal waters” carries a specific meaning in international parlance and does not include certain bays, estuaries, navigable rivers and other inland waters as defined by international law.

The London Convention 1972 also applies to some nations that have not ratified or acceded to it. The United Nations Law of the Sea treaty (UNCLOS) contains a provision that its Parties must obey other international rules. These other international rules in respect of ocean disposal are considered to be the London Convention 1972 and (when it comes into force) the 1996 Protocol. At this writing (August, 2001) 77 states that are States Parties to UNCLOS are not a Party to the London Convention 1972 but are, nevertheless, subject to its provisions (see section 3.2.2).

2.4 Self-assessment exercise on the London Convention and 1996 Protocol

2.4.1 Self Assessment Questions for the London Convention and 1996 Protocol

1. The diagram indicates the hierarchy of the London Convention 1972. Fill in the boxes with the correct information for each article or annex number:

London Convention 1972	
Article I	
Article II	
Article III	
Article IV	
	Annex I
	Annex II
	Annex III
Article V	
Article VI	
Article VII-XXII	

2. Summarise the trends in ocean waste disposal since the London Convention 1972 using graph, diagram or word description. (participants will have to have used the Internet to access <http://www.LondonConvention.org> or other sources to obtain this data)
3. Since 1972, which substances have been banned from ocean disposal?
4. Name 4 factors leading to updating and expanding the London Convention.
5. The diagram indicates the hierarchy of the 1996 Protocol. Fill in the boxes with the correct information for each article or annex number:

1996 Protocol

Preamble	
Article 1	
Article 2	
Article 3	
Article 4	
	Annex 1
	Annex 2
	18 clauses
	Annex 3
Article 5	
Article 6	
Article 7	
Article 8	
Article 9-29	

6. How do the 1996 Protocol and Waste Assessment Guidance relate?
7. How many countries have acceded to the London Convention 1972? to the 1996 Protocol?

2.4.2 Answers to Self-assessment Questions for LC 72 and 1996 Protocol

1. The London Convention has 22 Articles that describe what to consider in granting permits for ocean disposal of waste:
 - Articles 1 and 2 commit Parties to general marine pollution prevention principles and to co-operation with each other
 - Article 3 defines terminology of waste disposal
 - Article 4 lays out the basic prohibition, including:
 - Annex 1 lists prohibited substances (black list)
 - Annex 2 lists dangerous substances (grey list) that require special permit for disposal
 - Annex 3 lists factors to consider in issuing special permits
 - Article 5 outlines exceptions to permit requirements, such as emergencies
 - Article 6 requires parties to establish a regulatory regime
 - Articles 7 to 22 are mainly administrative, enforcement and procedural in nature.
 2. Trends in ocean dumping since 1972 (from London Convention Web site) are:
 - Industrial Waste dumping
 - 1970s - increased from 11 million tonnes to 17 million tonnes (due in part to more Parties reporting)
 - 1980s - decreased to about 8 million tonnes
 - 1992-1995 - varied from 4.5 to 6 million tonnes
 - since 1996 - no dumping permits issued
 - Sewage sludge dumping
 - 1970s - increased from 12.5 to 17 million tonnes
 - 1985 - decreased to 14 million tonnes
 - 1986-early 1990s - rose to 20 million tonnes, then fell to 12 million tonnes
 - 1992-1994 - rose to 16.25 million tonnes
 - Dredged material dumping
 - 150-400 million tonnes in Convention waters
 - 100-150 million tonnes in internal (coastal) waters
 - 2/3rds of dredged material from harbour and waterway maintenance operations
 - 80-85% of dumping permits notified to the Office for the London Convention concern dredged material.
 - Incineration at sea
 - mid 1970s-late 1980s - 100,000 tonnes
-

- since 1987 - steady decline
 - 1991 - incineration at sea phased out
 - Dumping radioactive wastes
 - high-level radioactive waste - never permitted for dumping
 - since 1983 - moratorium on dumping low-level radioactive waste
 - 1993 - banned dumping of all radioactive waste
 - Others
 - inert, geological material (1.5-7 million tonnes)
 - decommissioned vessels
 - fish waste (50,000 - 100,000 tonnes)
3. Effective 1991, incineration at sea of industrial wastes and sewage sludge has been banned, and dumping of radioactive waste was banned in 1993, following a 10 year moratorium.
4. Shortfalls in the London Convention were noted when Parties began implementing it. Some were:
- some black list substances are nearly ubiquitous in natural materials
 - measurement of trace contaminants is difficult and variable
 - new information on environmental impact and new treatment options led to new limits on disposal
 - incineration of industrial waste and sewage sludge at sea banned

These led to updating and expanding the London Convention with the 1996 Protocol.
(pgs 16,17)

5. The 1996 Protocol has 29 Articles:

- Article 1 consolidated relevant terminology
- Article 2 states the objectives of the Protocol
- Article 3 outlines general obligations of contracting parties
- Article 4 establishes the basic prohibition
 - Annex 1 - lists wastes or other matter that may be considered for dumping with a permit
 - Annex 2 - outlines procedures for assessing wastes or other matter that may be considered for dumping
 - 18 clauses outline the 8 steps on which WAG is based
 - Annex 3 - describes arbitration procedures
- Article 5 prohibits incineration at sea
- Article 6 prohibits export of waste to other countries for dumping or incineration at sea

- Article 7 requires countries apply the 1996 Protocol or other effective measures to their internal waters
 - Article 8 gives exceptions to permit requirements such as emergencies
 - Articles 9-29 focus on administrative, enforcement and procedural issues
6. Annex 2 of the 1996 Protocol has 18 clauses that describe an 8-step process to determine whether waste is suitable for ocean disposal and how to monitor it if it is. These 8 steps are embodied in the Waste Assessment Guidelines or WAG.
 7. As of August 2001, there are 78 Parties to the London Convention and 15 to the 1996 Protocol.

3 RELATIONSHIP BETWEEN THE LONDON CONVENTION AND OTHER INTERNATIONAL AGREEMENTS

The London Convention 1972 and its 1996 Protocol are one of several international conventions to protect the marine environment and conserve its species and ecosystems. Some of these complement the LC72, that is, they cover activities that it does not. Others supplement the LC72, for example, by providing additional protection as needed in specific circumstances.

3.1 *Stockholm, 1972*

At the United Nations Conference on the Human Environment (Stockholm, Sweden June, 1972), delegates considered the need for a common outlook and for common principles to inspire and guide the peoples of the world in the preservation and enhancement of the human environment. The result was the Stockholm Declaration.

3.2 *The United Nations Convention on the Law of the Sea (UNCLOS)*

The United Nations Convention on the Law of the Sea (UNCLOS) comprises 320 articles and nine annexes, governing all aspects of ocean space, such as delimitation, environmental control, marine scientific research, economic and commercial activities, transfer of technology and the settlement of disputes relating to ocean matters.

The Convention entered into force in 1994 and currently (August 2001) has 136 States Parties.

Part XII of the Convention (Articles 192 to 237) addresses Protection and Preservation of the Marine Environment and gives basic obligations to prevent, reduce and control pollution from land-based sources; pollution from sea-bed activities subject to national jurisdiction; pollution from activities in the Area; pollution by dumping; pollution from vessels; and pollution from or through the atmosphere (Articles 207 to 212).

Examples of international agreements to protect the marine environment...

...from ocean disposal:

- ❑ The London Convention 1972 and 1996 Protocol

...from land-based pollution:

- ❑ Global Programme of Action 1995
- ❑ Basel Convention

...from atmospheric pollution:

- ❑ Montreal Guidelines 1987
- ❑ Kyoto Protocol 1992
- ❑ Stockholm Convention 2001

...from discharges from ships:

- ❑ MARPOL 73/78

...from over-fishing

- ❑ UN Convention on straddling fish stocks and migratory fish stocks
- ❑ FAO Code of conduct for Responsible fisheries

3.2.1 **Key features of UNCLOS**

Some of the key features of the Convention relevant to prevention of marine pollution are as follows:

- ❑ Coastal States have sovereign rights in a 200-nautical mile exclusive economic zone (EEZ) with respect to natural resources and certain economic activities, and exercise jurisdiction over marine science research and environmental protection;
- ❑ Coastal States have sovereign rights over the continental shelf (the area of the seabed in shallow water adjacent to the coast) for exploring and exploiting it. The shelf can extend at least 200 nautical miles from the shore, and more under specified circumstances;
- ❑ All States enjoy the traditional freedoms of navigation, overflight, scientific research and fishing on the high seas. They are obliged to adopt, or cooperate with other States in adopting measures to manage and conserve living resources;
- ❑ States bordering enclosed or semi-enclosed seas are expected to co-operate in managing living resources, environmental and research policies and activities;
- ❑ States are bound to prevent and control marine pollution and are liable for damage caused by violation of their international obligations to combat such pollution;
- ❑ All marine scientific research in the EEZ and on the continental shelf is subject to the consent of the coastal State, but in most cases the State is obliged to grant consent to other States when the research is to be conducted for peaceful purposes and fulfils specified criteria.

3.2.2 Relationship between UNCLOS and the London Convention 1972

All States parties to UNCLOS are legally bound to adopt laws and regulations and take other measures to control pollution by dumping, and they must be no less effective than the “global rules and standards” (Article 210), which are considered to be those of the London Convention 1972. They will also be obliged to enforce such laws and regulations in accordance with Article 210 of UNCLOS. This is an important consequence in view of the fact that 77 out of 136 Parties to UNCLOS are not Contracting Parties to the London Convention 1972. When the 1996 Protocol to the London Convention comes into force, this will be the “global rules and standards” referenced by Article 210.

3.3 MARPOL 73/78

The International Convention for the Prevention of Pollution of Ships, 1973, was adopted that same year. This Convention was subsequently modified by the Protocol 1978, which was adopted in 1978. The Protocol introduced stricter regulations for the survey and certification of ships. It is to be read as one instrument and is usually referred to as MARPOL 73/78.

This IMO Convention is the most important global treaty for the prevention of pollution from the operation of ships. It governs the design and equipment of ships, establishes a system of certificates and inspections and requires member states to provide reception facilities for the disposal of oily waste and chemicals. It covers all technical aspects of pollution from ships, except the disposal of waste into the sea by dumping, and applies

to ships of all types, although it does not apply to pollution arising out of the exploration and exploitation of sea-bed mineral resources.

Regulations covering the various sources of ship-generated pollution are contained in six annexes that are updated regularly. Annexes I (oil), II (chemicals in bulk), III (chemicals in packaged form) and V (garbage) are in force. Annexes IV (sewage) and VI (air pollution) are not yet in force.

3.4 The Basel Convention

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal was adopted in Basel (Switzerland) in March 1989 and entered into force in May 1992. As of August 2001, 148 states and the European Union are Parties to the Convention.

The aim and objectives of this global convention are as follows:

- ❑ To reduce transboundary movements of hazardous wastes and other wastes subject to the Basel Convention to a minimum consistent with their environmentally sound management.
- ❑ To dispose of the hazardous wastes and other wastes generated, as close as possible to their source of generation.
- ❑ To minimise generation of hazardous wastes in terms of quantity and hazard.
- ❑ To ensure strict control over movements of hazardous wastes across borders.
- ❑ To prohibit shipments of hazardous wastes to countries lacking the legal, administrative and technical capacity to manage and dispose of them in an environmental sound manner.
- ❑ To assist developing countries and countries with economies in transition in the environmentally sound management of the hazardous and other wastes that they generate.

In 1995 a new article obligated Parties and other states that are members of OECD, EU and Liechtenstein to prohibit all transboundary movements of hazardous wastes for disposal in other states. It also obligates these states to phase out by 1997 all transboundary movements of hazardous wastes destined for recovery or recycling.

3.5 Agenda 21

Agenda 21 is a comprehensive plan of action to be taken globally, nationally and locally by organisations of the United Nations system, governments, and major groups in every area in which humans affect the environment. Along with the Rio Declaration on Environment and Development, and other instruments, it was adopted by more than 178 governments at the United Nations Conference on Environment and Development (UNCED; the “Earth Summit”) held in Rio de Janeiro, Brazil, June 1992.

The Commission on Sustainable Development (CSD) was created in December 1992 to ensure effective follow-up of UNCED, and to monitor and report on implementation of the agreements at the local, national, regional and international levels. A five year review of Earth Summit progress was made in 1997 by the United Nations General Assembly meeting in a special session.

The 55th General Assembly session decided in December 2000 that the CSD would serve as the central organising body for the 2002 World Summit on Sustainable Development, which will be held in Johannesburg, South Africa.

3.6 Guidelines and Standards for the Removal of Offshore Installations

GUIDELINES AND STANDARDS FOR THE REMOVAL OF OFFSHORE INSTALLATIONS AND STRUCTURES ON THE CONTINENTAL SHELF AND IN THE EXCLUSIVE ECONOMIC ZONE were passed by IMO Resolution A.672(16), adopted on 19 October 1989.

These Guidelines and Standards represent the "generally accepted international standards" as mentioned in UNCLOS, Article 60, which prescribes that any installations or structures which are abandoned or disused shall be removed to ensure safety of navigation and to prevent any potential effect on the marine environment.

All installations are to be removed except where: "non-removal or partial removal is consistent with these Guidelines and Standards". A decision should be based on a case-by-case evaluation including the following matters:

- ❑ potential effect on safety of navigation or other uses
- ❑ deterioration of material and future effects
- ❑ potential effect on the marine environment including living resources
- ❑ risk of shift from position
- ❑ costs, technical feasibility and risks of injury to personnel
- ❑ determination of new use or other reasonable justification

3.7 GPA 1995

The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (UNEP-GPA) was adopted by member countries 1995. It was developed through UNEP's efforts, beginning in 1982, to address issues related to impacts on the marine environment from land-based activities, including the following conventions and decisions:

- ❑ 1985 Montreal Guidelines for the Protection of the Marine Environment Against Pollution from Land-based Sources
- ❑ 1995 UNEP Governing Council decisions 18/31 and 18/32 pertaining to the Washington Conference a proposed new convention on Persistent Organic Pollutants (POPs)
- ❑ 1995 Conference to adopt a Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), Washington, DC, USA

The GPA is designed to be a source of conceptual and practical guidance to be drawn upon by national and/or regional authorities in devising and implementing sustained action to prevent, reduce, control and/or eliminate marine degradation from land-based activities.

Since passage of the GPA, a number of countries have developed their own national programmes of action for the protection of the marine environment from land-based

activities. Also, the eight countries that make up the Arctic Council have established the Arctic Programme of Action for the Protection of Marine Environment from Land-based Activities.

3.8 *Regional Conventions and Agreements*

Supplementing the global conventions referred to above, are a number of regional conventions and agreements, some of which are under the UNEP Regional Seas Programme. Examples include:

- ❑ The Cartagena Convention in the Caribbean
- ❑ The Permanent Commission for the South Pacific (CPPS)
- ❑ Convention on Protection of the Marine Environment of the North-east Atlantic (OSPAR)
- ❑ The Bamako Convention on the ban of the Import into Africa and the Control of Transboundary Movement of Hazardous Wastes within Africa
- ❑ Negotiations are also under way with other regional bodies, such as the Regional Organization for the Conservation of the Environment of the Red Sea and the Gulf of Aden (PERSGA), the Regional Organization for the Protection of the Marine Environment (ROPME) and the Regional Coordinating Unit for the East Asian Seas Action Plan (EAS/RCU).

3.9 *Other International Conventions*

Other international conventions that complement the London Convention 1972 by protecting some elements of marine ecosystems include:

- ❑ The **Convention on Biological Diversity** (1992) is a comprehensive, binding agreement covering the use and conservation of biodiversity. It requires countries to develop and implement strategies for sustainable use and protection of biodiversity, and provides a forum for continuing international dialogue on biodiversity-related issues through the annual conferences of the parties (COPs).
- ❑ The 1992 Convention on Biological Diversity contains no specific article on marine and coastal biodiversity. Instead, the 1995 Conference of the Parties deals with these issues in two decisions. One (II10) was a policy decision – now known as the **Jakarta Mandate on the Conservation and Sustainable Use of Marine and Coastal Biological Diversity** – containing basic principles and thematic areas. These provisions were to be implemented through a multi-year programme of work described in the second decision (IV5).
- ❑ The **Convention on Trade in Endangered Species** (CITES) prohibits international trade in Appendix 1 species and requires import/export permits for Appendix 2 species. The goal is to remove the economic incentive to harvest endangered species by preventing poaching and smuggling.
- ❑ **International Whaling Commission** (IWC) members agree to abide by its rules to conserve whales. Since 1986 there has been a moratorium on commercial harvest of all whale species.

- ❑ The **International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)**, 1990, provides a global framework for international co-operation in combating major incidents or threats of marine pollution.
- ❑ The **Convention on Wetlands of International Importance (RAMSAR)** protects many coastal wetlands; related initiatives (such as Important Bird Areas, IBA) are establishing networks of protected areas on the migration routes of major groups such as waterfowl and shorebirds.
- ❑ The **International Code of Conduct for Responsible Fisheries**, sponsored by the Food and Agricultural Organisation (FAO), was adopted by 80 countries in 1995. Its goal is to protect non-target species of fish and wildlife and illegal-size fish from fishing.
- ❑ The **UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks**, 1995, compels member countries to co-operate in the management of fish stocks that straddle or migrate across international borders.
- ❑ The **Kyoto Protocol to the United Nations Framework Convention on Climate Change** (1997) is not yet in force (August, 2001). The Protocol was adopted at the third session of the Conference of the Parties to the 1992 United Nations Framework Convention on Climate Change.
- ❑ The **Stockholm Convention on Persistent Organic Pollutants**, Stockholm, 22 May 2001, has not yet entered into force. As of August 2001, two countries have ratified it (Canada and Fiji). It was preceded by the Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants, Aarhus, June 1998, which also has not entered into force (August 2001). The latter is one of several protocols of the Convention on Long-range Transboundary Air Pollution, Geneva, November 1979, which entered into force in 1983, and currently (August 2001) has 48 Parties.
- ❑ The **Montreal Protocol on Substances that Deplete the Ozone Layer** (1987), entered into force in 1989 and was amended or adjusted in 1991, 1992, 1993, 1996, 1997 and 2000. It is one of several protocols of the Vienna Convention for the Protection of the Ozone Layer (1985). Ultraviolet radiation resulting from thinning of the stratospheric ozone layer has the potential to severely damage primary (i.e., plant) production in the ocean, with major consequences for atmospheric oxygen levels and other features of life on Earth.
- ❑ The **Malmö Declaration** (2000) was the result of a meeting of Ministers of Environment in Malmö, Sweden. Their purpose was to enable the world's environment ministers to gather to review important and emerging environmental issues and to chart the course for the future. The declaration was adopted at the Sixth Special Session of the Governing Council of the United Nations Environment Programme, May 2000.

3.10 Self Assessment Exercise on Relationships between the London Convention and other International Agreements

3.10.1 Questions on Relationships between the London Convention and other International Agreements

1. Does UNCLOS govern only pollution of the marine environment?
2. Describe some of the rights and obligations of UNCLOS member coastal States.
3. If an UNCLOS member (there are 136) is not a Party to the London Convention (there are 78), are they bound to adhere to it?
4. What convention is responsible for preventing pollution from ships? How is this accomplished?
5. What is the aim of the Basel Convention?
6. How many governments have adopted Agenda 21?
7. What factors are considered in allowing an offshore installations stay in place?
8. How was the GPA developed? Summarize 3 specific aims of the GPA.
9. What part do regional and international conventions and agreements play in protecting the marine environment?

3.10.2 Answers to Self Assessment Questions on Relationships between the London Convention and Other International Agreements

1. UNCLOS governs all aspects of ocean space, including delimitation, environmental control, marine scientific research, economic and commercial activities, transfer of technology and the settlement of disputes relating to ocean matters. (section 3.2)
2. Rights of Coastal States include a 200-nautical mile exclusive economic zone and the continental shelf for exploring, exploiting natural resources and certain economic activities, and they have jurisdiction over marine science research and environmental protection. (section 3.2.1)
3. Yes, all States party to UNCLOS, regardless whether they are party to the London Convention, are legally bound to adopt and enforce laws and regulations to control pollution by dumping, and they must be no less effective than the "global rules and standards" (article 210) considered to be those of the London Convention 1972. (section 3.2.2)
4. The International Convention for the Prevention of Pollution of Ships, 1973 and its 1978 Protocol protects the marine environment from pollution of ships. It ensures ships are adequately designed, equipped, certified and inspected, requires States to deal with oily and chemical wastes and works with London Convention's 6 annexes covering ship-generated pollution. (section 3.3)
5. The aim of the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal is to reduce and control the transboundary movement of hazardous wastes and eventually to phase out movement for disposal, recycling or recovery. (section 3.4)
6. 178 governments adopted Agenda 21 at the United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil, 3-14 June, 1992. (section 3.5)
7. The Guidelines and Standards for the Removal of Offshore Installations and Structures on the Continental Shelf and in the Exclusive Economic Zone prescribe that any installations or structures which are abandoned or disused shall be removed to ensure safety of navigation and to prevent any potential effect on the marine environment. Installations allowed to stay must comply with the Guidelines and Standards, which evaluate each case based on
 - ❑ potential effect on safety of navigation or other uses
 - ❑ deterioration of material and future effects
 - ❑ potential effect on the marine environment including living resources
 - ❑ risk of shift from position
 - ❑ costs, technical feasibility and risks of injury to personnel
 - ❑ determination of new use or other reasonable justification(section 3.6)
8. The GPA was developed through UNEP's efforts, beginning in 1982, to address issues related to impacts on the marine environment from land-based activities. The specific aims of the GPA:

- ❑ identifying the nature and severity of problems caused by marine pollution. What is the impact of marine pollution on (i) food security and poverty alleviation; (ii) public health; (iii) ecosystem health and biological diversity; and (iv) economic and social benefits and uses
 - ❑ assessing the severity and impacts of contaminants (e.g., sewage, persistent organic pollutants, radioactive substances, heavy metals, oils, nutrients, sediment mobilisation and litter)
 - ❑ assessing the physical alteration, including habitat modification and destruction, in areas of concern
 - ❑ assessing the sources of degradation, including (i) point sources (e.g., wastewater treatment facilities or dredging operations); (ii) non-point sources (e.g., urban and agricultural run-off); and (iii) atmospheric deposition caused by vehicle emissions, power plants and industrial facilities, incinerators and agricultural operations
 - ❑ establishment of priorities
 - ❑ setting management objectives for priority problems for source categories and areas affected
 - ❑ identification, evaluation and selection of strategies and measures
 - ❑ setting criteria for evaluating the effectiveness of strategies and measures
(section 3.7)
9. Regional and international conventions and agreements support and supplement the global conventions by protecting some elements of the marine ecosystems.
(section 3.8 and 3.9)

3.11 References, Part 1

¹ GESAMP 1993. Impact of oil and related chemicals and wastes on the marine environment. Reports and Studies No. 50. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. International Maritime Organization, London.

²GESAMP, 1990. State of the Marine Environment. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, Reports and Studies No.39.

³ GESAMP 1993. Ibid.

⁴ GESAMP 1993. Ibid.

⁵ Etkin, D.S., P. Wells, M. Mauke, J. Campbell, C. Gray, J. Koefoed, T. Meyer and S. Reddy, 1998. Estimates of oil entering the marine environment in the past decade. GESAMP Working Group 32 Project. Proc. 21st Arctic and Marine Oilspill Program Technical Seminar, June 10-12, 1998, Edmonton, Alberta. Environment Canada, Edmonton.

⁶ GESAMP, 2001. Protecting the oceans from land-based activities. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection Reports and Studies No. 71. International Maritime Organization, London

⁷ GESAMP, 2001. A sea of troubles. Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection Reports and Studies No. 70. International Maritime Organization, London

PART 2: WASTE ASSESSMENT PROCESS

4 STEP 1. WASTE CHARACTERISATION

In the Waste Assessment Guidelines (section 15) the assessment of physical, chemical and biological properties is the third heading; however, in the sequence shown in Figure 1 it is first. In highly iterative processes that differ markedly with varying circumstances, the waste characterisation may be needed either before or after waste prevention audits and consideration of other waste management options.

4.1 *Relevant WAG Clauses*

Guidance on assessing the physical, chemical and biological properties of materials proposed for ocean disposal is described in the WAG, paragraphs 10 – 11 (section 15.1.3).

4.2 *Explanation*

Waste characterisation is designed to provide information needed to answer the questions shown in the decision-tree schematic, Figure 1:

- ❑ Are there practical opportunities to re-use, recycle or treat the waste?
- ❑ Is it acceptable for ocean disposal?
- ❑ If not, can it be made acceptable?

In general, substances and materials known to man are classified for their intrinsic properties, availability, potential uses, risks and limitations when used and for their value. Detailed systems are developed to classify substances for their risks to human health and the environment, e.g., when in transport on land (OECD, UN Transport of Dangerous Goods Criteria) and at sea (GESAMP^{iv}, IMDG-Code^v). Administrative definitions such as "industrial waste", or, "hazardous wastes" make use of these or similar criteria.

All classification systems have in common that the intrinsic properties of the material or substance need to be known. In this case, sufficient information is also needed on the material's chemical, physical and toxicological properties to predict how it will behave in, and affect, the marine environment.

4.3 *Case Study*

[to be completed]

^{iv}Since 1973 the IMO/FAO/UNESCO-IOC/WMO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) has evaluated the hazard profiles of substances transported by ship for the purposes of implementation of the International Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

^vThe International Maritime Dangerous Goods Code is developed by IMO.

5 STEP 2. WASTE PREVENTION AUDIT AND WASTE MANAGEMENT OPTIONS

5.1 *Relevant WAG Clauses*

Guidance on waste prevention and other waste management options is described in the WAG, paragraphs 5-7 and 8-9 (sec. 15.1.1 and 15.1.2), respectively.

5.2 *Explanation*

5.2.1 **Waste Prevention**

The purpose of this requirement is to prevent the option of ocean disposal from being used as a facile remedy for badly designed or executed production processes and use patterns involving hazardous substances. Its objective is to encourage industry and other regulatory agencies to co-operate in reducing harmful wastes. The principal methods to achieve this objective are:

- ❑ The principle of substitution, whereby the generation of wastes, and of hazardous wastes in particular, may be minimised or avoided through the replacement of hazardous raw materials, processes, processing aids and/or products with less hazardous or, preferably, non-hazardous alternatives;
- ❑ The development of clean production processes, and clean products, implying continuous replacement of existing systems with systems which exert progressively lower impacts on the environment and human health and which are progressively more efficient in terms of resource utilisation; and, thereby
- ❑ The pursuit of “zero discharge”, through the development of production processes and, as far as possible, use and disposal patterns which are effectively cyclical, or operate in a “closed loop” configuration, such that waste generation is avoided and matter such as dredged materials and sewage sludge are protected from contamination at source.

Before an activity is started which will have environmental consequences, all options should be considered and the consequences compared. The Waste Prevention Audit is a screening exercise to chart the potential impacts of that activity. In practice, a proposed activity will very often be influenced by decisions taken in the past, thereby limiting the options for choice. For example, potential beneficial uses of dredged material include land reclamation, beach nourishment, topsoil for agricultural use, wetlands restoration/creation etc. and is dealt with in detail in PIANC (1992).

5.2.2 **Waste Management Options**

Information on potential alternative short-term, interim, and long-term options is essential at this stage and will have been collected as part of the Waste Prevention Audit. If all options are considered in this stage of the procedure and further exploration of the sea disposal option is warranted, ocean disposal managers may have to return to this stage, and compare all options once more (see " Impact Hypothesis," WAG paragraphs 29 –

39, section 8).

Technical literature is available to assist with the development of management options (section 18). A short list of key references is provided at the end of this section. However, it is important to translate 'text book solutions' into practical options for the planned activity and to target any search for additional information in this context.

5.3 Case Study

[to be completed]

6 STEP 3. ACTION LIST

6.1 Relevant WAG Clauses

Guidance on the development of an action list is described in the WAG, paragraphs 12 – 15 (sec. 15.1.4).

6.2 Explanation

An Action List is a list of contaminants with three levels of concentration identified: (1) the level above which the contaminant is virtually certain to cause unacceptable effects, (2) the level above which the contaminant may or may not cause unacceptable effects (the so-called “grey” area) and (3) the level below which the contaminant is virtually certain to have no adverse effects. Table 1 below illustrates these levels:

Table 1. Schematic diagram of action levels.

UPPER LEVEL (Reject)	<i>wastes which contain specified substances, or which cause biological responses, exceeding the relevant upper level shall not be dumped, unless made acceptable for dumping through management techniques or processes</i>
ASSESSMENT NEEDED	<i>wastes which contain specified substances, or which cause biological responses, below the upper level but above the lower level require more detailed assessment before their suitability for dumping can be determined.</i>
LOWER LEVEL (Accept)	<i>wastes which contain specified substances, or which cause biological responses, below the relevant lower levels should be considered to be of little environmental concern in relation to dumping.</i>

Because scientific uncertainties in the way that potentially harmful materials might behave in different circumstances – that is to say, different marine environments with different levels of existing contamination, different biota and different other uses of the sea – the 1996 Protocol requires each Party to the Convention to develop its own Action List.

Action List considerations should focus only on those substances (as trace contaminants in materials proposed for ocean disposal) which, in principle, **might be eligible for disposal at sea**. At this stage of the WAG procedure, all substances, the dumping of which is prohibited under the London Convention/Protocol, will already have been rejected. Action List considerations are especially crucial when assessing the suitability of **dredged material and sewage sludge** for sea disposal as determined by the level of contaminants contained in these materials.

When the Action List was developed, it was agreed that uniform, globally applicable numerical levels were not (and still are not) currently achievable. Hence, neither the WAG itself, nor this Training Set offers a directory of substances and concrete Action Levels. Action Levels should be developed at a **national level**, or if necessary, at a

local level. The information obtained with the characterisation of the waste in question should be used to organise specific Action Levels.

The case studies included with this training set give examples of approaches that Parties to the Convention have used to develop Action Levels.

6.3 Case Study

[to be completed]

7 STEP 4. SELECTION OF A DISPOSAL SITE^{vi}

7.1 Relevant WAG Clauses

Guidance on the characterisation and selection of a disposal site is described in the WAG, paragraphs 16 – 28 (section 15.1.5).

7.2 Introduction

The principal factors to be taken into account when selecting a disposal site are listed in Annex 3 parts B and C of the London Convention 1972. These have been further refined in the Waste Specific Guidelines that supplement to Annex 2 of the 1996 Protocol (see section 16). Disposal site selection is also an integral part of the Waste Assessment Framework or WAF shown in Figure 1. In practice, a disposal site may be either selected from among existing, previously designated sites or newly designated to accommodate, for example, a volume of material that is beyond the capacity of existing sites or another type of material which is unsuitable for existing sites (see section 1.4). Designation of a disposal site defines an area where disposal may be allowed to take place but does not guarantee that a specific disposal project will necessarily be allowed to proceed.

The principal factors to be considered are:

- characteristics of the water-column and the sea-bed at potential disposal sites
- location of amenities, values and other uses of the sea in the area
- economic and operational feasibility of marine transport to the site
- size of the disposal site: large enough to accommodate the anticipated volumes of waste for many years without unacceptable degradation of the marine environment or interference with other uses of the sea, but small enough for practical monitoring
- characteristics of the material to be dumped, including the

Steps to select a disposal site

1. Identify available areas within reasonable distance of the load site.
2. Determine requirements related to the characteristics of the waste material.
3. Select candidate disposal sites and assess potential impact of disposal of this type of waste at these sites.
4. Evaluate acceptability of probable impacts.
5. Compare potential impacts among the remaining sites.
6. Select the site from among those where adverse impacts are judged to be acceptable.

^{vi} Adapted from material provided by C M G Vivian BSc, PhD, Senior Licensing Officer, Disposal at Sea Section, Ministry of Agriculture, Fisheries and Food, Directorate of Fisheries Research, Fisheries Laboratory, Remembrance Avenue, Bumham-on-Crouch, Essex CM0 8HA, UK.

presence and mobility of contaminants

In the disposal site selection process, sufficient information is usually required to allow and assessment of potential impacts of dumping the anticipated types and volumes of material for the duration of use of the site. Impact assessment procedures for dumpsite selection parallel those for evaluation of specific dumping project applications (section 8).

Useful publications dealing with the selection of disposal sites at sea, include GESAMP (1982), Reed and Bierman (1989), Mathis and Payne (1984). More extensive references are provided by information sources in section 18.

7.3 Site Selection procedure

7.3.1 Identify available areas for a disposal site

The steps to be taken to identify potentially suitable areas for a disposal site are:

1. Determine the area within which material to be dumped can be reasonably transported, having regard to the shipping costs and operational constraints (such as hazardous sea-state conditions). This is sometimes called the 'Zone of Siting Feasibility' or ZSF (Pequegnat, 1988a).
2. Within this area, compile information on present and potential uses that may be incompatible with dredged material disposal. They could include:
 - fishing and shellfish harvesting grounds
 - spawning, migration and nursery grounds of important fisheries
 - sites used for aquaculture
 - engineering uses of the sea floor e.g. cables, pipelines etc.
 - seabed mineral resources (sand, gravel, precious metal deposits)
 - shipping lanes and anchorages
 - military exclusion zones such as firing ranges
 - marine archaeological sites
 - areas of special importance for scientific or conservation purposes including marine parks and protected areas
 - beaches and other areas used for recreational purposes

A key decision: disperse or not disperse?

A key decision related to the type of waste under consideration is whether (a) the environmental impact can best be reduced by having the material disperse rapidly, using the assimilative capacity of the marine ecosystem to consume the waste or otherwise render it harmless; or (b) whether it would best be deposited in a location where it will sink straight to the bottom and remain contained in a defined area out of harm's way (that is, where it will not interfere with other uses of the sea and any contaminants will not enter the marine food chain).

- ❑ sites new intakes for industrial uses such as cooling, desalination and aquaculture

Some or all of the uses may require a buffer zone to ensure that they are protected adequately. The information produced in this step is best presented as overlays on a hydrographic chart, immediately clarifying which are the remaining areas potentially suitable for disposal sites. Computerised Geographic Information Systems (GIS) greatly simplify this process.

7.3.2 Determine requirements related to the characteristics of the waste material

The physical characteristics of the material to be dumped are important in determining the suitability of a potential disposal site. Since some kinds of waste can change during loading (for example, by dredging) and following deposition, it is important to determine the likely physical, chemical and biological (including toxicological) characteristics of the material as it will be released from the disposal vessel and not simply the *in situ* characteristics. The most important physical characteristics for dredged material and some other wastes are the grain size distribution and the cohesiveness/degree of consolidation. For the purpose of habitat protection, managers should seek compatibility of the physical characteristics of the dredged material with the sediment type at the disposal site. Some examples of disposal sites are given in the accompanying text box. The main questions to be asked are:

- ❑ Will it sink quickly or will some parts or fractions of it float, or remain in suspension for some time and be carried away from the disposal site by currents? If so, where will they disperse to?
- ❑ While it sinks, will its physical, biological or chemical characteristics change?
- ❑ Is there any way that contaminants can affect marine organisms or enter the marine food chain?
- ❑ After it reaches the sea bottom, will it remain there or be moved later by ocean currents? Will its characteristics change? Can it affect marine organisms or enter

Examples of Disposal Sites

Sewage sludge, fish offal: a relatively shallow site with high currents will allow rapid dispersal to use the assimilative capacity of the marine ecosystem to consume the waste and prevent build-up of organic material and consequent degradation of the benthic environment. Avoid recreation and shellfish areas.

Vessels: disposal sites for derelict vessels may be in very deep water away from shipping lanes and fishing areas, or, alternatively, in shallow waters near recreation areas where vessels may be an attraction for SCUBA divers. In either case, official navigation charts and digital maps must include appropriate notices to mariners.

Bulky items such as derelict drilling rigs: very deep water away from shipping lanes and fishing areas

Dredged Material: spoils containing contaminants below the Action Level may be directed to a disposal site where natural sedimentation will cover the spoils with clean sediments; or they may be used as fill in near-shore construction projects followed by “capping” with clean construction aggregates.

the marine food chain? Will natural sedimentation or subsequent dumping events cover it up, further reducing the possibility that contaminants may enter the marine food chain?

7.3.3 Assess potential adverse effects for candidate disposal sites

Each candidate site should be evaluated to determine potential adverse effects of the waste material. The evaluations must consider the near- and far-field fates of the material and its constituents as well as the short- and long-term effects on marine resources and the environment.

The information required should be related to the type and characteristics of the dredged material involved and could include:

- ❑ the nature of the sea bed including its topography, geochemical and geological characteristics, data on benthic communities including fisheries resources and prior disposal activities in the area
- ❑ the physical nature of the water column including depth, temperature, the possible existence of a pycnocline/thermocline, currents (tidal, wave-induced, residual), and suspended matter
- ❑ the chemical and biological nature of the water column, including pH, salinity, dissolved oxygen, nutrients, primary productivity and contaminant concentrations e.g. trace metals. The need for this type of information may be very limited if the dredged material settles rapidly to the bottom
- ❑ the biological and ecological effects of the dredged material including toxicity, changes in community structure, disruption of ecological processes, degradation of water and sediment quality and alteration of sediment characteristics. These possible effects must be considered within the disposal site and in the area that could be influenced by the disposed material

When existing relevant information is inadequate site-specific field work to fill the gaps in the information will be required. Computer modelling may be needed to predict water and sediment movements. The information gathered in this step will be essential in the designing of appropriate monitoring programmes. Further details of the information required and guidance on surveys to gather the necessary information can be found in GESAMP (1982), Pequegnat (1988b), Pequegnat *et al* (1990), NRC (1990) and the WAF.

7.3.4 Evaluate acceptability of potential adverse effects

An assessment needs to be made at this stage of the acceptability or otherwise of the potential adverse effects at the candidate site or sites. Sites with unacceptable impacts can be eliminated from further consideration. If all candidate sites are eliminated, then either the parameters of acceptance have to be broadened or the waste can not be disposed of at sea.

7.3.5 Compare candidate disposal sites

If two or more suitable and acceptable sites are still under consideration, the potential adverse effects of the waste material at each should be compared. Comparison should include quantitative and qualitative evaluations of the perceived risks. Quantitative

comparisons of predicted water-quality characteristics to established criteria (e.g. USEPA Marine Water Quality Criteria) provide one mechanism for comparing sites. Risk assessment models covering human health effects and environmental and resource damages can also be used to compare sites.

7.3.6 Site Selection

If one or more sites prove to be suitable, then the regulatory authority can make a decision to select a disposal site, perhaps using other criteria such as proximity to the area being dredged when two or more sites appear equally acceptable.

7.4 Case Study

An application for a permit to deposit approximately 4.5 million m³ of dredged material at sea was received in March 1989. The material was to come from a proposed lengthening and deepening of an access channel to Barrow docks, Barrow-in-Furness, Cumbria, UK (Figure 2). The material to be excavated was characterised: a substantial part (60%) was cohesive material (clay) which would not disperse readily on disposal. Concentrations of trace metals in the clay were very low (below Action Levels) with only slightly higher concentrations in muddy surface material from within the docks - see Table 1. In view of the low level of contamination, the material was judged acceptable for ocean disposal if the project met other criteria.

A evaluation of other waste management options concluded that land-based alternatives were not available. No beneficial use could be identified for the unconsolidated silts from the dock area. Possibilities to make productive use of the consolidated/coarser material for construction of flood protection walls or land reclamation were investigated, but rejected by other management authorities. Since the material was below Action Levels of contaminants, the project moved to the disposal site selection phase.

Existing sites IS180 and IS210 (Figure 2) were unsuitable because the cohesive material would lead to shoaling and interference with navigation and shipping. A new dump site was therefore required.

7.4.1 Identification of suitable areas

Only one area could be selected within the ZSF after determining the uses of the seabed which were principally fishing, shipping lanes and engineering uses (pipelines and cables). This was area 'D' in Figure 2.

7.4.2 Determination of requirements related to the characteristics of the dredged material

The most important characteristic of the material was its cohesiveness and thus, one of the most important effects of disposal was likely to be shoaling. The new disposal site therefore had to be able to accommodate the volume of material without unacceptable shoaling.

7.4.3 Selection of candidate disposal sites and potential adverse effects

Only one area had been selected and there was no room for more than one site within that area.

All available data on the area was reviewed and where gaps in the data were identified, field studies were commissioned. Sediment transport pathways in the area were complex but offshore transport was dominant. The sediments in the proposed disposal site were hard packed muddy sands with stones and shell. Benthic surveys indicated a relatively low biomass on a tide-swept stony ground. Chemical contamination of the dredged material was so low that there were no concerns over increases in the flux of either natural or synthetic substances to the area nor with any chemical effects on biota. The main predicted environmental effects of depositing this material were the physical blanketing and burial of the existing sediments in the disposal site, the consequent loss of benthic fauna and significant shoaling. It was predicted that the dispersible material would mostly be transported offshore but that under certain conditions some might be carried into Morecambe Bay. This suggested that some of the material could be carried back into the dredged channel in some circumstances but that this could be minimised by depositing this material in the southern part of the area. The cohesive material (60% of the total) was expected to remain in the disposal site for a considerable period. Following cessation of dumping, recolonisation of the newly deposited sediment by benthos was expected to occur. Little interference from fisheries was expected since the site had been chosen to be remote from fishing activity.

TABLE 1 - CONCENTRATIONS OF ANNEX I AND ANNEX II METALS IN BARROW SEDIMENTS

Element		Docks and Dock Entrance	Approach Channel	Previous Maintenance Dredgings by Barrow Docks	Uncontaminated Sediments*
Cadmium	Mean	0.1	<0.009	0.22	
	Range	<0.007 - 0.25	<0.07 - 0.09	<0.1 - 0.46	<0.2
Chromium	Mean	28	13.3	13.5	
	Range	8.5 - 44	5.1 - 25	5.7 - 20	17 - 50
Copper	Mean	13.2	5.5	14.5	
	Range	3.8 - 44	0.8 - 17	1.7 - 35	5 - 18
Mercury	Mean	0.12	0.02	0.13	
	Range	0.01 - 0.81	0.01 - 0.05	<0.02 - 0.36	0.04 - 0.13
Nickel	Mean	13.5	11.6	10.2	
	Range	5.8 - 27.0	4.4 - 22	3.7 - 14	30 - 45
Lead	Mean	18.2	5.3	24.6	
	Range	4.9 - 69.0	1.5 - 32	3.9 - 65	10 - 90
Zinc	Mean	43.1	20.3	72.3	
	Range	15.0 - 70.0	9.5 - 33	21 - 170	30 - 115
Total	Mean	81	87.7	69.9	
Solids %	Range	58.7 - 92.0	83.3 - 93.1	68.6 - 88.1	

All concentrations mg/Kg wet weight unless stated otherwise

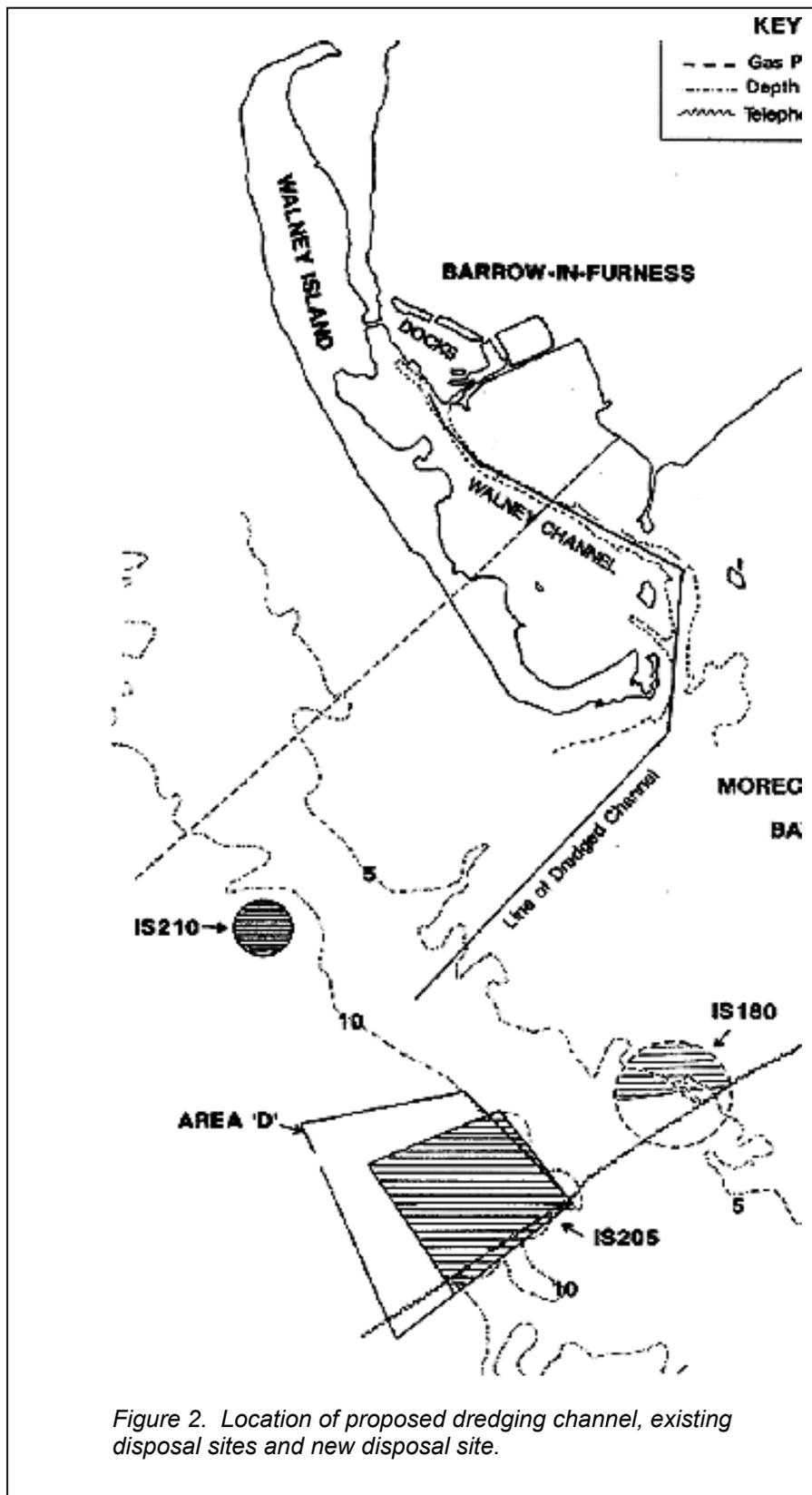


Figure 2. Location of proposed dredging channel, existing disposal sites and new disposal site.

7.4.4 Site selection

Since the two existing sites were unsuitable for disposal of all of the material and the new site was suitable, selection of the new site was obvious and no comparison with other candidate sites was needed. However, in discussing management of the project with the applicant, it became apparent that it would deal separately with the various types of material: It would use grab (clamshell) dredgers for silty material from the docks and dock entrances, trailer suction dredgers for the sands and gravel from the approach channel and bucket dredgers for the consolidated materials, particularly the clays. This meant that there was a possibility of different disposal sites for these different types of materials. Therefore, the use of sites IS180 and IS210, previously rejected because of the high clay content, was re-considered for disposal of the more dispersive portion of the material. After further studies, it was agreed to use IS180 for the more dispersive materials to be dredged first, to use IS210 for small amounts of clay that might be uncovered during this first phase and to use the new site, designated IS205, for the remainder.

7.4.5 Licence Conditions

Having decided to permit sea dumping in the new site, ways in which detrimental effects could be minimised were considered. The principal effect had been predicted to be one of physical blanketing of the sea bed. Making the dump site as small as possible within the proposed site would minimise this effect but would tend to raise the seabed and increase interference with navigation. The minimum depth required was agreed with the Navigational Authority and the size of dump site needed to comply with this depth calculated. To minimise the return of the mobile dredged material to the dredged channel the southern most part of the area was selected.

Because of the importance attached to dumping in the correct position within the dump site, techniques which allowed the tracking of the vessels, and plotting of individual vessels track on each dumping trip were investigated with the applicant. Appropriate equipment was installed on the dumping vessels.

The following supplementary licence conditions were stipulated.

1. The spoil was to be spread evenly over the site IS205 and nowhere within this spoil ground should depths be reduced to less than 7.0 m below Admiralty Chart datum.
2. Hydrographic surveys at the site IS205 were to be conducted quarterly from the commencement of disposal in that site until disposal was complete. Copies of the surveys were to be supplied to regulatory authority and to the Hydrographer of the Navy.

Further studies and detailed channel design resulted in a final estimate of 8,600,000 tonnes to be dredged. A permit issued in early 1991 permitted the disposal of this amount during the 12 months period up to 31st January 1992.

7.4.6 Monitoring

Since the primary effect of the disposal was predicted to be a physical one of blanketing the sea bed, it was a priority to map the physical extent of the dumped material. A licence condition requiring self-monitoring of depth during the disposal process formed the first part of this monitoring process. Additionally independent monitoring was

required, as a check on the self-monitoring and to monitor sediment movements subsequent to disposal and any associated biological changes.

Subsequently, the Licensing Authority carried out a survey at the new site using echo sounder, sidescan sonar, underwater photography and bottom sampling techniques. The results confirmed the predictions of the impact made in the permitting and site selection processes.

The data from the vessel tracking equipment showed that the dredged material had been dumped within the boundaries of the new site and this was confirmed by the hydrographic surveys carried out by the licensee.

7.5 References, Selecting Ocean Disposal Sites

- GESAMP (1982). Scientific criteria for the selection of waste disposal sites at sea. Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) Report and Studies (16): 60 pp.
- Mathis, D.B. and Payne, B.S. (1984). Guidance for designation of ocean sites for dredged material disposal. US Army Corps of Engineers Waterways Experimental Station, Vicksburg, Mississippi, USA. Environmental Effects of Dredging Information Exchange Bulletin, Vol. D-84-2.
- Murray, L.A. and Norton, M.G. (1979). The composition of dredged spoils dumped at sea from England and Wales. Ministry. Of Agriculture, Fisheries and Food, Directorate Of Fisheries Research, Lowestoft. Fisheries Research Technical Report (52) 10 pp.
- NRC (1990). Managing Troubled Waters. The role of marine environmental monitoring. Publ. by National Academy Press, Washington D.C., USA for the National Research Council.
- Pequegnat, W.E. (1988a). A technique for selecting an environmentally acceptable marine waste disposal site. Proceedings of an International Seminar on Environmental Impact Assessment of Port Development, Baltimore, Maryland, USA, 12-19 November 1988, 123-125.
- Pequegnat (1988b). Estuarine and oceanographic considerations for port development and maintenance. Proceedings of an International Seminar on Environmental Impact; Assessment of Port Development, Baltimore, Maryland, USA, 12-19 November 1988, 208-210.
- Pequegnat, W.E., Gallaway, B.J. and Wright, T.D. (1990). Revised procedural guide for designation surveys of ocean dredged material disposal sites. U.S. Army Corps of Engineers, Dredging Operations Technical Support Program, Technical Report D-90-8.
- PIANC (1992). Beneficial uses of dredged material. A practical guide. Permanent International Association of Navigation Congresses (PIANC), Report of Working Group 19, 36 pp.
- Reed, M. and Bierman, V.J. (1989). A protocol for designation of ocean disposal sites. In 'Oceanic Processes in Marine Pollution', Volume 3. 'Marine Waste Management: Science and Policy', (Editors) M.A. Champ and P.K. Park. Publ. by R.E. Krieger Publ. Co., Malabar, Florida, USA, 155-166.

7.6 Self Assessment Questions for Dump Site Selection

7.6.1 Self Assessment Questions for Dump Site Selection

1. List the 6 steps to follow when selecting a marine disposal site for waste
2. What are the principal factors considered in selecting a disposal site?
3. List three examples of commonly accepted disposal sites for specific wastes.
4. What characteristics of wastes are important in assessing its suitability for disposal at a candidate site?
5. How are the potential adverse effects of waste disposal at a candidate site evaluated?
6. What factors are used to compare the impact at candidate sites?
7. When all candidate sites could have potential adverse effects from waste disposal, how is a site selected?

7.6.2 Self Assessment Answers for Dump Site Selection

1. 6 Steps to select a disposal site
 - ❑ Identify available areas within reasonable distance of the load site.
 - ❑ Determine requirements related to the characteristics of the waste material.
 - ❑ Select candidate disposal sites and assess potential impact of disposal of this type of waste at these sites.
 - ❑ Evaluate acceptability of probable impacts.
 - ❑ Compare potential impacts among the remaining sites.
 - ❑ Select the site from among those where adverse impacts are judged to be acceptable.
2. The principal factors to consider in selecting a disposal site are:
 - ❑ characteristics of the water-column and the sea-bed at potential disposal sites
 - ❑ location of amenities, values and other uses of the sea in the area
 - ❑ economic and operational feasibility of marine transport to the site
 - ❑ size of the disposal site: large enough to accommodate the anticipated volumes of waste for many years without unacceptable degradation of the marine environment or interference with other uses of the sea, but small enough for practical monitoring
 - ❑ characteristics of the material to be dumped, including the presence and mobility of contaminants
3. Examples of commonly accepted disposal sites are:
 - ❑ Sewage sludge and fish offal are often disposed of in shallow sites with high currents to promote rapid dispersal which uses the assimilative capacity of the marine ecosystem to consume the waste and prevent build-up of organic material and consequent degradation of the benthic environment.
 - ❑ Derelict vessels or bulky items may be disposed in very deep water away from shipping lanes and fishing areas, or, alternatively, in shallow waters near recreation areas where vessels may be an attraction for SCUBA divers.
 - ❑ Spoils from dredging containing contaminants below the Action Level may be directed to a disposal site where natural sedimentation will cover the spoils with clean sediments; or they may be used as fill in near-shore construction projects followed by “capping” with clean construction aggregates.
4. Important characteristics of waste to consider in assessing suitability for disposal are:
 - ❑ The physical characteristics of the dredged material, such as grain size distribution and the cohesiveness/degree of consolidation, are important, and they can be affected by the dredging and disposal methods.
 - ❑ Will it sink quickly or will some parts or fractions of it float, or remain in suspension for some time and be carried away from the disposal site by currents? If so, where will they disperse to?

- ❑ While it sinks, will its physical, biological or chemical characteristics change?
 - ❑ Is there any way that contaminants can affect marine organisms or enter the marine food chain?
 - ❑ After it reaches the sea bottom, will it remain there or be moved later by ocean currents? Will its characteristics change? Can it affect marine organisms or enter the marine food chain? Will natural sedimentation or subsequent dumping events cover it up, further reducing the possibility that contaminants may enter the marine food chain?
5. When evaluating the potential adverse effects of disposing a waste at a given site, consider the physical, biological and chemical characteristics at the site, other uses at the site and the areas adjacent to the site, the effects of the waste material, and the anticipated flux and transformation of the material after disposal. Near and far-field fates of the material and its constituents must be considered along with short and long term effects on marine resources and the environment. More specifically, considerations could include:
- ❑ The nature of the sea bed including its topography, geochemical and geological characteristics, data on benthic communities including fisheries resources and prior disposal activities in the area.
 - ❑ The physical nature of the water column including depth, temperature, the possible existence of a pycnocline/thermocline, currents (tidal, wave-induced, residual), and suspended matter.
 - ❑ The chemical and biological nature of the water column, including pH, salinity, dissolved oxygen, nutrients, primary productivity and contaminant concentrations e.g. trace metals. The need for this type of information may be very limited if the dredged material settles rapidly to the bottom.
 - ❑ The biological and ecological effects of the dredged material including toxicity, changes in community structure, disruption of ecological processes, degradation of water and sediment quality and alteration of sediment characteristics. These possible effects must be considered within the disposal site and in the area that could be influenced by the disposed material.
6. Potential adverse effects must be compared if more than one site is a candidate. Quantitative comparisons of predicted water-quality characteristics to established criteria (e.g. USEPA Marine Water Quality Criteria) provide one mechanism for comparing sites. Risk assessment models covering human health effects and environmental and resource damages can also be used to compare sites.
7. An assessment needs to be made at this stage of the acceptability or otherwise of the potential adverse effects at the candidate site or sites. Sites with unacceptable impacts can be eliminated from further consideration. If all candidate sites are eliminated, then either the parameters of acceptance have to be broadened or the waste can not be disposed of at sea.

8 STEP 5. IMPACT HYPOTHESIS

8.1 *Relevant WAG Clauses*

Guidance on the assessment of impacts and development of impact hypotheses is described in the WAG, paragraphs 29 – 39 (sec. 15.1.6).

8.2 *Explanation*

This stage of the WAG occurs after ocean disposal managers have characterised the waste, completed the Waste Prevention Audit, considered land-based options, compared the characteristics of the waste to the Action List and selected a disposal site. In the last step, selecting a disposal site, first-order assessment of potential effects will have been completed. Before the project can be approved, however, the impact must be predicted in sufficient detail that managers can decide whether or not to approve the application (step 6), what permit conditions are needed (step 7) and then to compare monitoring results (step 8) to confirm that the actual impacts were as expected. The recommended procedure is through an 'Impact Hypothesis.'

An impact hypothesis takes the form of a statement that some effect will or will not occur as a result of the ocean disposal project. It contains elements of the expected behaviour of the waste material upon discharge, and of the expected effects of the discharge on marine biota. These predictions typically take the form of the “null hypothesis” which states that no impact beyond acceptable bounds will occur, and is the basis for field testing using scientific methods. Some examples illustrate hypotheses:

- “Upon discharge, coarse material representing 80% dredge spoils will settle to the bottom within the designated disposal site and fine material representing 20% will drift beyond the disposal site as a plume of fine suspended sediment.”
- “The plume of suspended sediment will be non-toxic to marine organisms as measured by bioassays using x species according to y protocols.”
- “The coarse material deposited on the bottom will smother benthos within the designated disposal site, but will be non-toxic to burrowing organisms immediately after disposal, as measured by bioassays using y species according to z protocols.”

These hypotheses are specific to the project, are environmentally relevant and are testable using the scientific methods.

8.3 *Case Study*

[to be completed]

9 STEP 6. PERMIT DECISION

9.1 *Relevant WAG Clauses*

In the WAG, factors to consider in whether or not to allow the project to proceed are included in the guidance on issuance of permits, paragraphs 46-49, section 15.1.8.

9.2 *Explanation*

If as a result of this the impact assessment, a dumping permit will **not be granted**, the WAG procedure ends here, and full focus should be given to the criteria and the process of implementing the land-based option chosen.

If, however, dumping is chosen as the preferred option, detailed permit conditions (step 7) are developed to ensure that the impacts are within the bounds of acceptability. The conditions should be sufficiently clear and explicit that ocean disposal officials can cancel the permit if the conditions indicate unacceptable impact, and that enforcement authorities can collect information for a successful prosecution if the conditions are not met (this of course would be the last course of action recommended. Procedures for enforcement are detailed in other guidance to the Parties to the Convention. The permit conditions should also specify the monitoring or other field studies that will be required of the applicant.

9.3 *Case Study*

[to be completed]

10 STEP 7. PERMIT CONDITIONS

10.1 *Relevant WAG Clauses*

Guidance on issuance of permits is described in the WAG, paragraphs 46-49, section 15.1.8.

10.2 *Explanation*

The London Convention is founded upon the prohibition of ocean disposal except in accordance with a permit which outlines the conditions, obligations, limitations and reporting requirements for each disposal operation. This implies that a permit-issuing process be in place which:

- ❑ specifies the form of permits and permit applications
- ❑ specifies the information and documentation that must accompany permit application forms
- ❑ establishes an evaluation procedure to ensure accuracy and validity of the information contained in the application, and procedures to guide decisions on whether to accept or reject applications, or what conditions to impose to protect human health and the environment
- ❑ provides regulatory authority to deny a permit for disposal contrary to requirements of the London Convention, and enforcement authority to prevent and, if necessary punish, those responsible for contraventions.

Contracting Parties are advised to set up their ocean disposal application forms so that they can easily extract and summarise information needed for regular reporting of ocean disposal and monitoring activities to IMO.

In accordance with Article VI(4) of the London Convention 1972, the permitting authority is obliged to report to IMO the permits it has issued as well as reports of associated monitoring activities. These reporting obligations have been extended under Article 9 of the 1996 Protocol. This information is important for Contracting Parties when exercising their individual and collective responsibility to prevent marine pollution caused by dumping and to verify the implementation policies to which they have agreed (Article II of the London Convention 1972).

10.3 *Case Study*

[to be completed]

11 STEP 8. MONITORING COMPLIANCE AND IMPACT

11.1 Relevant WAG Clauses

Guidance on monitoring of project compliance and the environmental impacts of the project is described in the WAG, paragraphs 40-45 (section 15.1.7).

11.2 Explanation

The notion "monitoring" is used in two distinctive ways in the WAG, paragraph 40: **compliance monitoring and field monitoring**. With compliance monitoring, the emphasis is on the administrative (enforcement) side; whereas field monitoring is wholly in the domain of marine science. Both are essential elements in the WAG procedure.

11.2.1 Monitoring of compliance

Monitoring is referred to in the London Convention: "*the condition of the seas for the purposes of this Convention (as required in Article VI(1)(d)), refers to those measurements performed by Contracting Parties, alone or in collaboration, to demonstrate compliance of their at-sea dumping and incineration practices with the overall intent of the Convention and the requirements of the Annexes (resolution LDC.36(12)).*"

For monitoring compliance with the conditions set in a dumping permit, the designated enforcement agency should work closely with the marine science advisers involved in the field monitoring programme. All issues and conditions identified in the dumping permit should be checked, for instance:

- ❑ Is the permit holder on track with carrying out its long-term dumping prevention programme, where appropriate? (see waste prevention audit)
- ❑ Does the waste taken on board match the waste characterised in the permit? (comparison of samples).
- ❑ Is the material indeed dumped at the dump-site indicated in the permit?
- ❑ Does the actual impact of the dumping operations differ from the predicted impact?

The licensing authority should have and use its authority to revoke or not renew a permit if, after careful consideration, important conditions in the permit have not been met.

11.2.2 Monitoring of environmental effects, or field monitoring

Field monitoring plays an important role in preventing pollution of the marine environment. Without long-term studies it is difficult to distinguish natural changes from those resulting directly or indirectly from pollution or other impacts by man. In the context of LC 1972, field monitoring provides critical feedback on the effectiveness of individual permit conditions to be used in decisions on the permitting process, and on management of specific dump sites, as noted in WAG, paragraphs 49 and 45.

Chemical monitoring of pollution has become very sophisticated due to the use of modern technology. It can tell us what is there, but it does not tell what the effects might

be. *Biological* monitoring is valuable to detect long-term effects on ecosystems, and is thus important in monitoring pollution. The ideal monitoring programme will include physical, chemical and biological observations in the field and should be supported, where appropriate, by laboratory experiments. The "Impact Hypothesis" (introduced earlier) forms the basis for defining field monitoring.

11.3 Case Study

[to be completed]

PART 3: WASTE SPECIFIC GUIDELINES

12 WASTE SPECIFIC GUIDELINES – SUMMARY

Because not all items in the generic Waste Assessment Guidance (WAG) document apply to all classes of material that may be acceptable for ocean disposal, separate guidelines are available. A brief explanation is given below. Notes on some specific waste types are also given in the section on Waste Characterisation. The full text of these documents is included in Part 4.

12.1 Specific Guideline for Assessment of Dredged Material

What is dredged material?

Dredged materials are sediments which are excavated under water, and consist of alluvial, fluvial or sedimentary deposits such as boulders, sand and mud. They may contain organic and biogenic compounds.

Why does dredged material pose a potential hazard to the environment?

Dredged material is important for its potential to physically harm the marine environment, for example, by smothering fishing grounds, and for its potential to contain toxic chemicals from a variety of sources. These effects will be exacerbated if a disposal site is ill-chosen.

What is the main focus of the dredged material assessment framework?

For focus of the guideline for assessment of dredged material is to identify and control the sources of contamination in a waste management framework that emphasises first prevention, and second, finding alternatives to ocean disposal. This requires collaboration between the local and national agencies involved with the control of point and non-point sources of pollution.

Vital components of the guideline for dredged material assessment are: an evaluation of the need for dredging and disposal, the identification of beneficial use of the material, its screening and assessment against Action Levels established for this purpose, and disposal site selection.

12.2 Specific Guideline for Assessment of Sewage Sludge

What is sewage sludge?

Sewage sludge is the residue remaining from the treatment of municipal sewage. It is an organic-rich waste produced primarily by physical processes. Sewage contains aqueous domestic waste as well as surface drainage and, in many cases, a component of treated and untreated industrial effluent.

Why does sewage sludge pose a potential hazard to the environment?

Sewage sludge tends to concentrate a wide range of substances by absorbing or binding them to the organic matrix of the sludge. It has a high bio-chemical oxygen demand (BOD) and may be contaminated by pathogens and parasites. It may, therefore, create environmental, aesthetic and health problems if not managed properly. Untreated sewage effluents discharged to rivers, estuaries and coastal waters can pose a high risk to environmental resources, amenities and human health. The purification process allows reclaimed water to be discharged to freshwater courses or coastal waters

or used in other applications, such as irrigation, under conditions that pose a greatly reduced risk to the receiving environment and human health. Sewage sludge is, however, an unavoidable product from sewage treatment and increased levels of waste water purification lead, inevitably, to greater quantities of sludge for which environmentally sound management strategies are required.

What is the main focus of this specific guideline?

A goal of waste management for sewage sludge should be the identification and control of sources of contamination, both point and diffuse, in particular from industrial sources, which will in due course, improve the range of management options, not least those associated with a beneficial use (in agriculture, horticulture, etc.). When ocean disposal is necessary, the focus is to ensure that any contaminants are below action levels and that the material will be disposed of at a disposal site that is suitable for this type of material, and in a manner in which environmental effects are minimised.

Screening of sewage sludge and its assessment against Action Levels established for this purpose, together with disposal site selection and monitoring, are vital components of this Guideline.

12.3 Specific Guideline for Assessment of Fish Waste, or Organic^{vii} Materials Resulting from Industrial Fish Processing Operations

What is fish waste?

Fish waste, or material resulting from industrial fish processing operations from either wild stocks or aquaculture, consists of particles of flesh, skin, bones, entrails, shells or liquid stickwater.

Why is fish waste considered separately and not included under organic material of natural origin?

This is done because wild marine fish harvests originate from the sea, whereas organic materials of natural origin, which can have various sources, are generated on land.

Why does fish waste pose a potential hazard to the environment?

The organic components of fish waste have a high biological oxygen demand, and, if not managed properly, can pose environmental and health problems. Generally, the solid wastes make up 30% to 40% of total production, depending on the species processed. It is imperative to consider the time frame between production of the waste and its ultimate disposal. Most fish wastes degrade rapidly in warm weather and can cause aesthetic problems and strong odours as a result of bacterial decomposition if not stored properly or disposed of quickly. If further processing of the waste to fish meal is considered a viable alternative, it is essential that the waste be fresh.

What is the main focus of this specific guideline?

This Guideline deals only with primary and secondary fish processing wastes and is not intended for application to discharges from ships actively fishing.

Given the nature of fish wastes, the focus of considerations to dump these wastes is the promotion of biological consumption (i.e., consumption of the wastes by marine

^{vii}The word "organic" is included in Annex I(11) to the London Convention 1972, but not included in Annex 1, paragraph 1.3, to the 1996 Protocol.

organisms). Hence, care should be taken to find dispersive sites that make the waste more available to consuming organisms.

Screening as part of the Action List is focused on the potential presence of chemicals used in aquaculture and their residues. The presence of contaminants may also be of concern for any fish wastes subject to chemical treatment.

12.4 Specific Guideline for Assessment of Vessels

What are vessels?

"Vessels" are defined in Article 1.6 of the London Protocol as: "waterborne craft of any type whatsoever." This expression includes air-cushioned craft and floating craft, whether self-propelled or not".

Why do vessels pose a potential hazard to the environment?

Vessels can harm the environment:

- ❑ if a decommissioned vessel (or parts thereof) is scuttled without prior and thorough cleaning; or,
- ❑ if material capable of creating floating debris or otherwise contributing to pollution of the marine environment has not been removed to the maximum extent; or,
- ❑ if the material dumped poses a serious obstacle to fishing or navigation (Annex 1, paragraph 2 of the 1996 Protocol).

What is the main focus of this specific guideline?

This guideline sets out the factors to be addressed when considering disposal of vessels, with particular emphasis on the evaluation of alternatives to sea disposal including re-use and recycling/scraping.

12.5 Specific Guideline for Platforms or Other Man-made Structures at Sea

What are platforms or other man-made structures at sea?

For the purpose of this guideline, platforms are defined as facilities designed and operated for the purpose of producing, processing, storing, or supporting the production of mineral resources.

Why do platforms pose a potential hazard to the environment?

Platforms can harm the marine environment:

- ❑ if a decommissioned platform (or parts thereof) is scuttled without prior and thorough cleaning; or,
- ❑ if material capable of creating floating debris or otherwise contributing to pollution of the marine environment has not been removed to the maximum extent; or,
- ❑ if the material dumped poses a serious obstacle to fishing or navigation (Annex 1, paragraph 2 of the 1996 Protocol).

What is the main focus of this specific guideline?

This guideline sets out the factors to be addressed when considering disposal of platforms or other man-made structures at sea, with particular emphasis on the need to evaluate alternatives to sea disposal prior to sea disposal being determined the preferred alternative, such as re-use of the platform, structure or parts of it e.g., in harbour construction or similar applications or use of the platform as artificial reef.

12.6 Specific Guideline for Assessment of Inert, Inorganic Geological Material^{viii}

What is inert, inorganic geological material?

Inert, inorganic geological material is not defined in this guideline. However, it is generally understood that the focus is on waste resulting from mining activities.

Why does this material pose a potential hazard to the environment?

As the material is inert, the hazards are confined to potential physical impacts on (smothering of) marine organisms.

What is the main focus of this specific guideline?

The most pertinent issue is waste minimisation and to avoid as much as possible the physical impacts of the material when dumped.

12.7 Specific Guideline for Assessment of Organic Material of Natural Origin^{ix}

What are organic materials of natural origin?

For the purpose of this guideline, organic materials of natural origin are defined as animal and vegetable matter predominantly of agricultural origin. This guideline will also be relevant to the disposal of spoilt cargoes at sea when such cargoes consist of organic materials of natural origin. In recent years, dumped spoilt cargoes included beef, agricultural crops (potatoes, rice, corn, beans, grain and bananas), and sugar.

Why do these materials pose a potential hazard to the environment?

The organic components of these materials may have a high biological oxygen demand and, if not managed properly, can pose environmental and health problems. An additional hazard exists when these materials remain floating.

What is the main focus of this specific guideline?

Given the nature of these materials, the focus of considerations to dump these wastes is the promotion of biological consumption (i.e., consumption of the wastes by marine organisms). Hence, care should be taken to find dispersive sites that make the waste more available to consuming organisms.

^{viii}This guidance is also applicable to "uncontaminated inert geological materials the chemical constituents of which are unlikely to be released into the marine environment" (Annex I, paragraph 11e, to the London Convention 1972).

^{ix}This guidance is also applicable to "uncontaminated organic materials of natural origin" (Annex I, paragraph 11f, to the London Convention 1972).

12.8 Specific Guideline for Bulky Items

The full title of this guideline document is *SPECIFIC GUIDELINE FOR THE ASSESSMENT OF BULKY ITEMS PRIMARILY COMPRISING IRON, STEEL, CONCRETE AND SIMILARLY UNHARMFUL MATERIALS FOR WHICH THE CONCERN IS PHYSICAL IMPACT, AND LIMITED TO THOSE CIRCUMSTANCES WHERE SUCH WASTES ARE GENERATED AT LOCATIONS, SUCH AS SMALL ISLANDS WITH ISOLATED COMMUNITIES, HAVING NO PRACTICABLE ACCESS TO DISPOSAL OPTIONS OTHER THAN DUMPING.*

What are bulky items, primarily comprising iron, steel, etc.?

The definition is given in the title of the guideline.

Why to these materials pose a hazard to the environment?

They could be harmful:

- if bulky items (or parts thereof) are scuttled without prior and thorough cleaning, or
- if material capable of creating floating debris or otherwise contributing to pollution of the marine environment has not been removed to the maximum extent, or
- if the material dumped poses a serious obstacle to fishing or navigation (Annex 1, para. 2 of the 1996 Protocol)

What is the main focus of this specific guideline?

The most pertinent issue for this category of material will be waste minimisation. Other important issues are re-use, if possible, proper cleaning and preparation prior to disposal, and if the concern is physical impact, ensuring that the material reaches the sea bed relatively rapidly.

PART 4: ADDITIONAL RESOURCES

13 LONDON CONVENTION 1972 (FULL TEXT)

CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER

THE CONTRACTING PARTIES TO THIS CONVENTION,

RECOGNIZING that the marine environment and the living organisms which it supports are of vital importance to humanity, and all people have an interest in assuring that it is so managed that its quality and resources are not impaired;

RECOGNIZING that the capacity of the sea to assimilate wastes and render them harmless, and its ability to regenerate natural resources, is not unlimited;

RECOGNIZING that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction;

RECALLING resolution 2749(XXV) of the General Assembly of the United Nations on the principles governing the sea-bed and the ocean floor and the subsoil thereof, beyond the limits of national jurisdiction;

NOTING that marine pollution originates in many sources, such as dumping and discharges through the atmosphere, rivers, estuaries, outfalls and pipelines, and that it is important that States use the best practicable means to prevent such pollution and develop products and processes which will reduce the amount of harmful wastes to be disposed of;

BEING CONVINCED that international action to control the pollution of the sea by dumping can and must be taken without delay but that this action should not preclude discussion of measures to control other sources of marine pollution as soon as possible; and

WISHING to improve protection of the marine environment by encouraging States with a common interest in particular geographical areas to enter into appropriate agreements supplementary to this Convention;

HAVE AGREED as follows:

Article I

Contracting Parties shall individually and collectively promote the effective control of all sources of pollution of the marine environment, and pledge themselves especially to take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

Article II

Contracting Parties shall, as provided for in the following articles, take effective measures individually, according to their scientific, technical and economic capabilities, and collectively, to prevent marine pollution caused by dumping and shall harmonize their policies in this regard.

Article III

For the purposes of this Convention:

- 1 (a) "Dumping" means:
 - (i) any deliberate disposal at sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea;
 - (ii) any deliberate disposal at sea of vessels, aircraft, platforms or other man-made structures at sea.
 - (b) "Dumping" does not include:
 - (i) the disposal at sea of wastes or other matter incidental to, or derived from the normal operations of vessels, aircraft, platforms or other man-made structures at sea and their equipment, other than wastes or other matter transported by or to vessels, aircraft, platforms or other man-made structures at sea, operating for the purpose of disposal of such matter or derived from the treatment of such wastes or other matter on such vessels, aircraft, platforms or structures;
 - (ii) placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of this Convention.
 - (c) The disposal of wastes or other matter directly arising from, or related to the exploration, exploitation and associated off-shore processing of sea-bed mineral resources will not be covered by the provisions of this Convention.
- 2 "Vessels and aircraft" means waterborne or airborne craft of any type whatsoever. This expression includes air cushioned craft and floating craft, whether self-propelled or not.
 - 3 "Sea" means all marine waters other than the internal waters of States.
 - 4 "Wastes or other matter" means material and substance of any kind, form or description.

- 5 "Special permit" means permission granted specifically on application in advance and in accordance with Annex II and Annex III.
- 6 "General permit" means permission granted in advance and in accordance with Annex III.
- 7 "The Organization" means the Organization designated by the Contracting Parties in accordance with article XIV(2).

Article IV

- 1 In accordance with the provisions of this Convention Contracting Parties shall prohibit the dumping of any wastes or other matter in whatever form or condition except as otherwise specified below:
 - (a) the dumping of wastes or other matter listed in Annex I is prohibited;
 - (b) the dumping of wastes or other matter listed in Annex II requires a prior special permit;
 - (c) the dumping of all other wastes or matter requires a prior general permit.
- 2 Any permit shall be issued only after careful consideration of all the factors set forth in Annex III, including prior studies of the characteristics of the dumping site, as set forth in sections B and C of that Annex.
- 3 No provision of this Convention is to be interpreted as preventing a Contracting Party from prohibiting, insofar as that Party is concerned, the dumping of wastes or other matter not mentioned in Annex I. That Party shall notify such measures to the Organization.

Article V

- 1 The provisions of article IV shall not apply when it is necessary to secure the safety of human life or of vessels, aircraft, platforms or other man-made structures at sea in cases of *force majeure* caused by stress of weather, or in any case which constitutes a danger to human life or a real threat to vessels, aircraft, platforms or other man-made structures at sea, if dumping appears to be the only way of averting the threat and if there is every probability that the damage consequent upon such dumping will be less than would otherwise occur. Such dumping shall be so conducted as to minimize the likelihood of damage to human or marine life and shall be reported forthwith to the Organization.
- 2 A Contracting Party may issue a special permit as an exception to article IV(1)(a), in emergencies, posing unacceptable risk relating to human health and admitting no other feasible solution. Before doing so the Party shall consult any other country or countries that are likely to be affected and the Organization which, after consulting other Parties, and international organizations as appropriate, shall, in accordance with article XIV promptly recommend to the Party the most appropriate procedures to adopt. The Party shall follow these recommendations to the maximum extent feasible consistent with the time within which action must be taken and with the general obligation to avoid damage to the marine environment and shall inform the Organization of the action it takes. The Parties pledge themselves to assist one another in such situations.

- 3 Any Contracting Party may waive its rights under paragraph (2) at the time of, or subsequent to ratification of, or accession to this Convention.

Article VI

- 1 Each Contracting Party shall designate an appropriate authority or authorities to:
- (a) issue special permits which shall be required prior to, and for, the dumping of matter listed in Annex II and in the circumstances provided for in article V(2);
 - (b) issue general permits which shall be required prior to, and for, the dumping of all other matter;
 - (c) keep records of the nature and quantities of all matter permitted to be dumped and the location, time and method of dumping;
 - (d) monitor individually, or in collaboration with other Parties and competent international organizations, the condition of the seas for the purposes of this Convention.
- 2 The appropriate authority or authorities of a contracting Party shall issue prior special or general permits in accordance with paragraph (1) in respect of matter intended for dumping:
- (a) loaded in its territory;
 - (b) loaded by a vessel or aircraft registered in its territory or flying its flag, when the loading occurs in the territory of a State not party to this Convention.
- 3 In issuing permits under sub-paragraphs (1)(a) and (b) above, the appropriate authority or authorities shall comply with Annex III, together with such additional criteria, measures and requirements as they may consider relevant.
- 4 Each Contracting Party, directly or through a Secretariat established under a regional agreement, shall report to the Organization, and where appropriate to other Parties, the information specified in sub-paragraphs(c) and (d) of paragraph (1) above, and the criteria, measures and requirements it adopts in accordance with paragraph (3) above. The procedure to be followed and the nature of such reports shall be agreed by the Parties in consultation.

Article VII

- 1 Each Contracting Party shall apply the measures required to implement the present Convention to all:
- (a) vessels and aircraft registered in its territory or flying its flag;
 - (b) vessels and aircraft loading in its territory or territorial seas matter which is to be dumped;
 - (c) vessels and aircraft and fixed or floating platforms under its jurisdiction believed to be engaged in dumping.
- 2 Each Party shall take in its territory appropriate measures to prevent and punish conduct in contravention of the provisions of this Convention.

- 3 The Parties agree to co-operate in the development of procedures for the effective application of this Convention particularly on the high seas, including procedures for the reporting of vessels and aircraft observed dumping in contravention of the Convention.
- 4 This Convention shall not apply to those vessels and aircraft entitled to sovereign immunity under international law. However, each Party shall ensure by the adoption of appropriate measures that such vessels and aircraft owned or operated by it act in a manner consistent with the object and purpose of this Convention, and shall inform the Organization accordingly.
- 5 Nothing in this Convention shall affect the right of each Party to adopt other measures, in accordance with the principles of international law, to prevent dumping at sea.

Article VIII

In order to further the objectives of this Convention, the Contracting Parties with common interests to protect in the marine environment in a given geographical area shall endeavour, taking into account characteristic regional features, to enter into regional agreements consistent with this Convention for the prevention of pollution, especially by dumping. The Contracting Parties to the present Convention shall endeavour to act consistently with the objectives and provisions of such regional agreements, which shall be notified to them by the Organization. Contracting Parties shall seek to co-operate with the Parties to regional agreements in order to develop harmonized procedures to be followed by Contracting Parties to the different conventions concerned. Special attention shall be given to co-operation in the field of monitoring and scientific research.

Article IX

The Contracting Parties shall promote, through collaboration within the Organization and other international bodies, support for those Parties which request it for:

- (a) the training of scientific and technical personnel;
- (b) the supply of necessary equipment and facilities for research and monitoring;
- (c) the disposal and treatment of waste and other measures to prevent or mitigate pollution caused by dumping;

preferably within the countries concerned, so furthering the aims and purposes of this Convention.

Article X

In accordance with the principles of international law regarding State responsibility for damage to the environment of other States or to any other area of the environment, caused by dumping of wastes and other matter of all kinds, the Contracting Parties undertake to develop procedures for the assessment of liability and the settlement of disputes regarding dumping.

Article XI

The Contracting Parties shall at their first consultative meeting consider procedures for the settlement of disputes concerning the interpretation and application of this Convention.

Article XII

The Contracting Parties pledge themselves to promote, within the competent specialized agencies and other international bodies, measures to protect the marine environment against pollution caused by:

- (a) hydrocarbons, including oil and their wastes;
- (b) other noxious or hazardous matter transported by vessels for purposes other than dumping;
- (c) wastes generated in the course of operation of vessels, aircraft, platforms and other man-made structures at sea;
- (d) radio-active pollutants from all sources, including vessels;
- (e) agents of chemical and biological warfare;
- (f) wastes or other matter directly arising from, or related to the exploration, exploitation and associated off-shore processing of sea-bed mineral resources.

The Parties will also promote, within the appropriate international organization, the codification of signals to be used by vessels engaged in dumping.

Article XIII

Nothing in this Convention shall prejudice the codification and development of the law of the sea by the United Nations Conference on the Law of the Sea convened pursuant to resolution 2750 C(XXV) of the General Assembly of the United Nations nor the present or future claims and legal views of any State concerning the law of the sea and the nature and extent of coastal and flag State jurisdiction. The Contracting Parties agree to consult at a meeting to be convened by the Organization after the Law of the Sea Conference, and in any case not later than 1976, with a view to defining the nature and extent of the right and the responsibility of a coastal State to apply the Convention in a zone adjacent to its coast.

Article XIV

- 1 The Government of the United Kingdom of Great Britain and Northern Ireland as a depositary shall call a meeting of the Contracting Parties not later than three months after the entry into force of this Convention to decide on organizational matters.
- 2 The Contracting Parties shall designate a competent Organization existing at the time of that meeting to be responsible for secretariat duties in relation to this Convention. Any Party to this Convention not being a member of this Organization shall make an appropriate contribution to the expenses incurred by the Organization in performing

these duties.

3 The Secretariat duties of the Organization shall include:

- (a) the convening of consultative meetings of the Contracting Parties not less frequently than once every two years and of special meetings of the Parties at any time on the request of two thirds of the Parties;
- (b) preparing and assisting, in consultation with the Contracting Parties and appropriate International Organizations, in the development and implementation of procedures referred to in sub-paragraph (4)(e) of this article;
- (c) considering enquiries by, and information from the Contracting Parties, consulting with them and with the appropriate International Organizations, and providing recommendations to the Parties on questions related to, but not specifically covered by the Convention;
- (d) conveying to the Parties concerned all notifications received by the Organization in accordance with articles IV(3), V(1) and (2), VI(4), XV, XX and XXI.

Prior to the designation of the Organization these functions shall, as necessary, be performed by the depositary, who for this purpose shall be the Government of the United Kingdom of Great Britain and Northern Ireland.

4 Consultative or special meetings of the Contracting Parties shall keep under continuing review the implementation of this Convention and may, inter alia:

- (a) review and adopt amendments to this Convention and its Annexes in accordance with article XV;
- (b) invite the appropriate scientific body or bodies to collaborate with and to advise the Parties or the Organization on any scientific or technical aspect relevant to this Convention, including particularly the content of the Annexes;
- (c) receive and consider reports made pursuant to article VI(4);
- (d) promote co-operation with and between regional organizations concerned with the prevention of marine pollution;
- (e) develop or adopt, in consultation with appropriate International Organizations, procedures referred to in article V(2), including basic criteria for determining exceptional and emergency situations, and procedures for consultative advice and the safe disposal of matter in such circumstances, including the designation of appropriate dumping areas, and recommend accordingly;
- (f) consider any additional action that may be required.

5 The Contracting Parties at their first consultative meeting shall establish rules of procedure as necessary.

Article XV

- 1 (a) At meetings of the Contracting Parties called in accordance with article XIV amendments to this Convention may be adopted by a two-thirds majority of those present. An amendment shall enter into force for the Parties which have accepted it on the sixtieth day after two thirds of the Parties shall have deposited an instrument of acceptance of the amendment with the Organization. Thereafter the amendment shall enter into force for any other Party 30 days after that Party deposits its instrument of acceptance of the amendment.
- (b) The Organization shall inform all Contracting Parties of any request made for a special meeting under article XIV and of any amendments adopted at meetings of the Parties and of the date on which each such amendment enters into force for each Party.
- 2 Amendments to the Annexes will be based on scientific or technical considerations. Amendments to the annexes approved by a two-thirds majority of those present at a meeting called in accordance with article XIV shall enter into force for each Contracting Party immediately on notification of its acceptance to the Organization and 100 days after approval by the meeting for all other Parties except for those which before the end of the 100 days make a declaration that they are not able to accept the amendment at that time. Parties should endeavour to signify their acceptance of an amendment to the Organization as soon as possible after approval at a meeting. A Party may at any time substitute an acceptance for a previous declaration of objection and the amendment previously objected to shall thereupon enter into force for that Party.
- 3 An acceptance or declaration of objection under this article shall be made by the deposit of an instrument with the Organization. The Organization shall notify all Contracting Parties of the receipt of such instruments.
- 4 Prior to the designation of the Organization, the Secretarial functions herein attributed to it shall be performed temporarily by the Government of the United Kingdom of Great Britain and Northern Ireland, as one of the depositaries of this Convention.

Article XVI

This Convention shall be open for signature by any State at London, Mexico City, Moscow and Washington from 29 December 1972 until 31 December 1973.

Article XVII

This Convention shall be subject to ratification. The instruments of ratification shall be deposited with the Governments of Mexico, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

Article XVIII

After 31 December 1973, this Convention shall be open for accession by any State. The instruments of accession shall be deposited with the Governments of Mexico, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

Article XIX

- 1 This Convention shall enter into force on the thirtieth day following the date of deposit of the fifteenth instrument of ratification or accession.
- 2 For each Contracting Party ratifying or acceding to the Convention after the deposit of the fifteenth instrument of ratification or accession, the Convention shall enter into force on the thirtieth day after deposit by such Party of its instrument of ratification or accession.

Article XX

The depositaries shall inform Contracting Parties:

- (a) of signatures to this Convention and of the deposit of instruments of ratification, accession or withdrawal, in accordance with articles XVI, XVII, XVIII and XXI, and
- (b) of the date on which this Convention will enter into force, in accordance with article XIX.

Article XXI

Any Contracting Party may withdraw from this Convention by giving six months' notice in writing to a depositary, which shall promptly inform all Parties of such notice.

Article XXII

The original of this Convention of which the English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Governments of Mexico, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland and the United States of America who shall send certified copies thereof to all States.

IN WITNESS WHEREOF the undersigned Plenipotentiaries, being duly authorized thereto by their respective Governments, have signed the present Convention.*

DONE in quadruplicate at London, Mexico City, Moscow and Washington, this twenty-ninth day of December, 1972.

ANNEX I

- 1 Organohalogen compounds.
- 2 Mercury and mercury compounds.
- 3 Cadmium and cadmium compounds.
- 4 Persistent plastics and other persistent synthetic materials, for example, netting and ropes, which may float or may remain in suspension in the sea in such a manner as to interfere materially with fishing, navigation or other legitimate uses of the sea.

- 5 Crude oil and its wastes, refined petroleum products, petroleum, distillate residues, and any mixtures containing any of these, taken on board for the purpose of dumping.
- 6 Radioactive wastes or other radioactive matter.
- 7 Materials in whatever form (e.g. solids, liquids, semi-liquids, gases or in a living state) produced for biological and chemical warfare.
- 8 With the exception of paragraph 6 above, the preceding paragraphs of this Annex do not apply to substances which are rapidly rendered harmless by physical, chemical or biological processes in the sea provided they do not:
 - (i) make edible marine organisms unpalatable, or
 - (ii) endanger human health or that of domestic animals.

The consultative procedure provided for under Article XIV should be followed by a Party if there is doubt about the harmlessness of the substance.

- 9 Except for industrial waste as defined in paragraph 11 below, this Annex does not apply to wastes or other materials (e.g. sewage sludge and dredged material) containing the matters referred to in paragraphs 1 - 5 above as trace contaminants. Such wastes shall be subject to the provisions of Annexes II and III as appropriate.

Paragraph 6 does not apply to wastes or other materials (e.g. sewage sludge and dredged material) containing *de minimis* (exempt) levels of radioactivity as defined by the IAEA and adopted by the Contracting Parties. Unless otherwise prohibited by Annex I, such wastes shall be subject to the provisions of Annexes II and III as appropriate.

- 10
 - (a) Incineration at sea of industrial waste, as defined in paragraph 11 below, and sewage sludge is prohibited.
 - (b) The incineration at sea of any other wastes or other matter requires the issue of a special permit.
 - (c) In the issue of special permits for incineration at sea Contracting Parties shall apply regulations as are developed under this Convention^x.
 - (d)
 - (i) "Marine incineration facility" means a vessel, platform, or other man-made structure operating for the purpose of incineration at sea.
 - (ii) "Incineration at sea" means the deliberate combustion of wastes or other matter on marine incineration facilities for the purpose of their thermal destruction. Activities incidental to the normal operation of vessels, platforms or other man-made structures are excluded from the scope of this definition.

- 11 Industrial waste as from 1 January 1996.

For the purposes of this Annex:

"Industrial waste" means waste materials generated by manufacturing or processing operations and does not apply to:

^x Regulations for the Control of Incineration of Wastes and Other Matter at Sea, as adopted in 1978, have not been reproduced in this document.

- (a) dredged material;
- (b) sewage sludge;
- (c) fish waste, or organic materials resulting from industrial fish processing operations;
- (d) vessels and platforms or other man-made structures at sea, provided that material capable of creating floating debris or otherwise contributing to pollution of the marine environment has been removed to the maximum extent;
- (e) uncontaminated inert geological materials the chemical constituents of which are unlikely to be released into the marine environment;
- (f) uncontaminated organic materials of natural origin.

Dumping of wastes and other matter specified in subparagraphs (a) - (f) above shall be subject to all other provisions of Annex I, and to the provisions of Annexes II and III.

This paragraph shall not apply to the radioactive wastes or any other radioactive matter referred to in paragraph 6 of this Annex.

- 12 Within 25 years from the date on which the amendment to paragraph 6 enters into force and at each 25 year interval thereafter, the Contracting Parties shall complete a scientific study relating to all radioactive wastes and other radioactive matter other than high level wastes or matter, taking into account such other factors as the Contracting Parties consider appropriate, and shall review the position of such substances on Annex I in accordance with the procedures set forth in Article XV.

ANNEX II

The following substances and materials requiring special care are listed for the purposes of Article VI(1)(a).

- A Wastes containing significant amounts of the matters listed below:

arsenic)
beryllium)
chromium)
copper) and their compounds
lead)
nickel)
vanadium)
zinc)
organosilicon compounds
cyanides
fluorides
pesticides and their by-products not covered in Annex I.

- B Containers, scrap metal and other bulky wastes liable to sink to the sea bottom which may present a serious obstacle to fishing or navigation.
- C In the issue of special permits for the incineration of substances and materials listed in this Annex, the Contracting Parties shall apply the Regulations for the Control of Incineration of Wastes and Other Matter at Sea set forth in the Addendum to Annex I and take full account of the Technical Guidelines on the Control of Incineration of Wastes and Other Matter at Sea adopted by the Contracting Parties in consultation, to the extent specified in these Regulations and Guidelines.
- D Materials which, though of a non-toxic nature, may become harmful due to the quantities in which they are dumped, or which are liable to seriously reduce amenities.

ANNEX III

Provisions to be considered in establishing criteria governing the issue of permits for the dumping of matter at sea, taking into account article IV(2), include:

A - Characteristics and composition of the matter

- 1 Total amount and average composition of matter dumped (e.g. per year).
- 2 Form, e.g. solid, sludge, liquid, or gaseous.
- 3 Properties: physical (e.g. solubility and density), chemical and biochemical (e.g. oxygen demand, nutrients) and biological (e.g. presence of viruses, bacteria, yeasts, parasites).
- 4 Toxicity.
- 5 Persistence: physical, chemical and biological.
- 6 Accumulation and biotransformation in biological materials or sediments.
- 7 Susceptibility to physical, chemical and biochemical changes and interaction in the aquatic environment with other dissolved organic and inorganic materials.
- 8 Probability of production of taints or other changes reducing marketability of resources (fish, shellfish, etc.).
- 9 In issuing a permit for dumping, Contracting Parties should consider whether an adequate scientific basis exists concerning characteristics and composition of the matter to be dumped to assess the impact of the matter on marine life and on human health.

B - Characteristics of dumping site and method of deposit

- 1 Location (e.g. co-ordinates of the dumping area, depth and distance from the coast), location in relation to other areas (e.g. amenity areas, spawning, nursery and fishing areas and exploitable resources).
- 2 Rate of disposal per specific period (e.g. quantity per day, per week, per month).
- 3 Methods of packaging and containment, if any.

- 4 Initial dilution achieved by proposed method of release.
- 5 Dispersal characteristics (e.g. effects of currents, tides and wind on horizontal transport and vertical mixing).
- 6 Water characteristics (e.g. temperature, pH, salinity, stratification, oxygen indices of pollution-dissolved oxygen (DO), chemical oxygen demand (COD), biochemical oxygen demand (BOD) - nitrogen present in organic and mineral form including ammonia, suspended matter, other nutrients and productivity).
- 7 Bottom characteristics (e.g. topography, geochemical and geological characteristics and biological productivity).
- 8 Existence and effects of other dumpings which have been made in the dumping area (e.g. heavy metal background reading and organic carbon content).
- 9 In issuing a permit for dumping, Contracting Parties should consider whether an adequate scientific basis exists for assessing the consequences of such dumping, as outlined in this Annex, taking into account seasonal variations.

C - General considerations and conditions

- 1 Possible effects on amenities (e.g. presence of floating or stranded material, turbidity, objectionable odour, discolouration and foaming).
 - 2 Possible effects on marine life, fish and shellfish culture, fish stocks and fisheries, seaweed harvesting and culture.
 - 3 Possible effects on other uses of the sea (e.g. impairment of water quality for industrial use, underwater corrosion of structures, interference with ship operations from floating materials, interference with fishing or navigation through deposit of waste or solid objects on the sea floor and protection of areas of special importance for scientific or conservation purposes).
 - 4 The practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the matter less harmful for dumping at sea.
-

14 1996 PROTOCOL (FULL TEXT)

1996 PROTOCOL TO THE CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER, 1972 AND RESOLUTIONS ADOPTED BY THE SPECIAL MEETING

THE CONTRACTING PARTIES TO THIS PROTOCOL,

STRESSING the need to protect the marine environment and to promote the sustainable use and conservation of marine resources,

NOTING in this regard the achievements within the framework of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 and especially the evolution towards approaches based on precaution and prevention,

NOTING FURTHER the contribution in this regard by complementary regional and national instruments which aim to protect the marine environment and which take account of specific circumstances and needs of those regions and States,

REAFFIRMING the value of a global approach to these matters and in particular the importance of continuing co-operation and collaboration between Contracting Parties in implementing the Convention and the Protocol,

RECOGNIZING that it may be desirable to adopt, on a national or regional level, more stringent measures with respect to prevention and elimination of pollution of the marine environment from dumping at sea than are provided for in international conventions or other types of agreements with a global scope,

TAKING INTO ACCOUNT relevant international agreements and actions, especially the United Nations Convention on the Law of the Sea, 1982, the Rio Declaration on Environment and Development and Agenda 21,

RECOGNIZING ALSO the interests and capacities of developing States and in particular small island developing States,

BEING CONVINCED that further international action to prevent, reduce and where practicable eliminate pollution of the sea caused by dumping can and must be taken without delay to protect and preserve the marine environment and to manage human activities in such a manner that the marine ecosystem will continue to sustain the legitimate uses of the sea and will continue to meet the needs of present and future generations,

HAVE AGREED as follows:

ARTICLE 1
DEFINITIONS

For the purposes of this Protocol:

- 1 "Convention" means the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, as amended.
- 2 "Organization" means the International Maritime Organization.
- 3 "Secretary-General" means the Secretary-General of the Organization.
- 4 .1 "Dumping" means:
 - .1 any deliberate disposal into the sea of wastes or other matter from vessels, aircraft, platforms or other man-made structures at sea;
 - .2 any deliberate disposal into the sea of vessels, aircraft, platforms or other man-made structures at sea;
 - .3 any storage of wastes or other matter in the seabed and the subsoil thereof from vessels, aircraft, platforms or other man-made structures at sea; and
 - .4 any abandonment or toppling at site of platforms or other man-made structures at sea, for the sole purpose of deliberate disposal.
- .2 "Dumping" does not include:
 - .1 the disposal into the sea of wastes or other matter incidental to, or derived from the normal operations of vessels, aircraft, platforms or other man-made structures at sea and their equipment, other than wastes or other matter transported by or to vessels, aircraft, platforms or other man-made structures at sea, operating for the purpose of disposal of such matter or derived from the treatment of such wastes or other matter on such vessels, aircraft, platforms or other man-made structures;
 - .2 placement of matter for a purpose other than the mere disposal thereof, provided that such placement is not contrary to the aims of this Protocol; and
 - .3 notwithstanding paragraph 4.1.4, abandonment in the sea of matter (e.g., cables, pipelines and marine research devices) placed for a purpose other than the mere disposal thereof.
- .3 The disposal or storage of wastes or other matter directly arising from, or related to the exploration, exploitation and associated off-shore processing of seabed mineral resources is not covered by the provisions of this Protocol.
- 5 .1 "Incineration at sea" means the combustion on board a vessel, platform or other man-made structure at sea of wastes or other matter for the purpose of their deliberate disposal by thermal destruction.
- .2 "Incineration at sea" does not include the incineration of wastes or other matter on board a vessel, platform, or other man-made structure at sea if such wastes

or other matter were generated during the normal operation of that vessel, platform or other man-made structure at sea.

- 6 "Vessels and aircraft" means waterborne or airborne craft of any type whatsoever. This expression includes air-cushioned craft and floating craft, whether self-propelled or not.
- 7 "Sea" means all marine waters other than the internal waters of States, as well as the seabed and the subsoil thereof; it does not include sub-seabed repositories accessed only from land.
- 8 "Wastes or other matter" means material and substance of any kind, form or description.
- 9 "Permit" means permission granted in advance and in accordance with relevant measures adopted pursuant to article 4.1.2 or 8.2.
- 10 "Pollution" means the introduction, directly or indirectly, by human activity, of wastes or other matter into the sea which results or is likely to result in such deleterious effects as harm to living resources and marine ecosystems, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.

ARTICLE 2

OBJECTIVES

Contracting Parties shall individually and collectively protect and preserve the marine environment from all sources of pollution and take effective measures, according to their scientific, technical and economic capabilities, to prevent, reduce and where practicable eliminate pollution caused by dumping or incineration at sea of wastes or other matter. Where appropriate, they shall harmonize their policies in this regard.

ARTICLE 3

GENERAL OBLIGATIONS

- 1 In implementing this Protocol, Contracting Parties shall apply a precautionary approach to environmental protection from dumping of wastes or other matter whereby appropriate preventative measures are taken when there is reason to believe that wastes or other matter introduced into the marine environment are likely to cause harm even when there is no conclusive evidence to prove a causal relation between inputs and their effects.
- 2 Taking into account the approach that the polluter should, in principle, bear the cost of pollution, each Contracting Party shall endeavour to promote practices whereby those it has authorized to engage in dumping or incineration at sea bear the cost of meeting the pollution prevention and control requirements for the authorized activities, having due regard to the public interest.
- 3 In implementing the provisions of this Protocol, Contracting Parties shall act so as not to transfer, directly or indirectly, damage or likelihood of damage from one part of the environment to another or transform one type of pollution into another.
- 4 No provision of this Protocol shall be interpreted as preventing Contracting Parties from taking, individually or jointly, more stringent measures in accordance with international law with respect to the prevention, reduction and where practicable elimination of pollution.

ARTICLE 4

DUMPING OF WASTES OR OTHER MATTER

- 1 .1 Contracting Parties shall prohibit the dumping of any wastes or other matter with the exception of those listed in Annex 1.
- .2 The dumping of wastes or other matter listed in Annex 1 shall require a permit. Contracting Parties shall adopt administrative or legislative measures to ensure that issuance of permits and permit conditions comply with provisions of Annex 2. Particular attention shall be paid to opportunities to avoid dumping in favour of environmentally preferable alternatives.
- 2 No provision of this Protocol shall be interpreted as preventing a Contracting Party from prohibiting, insofar as that Contracting Party is concerned, the dumping of wastes or other matter mentioned in Annex 1. That Contracting Party shall notify the Organization of such measures.

ARTICLE 5

INCINERATION AT SEA

Contracting Parties shall prohibit incineration at sea of wastes or other matter.

ARTICLE 6

EXPORT OF WASTES OR OTHER MATTER

Contracting Parties shall not allow the export of wastes or other matter to other countries for dumping or incineration at sea.

ARTICLE 7

INTERNAL WATERS

- 1 Notwithstanding any other provision of this Protocol, this Protocol shall relate to internal waters only to the extent provided for in paragraphs 2 and 3.
- 2 Each Contracting Party shall at its discretion either apply the provisions of this Protocol or adopt other effective permitting and regulatory measures to control the deliberate disposal of wastes or other matter in marine internal waters where such disposal would be "dumping" or "incineration at sea" within the meaning of article 1, if conducted at sea.
- 3 Each Contracting Party should provide the Organization with information on legislation and institutional mechanisms regarding implementation, compliance and enforcement in marine internal waters. Contracting Parties should also use their best efforts to provide on a voluntary basis summary reports on the type and nature of the materials dumped in marine internal waters.

**ARTICLE 8
EXCEPTIONS**

- 1 The provisions of articles 4.1 and 5 shall not apply when it is necessary to secure the safety of human life or of vessels, aircraft, platforms or other man-made structures at sea in cases of *force majeure* caused by stress of weather, or in any case which constitutes a danger to human life or a real threat to vessels, aircraft, platforms or other man-made structures at sea, if dumping or incineration at sea appears to be the only way of averting the threat and if there is every probability that the damage consequent upon such dumping or incineration at sea will be less than would otherwise occur. Such dumping or incineration at sea shall be conducted so as to minimize the likelihood of damage to human or marine life and shall be reported forthwith to the Organization.
- 2 A Contracting Party may issue a permit as an exception to articles 4.1 and 5, in emergencies posing an unacceptable threat to human health, safety, or the marine environment and admitting of no other feasible solution. Before doing so the Contracting Party shall consult any other country or countries that are likely to be affected and the Organization which, after consulting other Contracting Parties, and competent international organizations as appropriate, shall, in accordance with article 18.6 promptly recommend to the Contracting Party the most appropriate procedures to adopt. The Contracting Party shall follow these recommendations to the maximum extent feasible consistent with the time within which action must be taken and with the general obligation to avoid damage to the marine environment and shall inform the Organization of the action it takes. The Contracting Parties pledge themselves to assist one another in such situations.
- 3 Any Contracting Party may waive its rights under paragraph 2 at the time of, or subsequent to ratification of, or accession to this Protocol.

**ARTICLE 9
ISSUANCE OF PERMITS AND REPORTING**

- 1 Each Contracting Party shall designate an appropriate authority or authorities to:
 - .1 issue permits in accordance with this Protocol;
 - .2 keep records of the nature and quantities of all wastes or other matter for which dumping permits have been issued and where practicable the quantities actually dumped and the location, time and method of dumping; and
 - .3 monitor individually, or in collaboration with other Contracting Parties and competent international organizations, the condition of the sea for the purposes of this Protocol.
- 2 The appropriate authority or authorities of a Contracting Party shall issue permits in accordance with this Protocol in respect of wastes or other matter intended for dumping or, as provided for in article 8.2, incineration at sea:
 - .1 loaded in its territory; and
 - .2 loaded onto a vessel or aircraft registered in its territory or flying its flag, when the loading occurs in the territory of a State not a Contracting Party to this Protocol.

- 3 In issuing permits, the appropriate authority or authorities shall comply with the requirements of article 4, together with such additional criteria, measures and requirements as they may consider relevant.
- 4 Each Contracting Party, directly or through a secretariat established under a regional agreement, shall report to the Organization and where appropriate to other Contracting Parties:
 - .1 the information specified in paragraphs 1.2 and 1.3;
 - .2 the administrative and legislative measures taken to implement the provisions of this Protocol, including a summary of enforcement measures; and
 - .3 the effectiveness of the measures referred to in paragraph 4.2 and any problems encountered in their application.

The information referred to in paragraphs 1.2 and 1.3 shall be submitted on an annual basis. The information referred to in paragraphs 4.2 and 4.3 shall be submitted on a regular basis.
- 5 Reports submitted under paragraphs 4.2 and 4.3 shall be evaluated by an appropriate subsidiary body as determined by the Meeting of Contracting Parties. This body will report its conclusions to an appropriate Meeting or Special Meeting of Contracting Parties.

ARTICLE 10

APPLICATION AND ENFORCEMENT

- 1 Each Contracting Party shall apply the measures required to implement this Protocol to all:
 - .1 vessels and aircraft registered in its territory or flying its flag;
 - .2 vessels and aircraft loading in its territory the wastes or other matter which are to be dumped or incinerated at sea; and
 - .3 vessels, aircraft and platforms or other man-made structures believed to be engaged in dumping or incineration at sea in areas within which it is entitled to exercise jurisdiction in accordance with international law.
- 2 Each Contracting Party shall take appropriate measures in accordance with international law to prevent and if necessary punish acts contrary to the provisions of this Protocol.
- 3 Contracting Parties agree to co-operate in the development of procedures for the effective application of this Protocol in areas beyond the jurisdiction of any State, including procedures for the reporting of vessels and aircraft observed dumping or incinerating at sea in contravention of this Protocol.
- 4 This Protocol shall not apply to those vessels and aircraft entitled to sovereign immunity under international law. However, each Contracting Party shall ensure by the adoption of appropriate measures that such vessels and aircraft owned or operated by it act in a manner consistent with the object and purpose of this Protocol and shall inform the Organization accordingly.
- 5 A State may, at the time it expresses its consent to be bound by this Protocol, or at any time thereafter, declare that it shall apply the provisions of this Protocol to its vessels

and aircraft referred to in paragraph 4, recognising that only that State may enforce those provisions against such vessels and aircraft.

ARTICLE 11

COMPLIANCE PROCEDURES

- 1 No later than two years after the entry into force of this Protocol, the Meeting of Contracting Parties shall establish those procedures and mechanisms necessary to assess and promote compliance with this Protocol. Such procedures and mechanisms shall be developed with a view to allowing for the full and open exchange of information, in a constructive manner.
- 2 After full consideration of any information submitted pursuant to this Protocol and any recommendations made through procedures or mechanisms established under paragraph 1, the Meeting of Contracting Parties may offer advice, assistance or co-operation to Contracting Parties and non-Contracting Parties.

ARTICLE 12

REGIONAL CO-OPERATION

In order to further the objectives of this Protocol, Contracting Parties with common interests to protect the marine environment in a given geographical area shall endeavour, taking into account characteristic regional features, to enhance regional co-operation including the conclusion of regional agreements consistent with this Protocol for the prevention, reduction and where practicable elimination of pollution caused by dumping or incineration at sea of wastes or other matter. Contracting Parties shall seek to co-operate with the parties to regional agreements in order to develop harmonized procedures to be followed by Contracting Parties to the different conventions concerned.

ARTICLE 13

TECHNICAL CO-OPERATION AND ASSISTANCE

- 1 Contracting Parties shall, through collaboration within the Organization and in co-ordination with other competent international organizations, promote bilateral and multilateral support for the prevention, reduction and where practicable elimination of pollution caused by dumping as provided for in this Protocol to those Contracting Parties that request it for:
 - .1 training of scientific and technical personnel for research, monitoring and enforcement, including as appropriate the supply of necessary equipment and facilities, with a view to strengthening national capabilities;
 - .2 advice on implementation of this Protocol;
 - .3 information and technical co-operation relating to waste minimization and clean production processes;
 - .4 information and technical co-operation relating to the disposal and treatment of waste and other measures to prevent, reduce and where practicable eliminate pollution caused by dumping; and

- .5 access to and transfer of environmentally sound technologies and corresponding know-how, in particular to developing countries and countries in transition to market economies, on favourable terms, including on concessional and preferential terms, as mutually agreed, taking into account the need to protect intellectual property rights as well as the special needs of developing countries and countries in transition to market economies.
- 2 The Organization shall perform the following functions:
 - .1 forward requests from Contracting Parties for technical co-operation to other Contracting Parties, taking into account such factors as technical capabilities;
 - .2 co-ordinate requests for assistance with other competent international organizations, as appropriate; and
 - .3 subject to the availability of adequate resources, assist developing countries and those in transition to market economies, which have declared their intention to become Contracting Parties to this Protocol, to examine the means necessary to achieve full implementation.

ARTICLE 14

SCIENTIFIC AND TECHNICAL RESEARCH

- 1 Contracting Parties shall take appropriate measures to promote and facilitate scientific and technical research on the prevention, reduction and where practicable elimination of pollution by dumping and other sources of marine pollution relevant to this Protocol. In particular, such research should include observation, measurement, evaluation and analysis of pollution by scientific methods.
- 2 Contracting Parties shall, to achieve the objectives of this Protocol, promote the availability of relevant information to other Contracting Parties who request it on:
 - .1 scientific and technical activities and measures undertaken in accordance with this Protocol;
 - .2 marine scientific and technological programmes and their objectives; and
 - .3 the impacts observed from the monitoring and assessment conducted pursuant to article 9.1.3.

ARTICLE 15

RESPONSIBILITY AND LIABILITY

In accordance with the principles of international law regarding State responsibility for damage to the environment of other States or to any other area of the environment, the Contracting Parties undertake to develop procedures regarding liability arising from the dumping or incineration at sea of wastes or other matter.

ARTICLE 16

SETTLEMENT OF DISPUTES

- 1 Any disputes regarding the interpretation or application of this Protocol shall be resolved in the first instance through negotiation, mediation or conciliation, or other peaceful means chosen by parties to the dispute.
- 2 If no resolution is possible within twelve months after one Contracting Party has notified another that a dispute exists between them, the dispute shall be settled, at the request of a party to the dispute, by means of the Arbitral Procedure set forth in Annex 3, unless the parties to the dispute agree to use one of the procedures listed in paragraph 1 of Article 287 of the 1982 United Nations Convention on the Law of the Sea. The parties to the dispute may so agree, whether or not they are also States Parties to the 1982 United Nations Convention on the Law of the Sea.
- 3 In the event an agreement to use one of the procedures listed in paragraph 1 of Article 287 of the 1982 United Nations Convention on the Law of the Sea is reached, the provisions set forth in Part XV of that Convention that are related to the chosen procedure would also apply, *mutatis mutandis*.
- 4 The twelve month period referred to in paragraph 2 may be extended for another twelve months by mutual consent of the parties concerned.
- 5 Notwithstanding paragraph 2, any State may, at the time it expresses its consent to be bound by this Protocol, notify the Secretary-General that, when it is a party to a dispute about the interpretation or application of article 3.1 or 3.2, its consent will be required before the dispute may be settled by means of the Arbitral Procedure set forth in Annex 3.

ARTICLE 17

INTERNATIONAL CO-OPERATION

Contracting Parties shall promote the objectives of this Protocol within the competent international organizations.

ARTICLE 18

MEETINGS OF CONTRACTING PARTIES

- 1 Meetings of Contracting Parties or Special Meetings of Contracting Parties shall keep under continuing review the implementation of this Protocol and evaluate its effectiveness with a view to identifying means of strengthening action, where necessary, to prevent, reduce and where practicable eliminate pollution caused by dumping and incineration at sea of wastes or other matter. To these ends, Meetings of Contracting Parties or Special Meetings of Contracting Parties may:
 - .1 review and adopt amendments to this Protocol in accordance with articles 21 and 22;
 - .2 establish subsidiary bodies, as required, to consider any matter with a view to facilitating the effective implementation of this Protocol;
 - .3 invite appropriate expert bodies to advise the Contracting Parties or the Organization on matters relevant to this Protocol;

- .4 promote co-operation with competent international organizations concerned with the prevention and control of pollution;
 - .5 consider the information made available pursuant to article 9.4;
 - .6 develop or adopt, in consultation with competent international organizations, procedures referred to in article 8.2, including basic criteria for determining exceptional and emergency situations, and procedures for consultative advice and the safe disposal of matter at sea in such circumstances;
 - .7 consider and adopt resolutions; and
 - .8 consider any additional action that may be required.
- 2 The Contracting Parties at their first Meeting shall establish rules of procedure as necessary.

ARTICLE 19

DUTIES OF THE ORGANIZATION

- 1 The Organization shall be responsible for Secretariat duties in relation to this Protocol. Any Contracting Party to this Protocol not being a member of this Organization shall make an appropriate contribution to the expenses incurred by the Organization in performing these duties.
- 2 Secretariat duties necessary for the administration of this Protocol include:
- .1 convening Meetings of Contracting Parties once per year, unless otherwise decided by Contracting Parties, and Special Meetings of Contracting Parties at any time on the request of two-thirds of the Contracting Parties;
 - .2 providing advice on request on the implementation of this Protocol and on guidance and procedures developed thereunder;
 - .3 considering enquiries by, and information from Contracting Parties, consulting with them and with the competent international organizations, and providing recommendations to Contracting Parties on questions related to, but not specifically covered by, this Protocol;
 - .4 preparing and assisting, in consultation with Contracting Parties and the competent international organizations, in the development and implementation of procedures referred to in article 18.6.;
 - .5 conveying to the Contracting Parties concerned all notifications received by the Organization in accordance with this Protocol; and
 - .6 preparing, every two years, a budget and a financial account for the administration of this Protocol which shall be distributed to all Contracting Parties.
- 3 The Organization shall, subject to the availability of adequate resources, in addition to the requirements set out in article 13.2.3.
- .1 collaborate in assessments of the state of the marine environment; and
 - .2 co-operate with competent international organizations concerned with the prevention and control of pollution.

ARTICLE 20
ANNEXES

Annexes to this Protocol form an integral part of this Protocol.

ARTICLE 21
AMENDMENT OF THE PROTOCOL

- 1 Any Contracting Party may propose amendments to the articles of this Protocol. The text of a proposed amendment shall be communicated to Contracting Parties by the Organization at least six months prior to its consideration at a Meeting of Contracting Parties or a Special Meeting of Contracting Parties.
- 2 Amendments to the articles of this Protocol shall be adopted by a two-thirds majority vote of the Contracting Parties which are present and voting at the Meeting of Contracting Parties or Special Meeting of Contracting Parties designated for this purpose.
- 3 An amendment shall enter into force for the Contracting Parties which have accepted it on the sixtieth day after two-thirds of the Contracting Parties shall have deposited an instrument of acceptance of the amendment with the Organization. Thereafter the amendment shall enter into force for any other Contracting Party on the sixtieth day after the date on which that Contracting Party has deposited its instrument of acceptance of the amendment.
- 4 The Secretary-General shall inform Contracting Parties of any amendments adopted at Meetings of Contracting Parties and of the date on which such amendments enter into force generally and for each Contracting Party.
- 5 After entry into force of an amendment to this Protocol, any State that becomes a Contracting Party to this Protocol shall become a Contracting Party to this Protocol as amended, unless two-thirds of the Contracting Parties present and voting at the Meeting or Special Meeting of Contracting Parties adopting the amendment agree otherwise.

ARTICLE 22
AMENDMENT OF THE ANNEXES

- 1 Any Contracting Party may propose amendments to the Annexes to this Protocol. The text of a proposed amendment shall be communicated to Contracting Parties by the Organization at least six months prior to its consideration by a Meeting of Contracting Parties or Special Meeting of Contracting Parties.
- 2 Amendments to the Annexes other than Annex 3 will be based on scientific or technical considerations and may take into account legal, social and economic factors as appropriate. Such amendments shall be adopted by a two-thirds majority vote of the Contracting Parties present and voting at a Meeting of Contracting Parties or Special Meeting of Contracting Parties designated for this purpose.
- 3 The Organization shall without delay communicate to Contracting Parties amendments to the Annexes that have been adopted at a Meeting of Contracting Parties or Special Meeting of Contracting Parties.

- 4 Except as provided in paragraph 7, amendments to the Annexes shall enter into force for each Contracting Party immediately on notification of its acceptance to the Organization or 100 days after the date of their adoption at a Meeting of Contracting Parties, if that is later, except for those Contracting Parties which before the end of the 100 days make a declaration that they are not able to accept the amendment at that time. A Contracting Party may at any time substitute an acceptance for a previous declaration of objection and the amendment previously objected to shall thereupon enter into force for that Contracting Party.
- 5 The Secretary-General shall without delay notify Contracting Parties of instruments of acceptance or objection deposited with the Organization.
- 6 A new Annex or an amendment to an Annex which is related to an amendment to the articles of this Protocol shall not enter into force until such time as the amendment to the articles of this Protocol enters into force.
- 7 With regard to amendments to Annex 3 concerning the Arbitral Procedure and with regard to the adoption and entry into force of new Annexes the procedures on amendments to the articles of this Protocol shall apply.

ARTICLE 23

RELATIONSHIP BETWEEN THE PROTOCOL AND THE CONVENTION

This Protocol will supersede the Convention as between Contracting Parties to this Protocol which are also Parties to the Convention.

ARTICLE 24

SIGNATURE, RATIFICATION, ACCEPTANCE, APPROVAL AND ACCESSION

- 1 This Protocol shall be open for signature by any State at the Headquarters of the Organization from 1 April 1997 to 31 March 1998 and shall thereafter remain open for accession by any State.
- 2 States may become Contracting Parties to this Protocol by:
 - .1 signature not subject to ratification, acceptance or approval; or
 - .2 signature subject to ratification, acceptance or approval, followed by ratification, acceptance or approval; or
 - .3 accession.
- 3 Ratification, acceptance, approval or accession shall be effected by the deposit of an instrument to that effect with the Secretary-General.

ARTICLE 25

ENTRY INTO FORCE

- 1 This Protocol shall enter into force on the thirtieth day following the date on which:
 - .1 at least 26 States have expressed their consent to be bound by this Protocol in accordance with article 24; and

- .2 at least 15 Contracting Parties to the Convention are included in the number of States referred to in paragraph 1.1.
- 2 For each State that has expressed its consent to be bound by this Protocol in accordance with article 24 following the date referred to in paragraph 1, this Protocol shall enter into force on the thirtieth day after the date on which such State expressed its consent.

ARTICLE 26

TRANSITIONAL PERIOD

- 1 Any State that was not a Contracting Party to the Convention before 31 December 1996 and that expresses its consent to be bound by this Protocol prior to its entry into force or within five years after its entry into force may, at the time it expresses its consent, notify the Secretary-General that, for reasons described in the notification, it will not be able to comply with specific provisions of this Protocol other than those provided in paragraph 2, for a transitional period that shall not exceed that described in paragraph 4.
- 2 No notification made under paragraph 1 shall affect the obligations of a Contracting Party to this Protocol with respect to incineration at sea or the dumping of radioactive wastes or other radioactive matter.
- 3 Any Contracting Party to this Protocol that has notified the Secretary-General under paragraph 1 that, for the specified transitional period, it will not be able to comply, in part or in whole, with article 4.1 or article 9 shall nonetheless during that period prohibit the dumping of wastes or other matter for which it has not issued a permit, use its best efforts to adopt administrative or legislative measures to ensure that issuance of permits and permit conditions comply with the provisions of Annex 2, and notify the Secretary-General of any permits issued.
- 4 Any transitional period specified in a notification made under paragraph 1 shall not extend beyond five years after such notification is submitted.
- 5 Contracting Parties that have made a notification under paragraph 1 shall submit to the first Meeting of Contracting Parties occurring after deposit of their instrument of ratification, acceptance, approval or accession a programme and timetable to achieve full compliance with this Protocol, together with any requests for relevant technical co-operation and assistance in accordance with article 13 of this Protocol.
- 6 Contracting Parties that have made a notification under paragraph 1 shall establish procedures and mechanisms for the transitional period to implement and monitor submitted programmes designed to achieve full compliance with this Protocol. A report on progress toward compliance shall be submitted by such Contracting Parties to each Meeting of Contracting Parties held during their transitional period for appropriate action.

ARTICLE 27

WITHDRAWAL

- 1 Any Contracting Party may withdraw from this Protocol at any time after the expiry of two years from the date on which this Protocol enters into force for that Contracting Party.

- 2 Withdrawal shall be effected by the deposit of an instrument of withdrawal with the Secretary-General.
- 3 A withdrawal shall take effect one year after receipt by the Secretary-General of the instrument of withdrawal or such longer period as may be specified in that instrument.

ARTICLE 28
DEPOSITARY

- 1 This Protocol shall be deposited with the Secretary-General.
- 2 In addition to the functions specified in articles 10.5, 16.5, 21.4, 22.5 and 26.5, the Secretary-General shall:
 - .1 inform all States which have signed this Protocol or acceded thereto of:
 - .1 each new signature or deposit of an instrument of ratification, acceptance, approval or accession, together with the date thereof;
 - .2 the date of entry into force of this Protocol; and
 - .3 the deposit of any instrument of withdrawal from this Protocol together with the date on which it was received and the date on which the withdrawal takes effect.
 - .2 transmit certified copies of this Protocol to all States which have signed this Protocol or acceded thereto.
- 3 As soon as this Protocol enters into force, a certified true copy thereof shall be transmitted by the Secretary-General to the Secretariat of the United Nations for registration and publication in accordance with Article 102 of the Charter of the United Nations.

ARTICLE 29
AUTHENTIC TEXTS

This Protocol is established in a single original in the Arabic, Chinese, English, French, Russian and Spanish languages, each text being equally authentic.

IN WITNESS WHEREOF the undersigned being duly authorized by their respective Governments for that purpose have signed this Protocol.

DONE AT LONDON, this seventh day of November, one thousand nine hundred and ninety-six.

ANNEX 1

**WASTES OR OTHER MATTER THAT
MAY BE CONSIDERED FOR DUMPING**

- 1 The following wastes or other matter are those that may be considered for dumping being mindful of the Objectives and General Obligations of this Protocol set out in articles 2 and 3:
 - .1 dredged material;
 - .2 sewage sludge;
 - .3 fish waste, or material resulting from industrial fish processing operations;
 - .4 vessels and platforms or other man-made structures at sea;
 - .5 inert, inorganic geological material;
 - .6 organic material of natural origin; and
 - .7 bulky items primarily comprising iron, steel, concrete and similarly unarmful materials for which the concern is physical impact, and limited to those circumstances where such wastes are generated at locations, such as small islands with isolated communities, having no practicable access to disposal options other than dumping.
- 2 The wastes or other matter listed in paragraphs 1.4 and 1.7 may be considered for dumping, provided that material capable of creating floating debris or otherwise contributing to pollution of the marine environment has been removed to the maximum extent and provided that the material dumped poses no serious obstacle to fishing or navigation.
- 3 Notwithstanding the above, materials listed in paragraphs 1.1 to 1.7 containing levels of radioactivity greater than *de minimis* (exempt) concentrations as defined by the IAEA and adopted by Contracting Parties, shall not be considered eligible for dumping; provided further that within 25 years of 20 February 1994, and at each 25 year interval thereafter, Contracting Parties shall complete a scientific study relating to all radioactive wastes and other radioactive matter other than high level wastes or matter, taking into account such other factors as Contracting Parties consider appropriate and shall review the prohibition on dumping of such substances in accordance with the procedures set forth in article 22.

ANNEX 2

**ASSESSMENT OF WASTES OR OTHER MATTER
THAT MAY BE CONSIDERED FOR DUMPING**

GENERAL

- 1 The acceptance of dumping under certain circumstances shall not remove the obligations under this Annex to make further attempts to reduce the necessity for dumping.

WASTE PREVENTION AUDIT

- 2 The initial stages in assessing alternatives to dumping should, as appropriate, include an evaluation of:
 - .1 types, amounts and relative hazard of wastes generated;
 - .2 details of the production process and the sources of wastes within that process; and
 - .3 feasibility of the following waste reduction/prevention techniques:
 - .1 product reformulation;
 - .2 clean production technologies;
 - .3 process modification;
 - .4 input substitution; and
 - .5 on-site, closed-loop recycling.
- 3 In general terms, if the required audit reveals that opportunities exist for waste prevention at source, an applicant is expected to formulate and implement a waste prevention strategy, in collaboration with relevant local and national agencies, which includes specific waste reduction targets and provision for further waste prevention audits to ensure that these targets are being met. Permit issuance or renewal decisions shall assure compliance with any resulting waste reduction and prevention requirements.
- 4 For dredged material and sewage sludge, the goal of waste management should be to identify and control the sources of contamination. This should be achieved through implementation of waste prevention strategies and requires collaboration between the relevant local and national agencies involved with the control of point and non-point sources of pollution. Until this objective is met, the problems of contaminated dredged material may be addressed by using disposal management techniques at sea or on land.

CONSIDERATION OF WASTE MANAGEMENT OPTIONS

- 5 Applications to dump wastes or other matter shall demonstrate that appropriate consideration has been given to the following hierarchy of waste management options, which implies an order of increasing environmental impact:
 - .1 re-use;
 - .2 off-site recycling;
 - .3 destruction of hazardous constituents;
 - .4 treatment to reduce or remove the hazardous constituents; and
 - .5 disposal on land, into air and in water.
- 6 A permit to dump wastes or other matter shall be refused if the permitting authority determines that appropriate opportunities exist to re-use, recycle or treat the waste without undue risks to human health or the environment or disproportionate costs. The practical availability of other means of disposal should be considered in the light of a comparative risk assessment involving both dumping and the alternatives.

CHEMICAL, PHYSICAL AND BIOLOGICAL PROPERTIES

- 7 A detailed description and characterization of the waste is an essential precondition for the consideration of alternatives and the basis for a decision as to whether a waste may be dumped. If a waste is so poorly characterized that proper assessment cannot be made of its potential impacts on human health and the environment, that waste shall not be dumped.
- 8 Characterization of the wastes and their constituents shall take into account:
- .1 origin, total amount, form and average composition;
 - .2 properties: physical, chemical, biochemical and biological;
 - .3 toxicity;
 - .4 persistence: physical, chemical and biological; and
 - .5 accumulation and biotransformation in biological materials or sediments.

ACTION LIST

- 9 Each Contracting Party shall develop a national Action List to provide a mechanism for screening candidate wastes and their constituents on the basis of their potential effects on human health and the marine environment. In selecting substances for consideration in an Action List, priority shall be given to toxic, persistent and bioaccumulative substances from anthropogenic sources (e.g., cadmium, mercury, organohalogenes, petroleum hydrocarbons, and, whenever relevant, arsenic, lead, copper, zinc, beryllium, chromium, nickel and vanadium, organosilicon compounds, cyanides, fluorides and pesticides or their by-products other than organohalogenes). An Action List can also be used as a trigger mechanism for further waste prevention considerations.
- 10 An Action List shall specify an upper level and may also specify a lower level. The upper level should be set so as to avoid acute or chronic effects on human health or on sensitive marine organisms representative of the marine ecosystem. Application of an Action List will result in three possible categories of waste:
- .1 wastes which contain specified substances, or which cause biological responses, exceeding the relevant upper level shall not be dumped, unless made acceptable for dumping through the use of management techniques or processes;
 - .2 wastes which contain specified substances, or which cause biological responses, below the relevant lower levels should be considered to be of little environmental concern in relation to dumping; and
 - .3 wastes which contain specified substances, or which cause biological responses, below the upper level but above the lower level require more detailed assessment before their suitability for dumping can be determined.

DUMP-SITE SELECTION

- 11 Information required to select a dump-site shall include:
- .1 physical, chemical and biological characteristics of the water-column and the seabed;
 - .2 location of amenities, values and other uses of the sea in the area under consideration;
 - .3 assessment of the constituent fluxes associated with dumping in relation to existing fluxes of substances in the marine environment; and
 - .4 economic and operational feasibility.

ASSESSMENT OF POTENTIAL EFFECTS

- 12 Assessment of potential effects should lead to a concise statement of the expected consequences of the sea or land disposal options, i.e., the "Impact Hypothesis". It provides a basis for deciding whether to approve or reject the proposed disposal option and for defining environmental monitoring requirements.
- 13 The assessment for dumping should integrate information on waste characteristics, conditions at the proposed dump-site(s), fluxes, and proposed disposal techniques and specify the potential effects on human health, living resources, amenities and other legitimate uses of the sea. It should define the nature, temporal and spatial scales and duration of expected impacts based on reasonably conservative assumptions.
- 14 An analysis of each disposal option should be considered in the light of a comparative assessment of the following concerns: human health risks, environmental costs, hazards, (including accidents), economics and exclusion of future uses. If this assessment reveals that adequate information is not available to determine the likely effects of the proposed disposal option then this option should not be considered further. In addition, if the interpretation of the comparative assessment shows the dumping option to be less preferable, a permit for dumping should not be given.
- 15 Each assessment should conclude with a statement supporting a decision to issue or refuse a permit for dumping.

MONITORING

- 16 Monitoring is used to verify that permit conditions are met - compliance monitoring - and that the assumptions made during the permit review and site selection process were correct and sufficient to protect the environment and human health - field monitoring. It is essential that such monitoring programmes have clearly defined objectives.

PERMIT AND PERMIT CONDITIONS

- 17 A decision to issue a permit should only be made if all impact evaluations are completed and the monitoring requirements are determined. The provisions of the permit shall ensure, as far as practicable, that environmental disturbance and detriment are

minimized and the benefits maximized. Any permit issued shall contain data and information specifying:

- .1 the types and sources of materials to be dumped;
 - .2 the location of the dump-site(s);
 - .3 the method of dumping; and
 - .4 monitoring and reporting requirements.
- 18 Permits should be reviewed at regular intervals, taking into account the results of monitoring and the objectives of monitoring programmes. Review of monitoring results will indicate whether field programmes need to be continued, revised or terminated and will contribute to informed decisions regarding the continuance, modification or revocation of permits. This provides an important feedback mechanism for the protection of human health and the marine environment.

ANNEX 3 ARBITRAL PROCEDURE

Article 1

- 1 An Arbitral Tribunal (hereinafter referred to as the "Tribunal") shall be established upon the request of a Contracting Party addressed to another Contracting Party in application of article 16 of this Protocol. The request for arbitration shall consist of a statement of the case together with any supporting documents.
- 2 The requesting Contracting Party shall inform the Secretary-General of:
 - .1 its request for arbitration; and
 - .2 the provisions of this Protocol the interpretation or application of which is, in its opinion, the subject of disagreement.
- 3 The Secretary-General shall transmit this information to all Contracting States.

Article 2

- 1 The Tribunal shall consist of a single arbitrator if so agreed between the parties to the dispute within 30 days from the date of receipt of the request for arbitration.
- 2 In the case of the death, disability or default of the arbitrator, the parties to a dispute may agree upon a replacement within 30 days of such death, disability or default.

Article 3

- 1 Where the parties to a dispute do not agree upon a Tribunal in accordance with article 2 of this Annex, the Tribunal shall consist of three members:
 - .1 one arbitrator nominated by each party to the dispute; and
 - .2 a third arbitrator who shall be nominated by agreement between the two first named and who shall act as its Chairman.
- 2 If the Chairman of a Tribunal is not nominated within 30 days of nomination of the second arbitrator, the parties to a dispute shall, upon the request of one party, submit to

the Secretary-General within a further period of 30 days an agreed list of qualified persons. The Secretary-General shall select the Chairman from such list as soon as possible. He shall not select a Chairman who is or has been a national of one party to the dispute except with the consent of the other party to the dispute.

- 3 If one party to a dispute fails to nominate an arbitrator as provided in paragraph 1.1 within 60 days from the date of receipt of the request for arbitration, the other party may request the submission to the Secretary-General within a period of 30 days of an agreed list of qualified persons. The Secretary-General shall select the Chairman of the Tribunal from such list as soon as possible. The Chairman shall then request the party which has not nominated an arbitrator to do so. If this party does not nominate an arbitrator within 15 days of such request, the Secretary-General shall, upon request of the Chairman, nominate the arbitrator from the agreed list of qualified persons.
- 4 In the case of the death, disability or default of an arbitrator, the party to the dispute who nominated him shall nominate a replacement within 30 days of such death, disability or default. If the party does not nominate a replacement, the arbitration shall proceed with the remaining arbitrators. In the case of the death, disability or default of the Chairman, a replacement shall be nominated in accordance with the provision of paragraphs 1.2 and 2 within 90 days of such death, disability or default.
- 5 A list of arbitrators shall be maintained by the Secretary-General and composed of qualified persons nominated by the Contracting Parties. Each Contracting Party may designate for inclusion in the list four persons who shall not necessarily be its nationals. If the parties to the dispute have failed within the specified time limits to submit to the Secretary-General an agreed list of qualified persons as provided for in paragraphs 2, 3 and 4, the Secretary-General shall select from the list maintained by him the arbitrator or arbitrators not yet nominated.

Article 4

The Tribunal may hear and determine counter-claims arising directly out of the subject matter of the dispute.

Article 5

Each party to the dispute shall be responsible for the costs entailed by the preparation of its own case. The remuneration of the members of the Tribunal and of all general expenses incurred by the arbitration shall be borne equally by the parties to the dispute. The Tribunal shall keep a record of all its expenses and shall furnish a final statement thereof to the parties.

Article 6

Any Contracting Party which has an interest of a legal nature which may be affected by the decision in the case may, after giving written notice to the parties to the dispute which have originally initiated the procedure, intervene in the arbitration procedure with the consent of the Tribunal and at its own expense. Any such intervenor shall have the right to present evidence, briefs and oral argument on the matters giving rise to its intervention, in accordance with procedures established pursuant to article 7 of this Annex, but shall have no rights with respect to the composition of the Tribunal.

Article 7

A Tribunal established under the provisions of this Annex shall decide its own rules of procedure.

Article 8

- 1 Unless a Tribunal consists of a single arbitrator, decisions of the Tribunal as to its procedure, its place of meeting, and any question related to the dispute laid before it, shall be taken by majority vote of its members. However, the absence or abstention of any member of the Tribunal who was nominated by a party to the dispute shall not constitute an impediment to the Tribunal reaching a decision. In case of equal voting, the vote of the Chairman shall be decisive.
- 2 The parties to the dispute shall facilitate the work of the Tribunal and in particular shall, in accordance with their legislation and using all means at their disposal:
 - .1 provide the Tribunal with all necessary documents and information; and
 - .2 enable the Tribunal to enter their territory, to hear witnesses or experts, and to visit the scene.
- 3 The failure of a party to the dispute to comply with the provisions of paragraph 2 shall not preclude the Tribunal from reaching a decision and rendering an award.

Article 9

The Tribunal shall render its award within five months from the time it is established unless it finds it necessary to extend that time limit for a period not to exceed five months. The award of the Tribunal shall be accompanied by a statement of reasons for the decision. It shall be final and without appeal and shall be communicated to the Secretary-General who shall inform the Contracting Parties. The parties to the dispute shall immediately comply with the award.

15 WASTE ASSESSMENT GUIDANCE (FULL TEXT)

GUIDELINES FOR THE ASSESSMENT OF WASTES OR OTHER MATTER THAT MAY BE CONSIDERED FOR DUMPING^{xi}

INTRODUCTION

1 The Guidelines for the Assessment of Wastes or Other Matter that May be Considered for Dumping are intended for use by national authorities responsible for regulating dumping of wastes and embody a mechanism to guide national authorities in evaluating applications for dumping of wastes in a manner consistent with the provisions of the London Convention 1972 or the 1996 Protocol thereto. Annex 2 to the 1996 Protocol places emphasis on progressively reducing the need to use the sea for dumping of wastes. Furthermore, it recognizes that avoidance of pollution demands rigorous controls on the emission and dispersion of contaminating substances and the use of scientifically-based procedures for selecting appropriate options for waste disposal. When applying these Guidelines, uncertainties in relation to assessments of impacts on the marine environment will need to be considered and a precautionary approach applied in addressing these uncertainties. They should be applied with a view that acceptance of dumping under certain circumstances does not remove the obligation to make further attempts to reduce the necessity for dumping.

2 The 1996 Protocol to the London Convention 1972 follows an approach under which dumping of wastes or other matter is prohibited except for those materials specifically enumerated in Annex I, and in the context of that Protocol, these Guidelines would apply to the materials listed in that Annex. The London Convention 1972 prohibits the dumping of certain wastes or other matter specified therein and in the context of that Convention these Guidelines meet the requirements of its Annexes for wastes not prohibited for dumping at sea. When applying these Guidelines under the London Convention 1972, they should not be viewed as a tool for the reconsideration of dumping of wastes or other matter in contravention of Annex I to the London Convention 1972.

3 The schematic shown in Figure 1 provides a clear indication of the stages in the application of the Guidelines where important decisions should be made and is not designed as a conventional "decision tree". In general, national authorities should use the schematic in an iterative manner ensuring that all steps receive consideration before a decision is made to issue a permit. Figure 1 illustrates the relationship between the operational components of Annex 2 of the 1996 Protocol and contains the following elements:

- .1 Waste Characterisation (paragraphs 10-11)
(Chemical, Physical and Biological Properties)
- .2 Waste Prevention Audit and Waste Management Options (paragraphs 5-9)
- .3 Action List (paragraphs 12-15)
- .4 Identify and Characterise Dump-site (paragraphs 16-28)

^{xi} This is the full text of the official document approved by the International Maritime Organisation in 1996. It follows the spelling conventions of that document (-zation, etc.). Heading numbering has been added to conform to this Training Set.

(Dump-site Selection)

.5 Determine Potential Impacts and Prepare Impact Hypothesis(es)
(paragraphs 29-39)

(Assessment of Potential Effects)

.6 Issue Permit (paragraphs 46-49)

(Permit and Permit Conditions)

.7 Implement Project and Monitor Compliance (paragraphs 40-45)

(Monitoring)

.8 Field Monitoring and Assessment (paragraphs 40-45)

(Monitoring)

4 These generic Guidelines are complemented by specific dredged material guidance (Dredged Material Assessment Framework, Resolution LC.52 (18)) and by further specific guidance developed for each waste category listed in Annex 1 to the 1996 Protocol to the London Convention 1972. [Note: these have since been completed; see section 16].

15.1.1 WASTE PREVENTION AUDIT

5 The initial stages in assessing alternatives to dumping should, as appropriate, include an evaluation of:

.1 types, amounts and relative hazards of wastes generated;

.2 details of the production process and the sources of wastes within that process; and

.3 feasibility of the following waste reduction/prevention techniques:

.3.1 product reformulation;

.3.2 clean production technologies;

.3.3 process modification;

.3.4 input substitution; and

.3.5 on-site, closed-loop recycling.

6 In general terms, if the required audit reveals that opportunities exist for waste prevention at source, an applicant is expected to formulate and implement a waste prevention strategy in collaboration with relevant local and national agencies which includes specific waste reduction targets and provision for further waste prevention audits to ensure that these targets are being met. Permit issuance or renewal decisions shall assure compliance with any resulting waste reduction and prevention requirements.

7 For dredged material and sewage sludge, the goal of waste management should be to identify and control the sources of contamination. This should be achieved through implementation of waste prevention strategies and requires collaboration between the

local and national agencies involved with the control of point and non-point sources of pollution. Until this objective is met, the problems of contaminated dredged material may be addressed by using disposal management techniques at sea or on land.

15.1.2 CONSIDERATION OF WASTE MANAGEMENT OPTIONS

8 Applications to dump wastes or other matter shall demonstrate that appropriate consideration has been given to the following hierarchy of waste management options, which implies an order of increasing environmental impact:

- .1 re-use;
- .2 off-site recycling;
- .3 destruction of hazardous constituents;
- .4 treatment to reduce or remove the hazardous constituents; and
- .5 disposal on land, into air and into water.

9 A permit to dump wastes or other matter shall be refused if the permitting authority determines that appropriate opportunities exist to re-use, recycle or treat the waste without undue risks to human health or the environment or disproportionate costs. The practical availability of other means of disposal should be considered in the light of a comparative risk assessment involving both dumping and the alternatives.

15.1.3 CHEMICAL, PHYSICAL AND BIOLOGICAL PROPERTIES

10 A detailed description and characterization of the waste is an essential precondition for the consideration of alternatives and the basis for a decision as to whether a waste may be dumped. If a waste is so poorly characterised that proper assessment cannot be made of its potential impacts on human health and the environment, that waste shall not be dumped.

11 Characterization of the wastes and their constituents shall take into account:

- .1 origin, total amount, form and average composition;
- .2 properties: physical, chemical, biochemical and biological;
- .3 toxicity;
- .4 persistence: physical, chemical and biological; and
- .5 accumulation and biotransformation in biological materials or sediments.

15.1.4 ACTION LIST

12 The Action List provides a screening mechanism for determining whether a material is considered acceptable for dumping. It constitutes a crucial part of Annex 2 to the 1996 Protocol and the Scientific Group will continuously review all aspects of it to assist Contracting Parties with its application. It may also be used in meeting the requirements of Annexes I and II to the London Convention 1972

13 Each Contracting Party shall develop a national Action List to provide a mechanism for screening candidate wastes and their constituents on the basis of their potential effects on human health and the marine environment. In selecting substances for consideration in an Action List, priority shall be given to toxic, persistent and bio-accumulative substances from anthropogenic sources (e.g., cadmium, mercury, organohalogens, petroleum hydrocarbons and, whenever relevant, arsenic, lead, copper, zinc, beryllium, chromium, nickel and vanadium, organosilicon compounds, cyanides, fluorides and pesticides or their by-products other than organohalogens). An Action List can also be used as a trigger mechanism for further waste prevention considerations.

14 For an individual waste category, it may be possible to define national action levels on the basis of concentration limits, biological responses, environmental quality standards, flux considerations or other reference values.

15 An Action List shall specify an upper level and may also specify a lower level. The upper level should be set so as to avoid acute or chronic effects on human health or on sensitive marine organisms representative of the marine ecosystem. Application of an Action List will result in three possible categories of waste:

.1 wastes which contain specified substances, or which cause biological responses *exceeding* the relevant upper level shall not be dumped, unless made acceptable for dumping through the use of management techniques or processes;

.2 wastes which contain specified substances, or which cause biological responses *below* the relevant lower levels should be considered to be of little environmental concern in relation to dumping; and

.3 wastes which contain specified substances, or which cause biological responses *below* the upper level but *above* the lower level require more detailed assessment before their suitability for dumping can be determined.

15.1.5 DUMP-SITE SELECTION

Site selection considerations

16 Proper selection of a dump-site at sea for the reception of waste is of paramount importance.

17 Information required to select a dump-site shall include:

.1 physical, chemical and biological characteristics of the water-column and the sea-bed;

.2 location of amenities, values and other uses of the sea in the area under consideration;

.3 assessment of the constituent fluxes associated with dumping in relation to existing fluxes of substances in the marine environment; and

.4 economic and operational feasibility.

18 Guidance for procedures to be followed in dump-site selection can be found in a report of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP Reports and Studies No. 16 - Scientific Criteria for the Selection of Waste Disposal Sites at Sea). Prior to selecting a dump-site, it is essential that data be available on the oceanographic characteristics of the general area in which the site is to be

located. This information can be obtained from the literature but field work should be undertaken to fill the gaps. Required information includes:

.1 the nature of the seabed, including its topography, geochemical and geological characteristics, its biological composition and activity, and prior dumping activities affecting the area;

.2 the physical nature of the water column, including temperature, depth, possible existence of a thermocline/pycnocline and how it varies in depth with season and weather conditions, tidal period and orientation of the tidal ellipse, mean direction and velocity of the surface and bottom drifts, velocities of storm-wave induced bottom currents, general wind and wave characteristics, and the average number of storm days per year, suspended matter; and

.3 the chemical and biological nature of the water column, including pH, salinity, dissolved oxygen at surface and bottom, chemical and biochemical oxygen demand, nutrients and their various forms and primary productivity.

19 Some of the important amenities, biological features and uses of the sea to be considered in determining the specific location of the dump-site are:

.1 the shoreline and bathing beaches;

.2 areas of beauty or significant cultural or historical importance;

.3 areas of special scientific or biological importance, such as sanctuaries;

.4 fishing areas;

.5 spawning, nursery and recruitment areas;

.6 migration routes;

.7 seasonal and critical habitats;

.8 shipping lanes;

.9 military exclusion zones; and

.10 engineering uses of the seafloor, including mining, undersea cables, desalination or energy conversion sites.

Size of the dump-site

20 Size of the dump-site is an important consideration for the following reasons:

.1 it should be large enough, unless it is an approved dispersion site, to have the bulk of the material remain either within the site limits or within a predicted area of impact after dumping;

.2 it should be large enough to accommodate anticipated volumes of solid waste and/or liquid wastes to be diluted to near background levels before or upon reaching site boundaries;

.3 it should be large enough in relation to anticipated volumes for dumping so that it would serve its function for many years; and

.4 it should not be so large that monitoring would require undue expenditure of time and money.

Site capacity

21 In order to assess the capacity of a site, especially for solid wastes, the following should be taken into consideration:

- .1 the anticipated loading rates per day, week, month or year;
- .2 whether or not it is a dispersive site; and
- .3 the allowable reduction in water depth over the site because of mounding of material.

Evaluation of potential impacts

22 An important consideration in determining the suitability of a waste for dumping at a specific site is the degree to which this results in increased exposures of organisms to substances that may cause adverse effects.

23 The extent of adverse effects of a substance is a function of the exposures of organisms (including humans). Exposure, in turn, is a function, *inter alia*, of input flux and the physical, chemical and biological processes that control the transport, behaviour, fate and distribution of a substance.

24 The presence of natural substances and the ubiquitous occurrence of contaminants means that there will always be some pre-existing exposures of organisms to all substances contained in any waste that might be dumped. Concerns about exposures to hazardous substances thus relate to additional exposures as a consequence of dumping. This, in turn, can be translated back to the relative magnitude of the input fluxes of substances from dumping compared with existing input fluxes from other sources.

25 Accordingly, due consideration needs to be given to the relative magnitude of the substance fluxes associated with dumping in the local and regional area surrounding the dump-site. In cases where it is predicted that dumping will substantially augment existing fluxes associated with natural processes, dumping at the site under consideration should be deemed inadvisable.

26 In the case of synthetic substances, the relationship between fluxes associated with dumping and pre-existing fluxes in the vicinity of the site may not provide a suitable basis for decisions.

27 Temporal characteristics should be considered to identify potentially critical times of the year (e.g., for marine life) when dumping should not take place. This consideration leaves periods when it is expected that dumping operations will have less impact than at other times. If these restrictions become too burdensome and costly, there should be some opportunity for compromise in which priorities may have to be established concerning species to be left wholly undisturbed. Examples of such biological considerations are:

- .1 periods when marine organisms are migrating from one part of the ecosystem to another (e.g., from an estuary to open sea or vice versa) and growing and breeding periods;
- .2 periods when marine organisms are hibernating on or are buried in the sediments; and
- .3 periods when particularly sensitive and possibly endangered species are exposed.

Contaminant mobility

- 28 Contaminant mobility is dependent upon several factors, among which are:
- .1 type of matrix;
 - .2 form of contaminant;
 - .3 contaminant partitioning;
 - .4 physical state of the system, e.g., temperature, waterflow, suspended matter;
 - .5 physio-chemical state of the system;
 - .6 length of diffusion and advection pathways; and
 - .7 biological activities e.g., bioturbation.

15.1.6 ASSESSMENT OF POTENTIAL EFFECTS

29 Assessment of potential effects should lead to a concise statement of the expected consequences of the sea or land disposal options, i.e., the "Impact Hypothesis". It provides a basis for deciding whether to approve or reject the proposed disposal option and for defining environmental monitoring requirements. As far as possible, waste management options causing dispersion and dilution of contaminants in the environment should be avoided and preference given to techniques that prevent the input of the contaminants to the environment.

30 The assessment for dumping should integrate information on waste characteristics, conditions at the proposed dump-site(s), fluxes and proposed disposal techniques and specify the potential effects on human health, living resources, amenities and other legitimate uses of the sea. It should define the nature, temporal and spatial scales and duration of expected impacts based on reasonably conservative assumptions.

31 The assessment should be as comprehensive as possible. The primary potential impacts should be identified during the dump-site selection process. These are considered to pose the most serious threats to human health and the environment. Alterations to the physical environment, risks to human health, devaluation of marine resources and interference with other legitimate uses of the sea are often seen as primary concerns in this regard.

32 In constructing an impact hypothesis, particular attention should be given to, but not limited to, potential impacts on amenities (e.g., presence of floatables), sensitive areas (e.g., spawning, nursery or feeding areas), habitat (e.g., biological, chemical and physical modification), migratory patterns and marketability of resources. Consideration should also be given to potential impacts on other uses of the sea including: fishing, navigation, engineering uses, areas of special concern and value, and traditional uses of the sea.

33 Even the least complex and most innocuous wastes may have a variety of physical, chemical and biological effects. Impact hypotheses cannot attempt to reflect them all. It must be recognized that even the most comprehensive impact hypotheses may not address all possible scenarios such as unanticipated impacts. It is therefore imperative that the monitoring programme be linked directly to the hypotheses and serve as a feedback mechanism to verify the predictions and review the adequacy of

management measures applied to the dumping operation and at the dump-site. It is important to identify the sources and consequences of uncertainty.

34 The expected consequences of dumping should be described in terms of affected habitats, processes, species, communities and uses. The precise nature of the predicted effect (e.g., change, response, or interference) should be described. The effect should be quantified in sufficient detail so that there would be no doubt as to the variables to be measured during field monitoring. In the latter context, it would be essential to determine "where" and "when" the impacts can be expected.

35 Emphasis should be placed on biological effects and habitat modification as well as physical and chemical change. However, if the potential effect is due to substances, the following factors should be addressed:

.1 estimates of statistically significant increases of the substance in seawater, sediments, or biota in relation to existing conditions and associated effects; and

.2 estimate of the contribution made by the substance to local and regional fluxes and the degree to which existing fluxes pose threats or adverse effects on the marine environment or human health.

36 In the case of repeated or multiple dumping operations, impact hypotheses should take into account the cumulative effects of such operations. It will also be important to consider the possible interactions with other waste dumping practices in the area, both existing or planned.

37 An analysis of each disposal option should be considered in light of a comparative assessment of the following concerns: human health risks, environmental costs, hazards (including accidents), economics and exclusion of future uses. If this assessment reveals that adequate information is not available to determine the likely effects of the proposed disposal option, including potential long-term harmful consequences, then this option should not be considered further. In addition, if the interpretation of the comparative assessment shows the dumping option to be less preferable, a permit for dumping should not be given.

38 Each assessment should conclude with a statement supporting a decision to issue or refuse a permit for dumping.

39 Where monitoring is required, the effects and parameters described in the hypotheses should help to guide field and analytical work so that relevant information can be obtained in the most efficient and cost-effective manner.

15.1.7 MONITORING

40 Monitoring is used to verify that permit conditions are met - compliance monitoring - and that the assumptions made during the permit review and site selection process were correct and sufficient to protect the environment and human health - field monitoring. It is essential that such monitoring programmes have clearly defined objectives.

41 The Impact Hypothesis forms the basis for defining field monitoring. The measurement programme should be designed to ascertain that changes in the receiving environment are within those predicted. The following questions must be answered:

- .1 What testable hypotheses can be derived from the Impact Hypothesis?
- .2 What measurements (type, location, frequency, performance requirements) are required to test these hypotheses?
- .3 How should the data be managed and interpreted?

42 It may usually be assumed that suitable specifications of existing (pre-disposal) conditions in the receiving area are already contained in the application for dumping. If the specification of such conditions is inadequate to permit the formulation of an Impact Hypothesis, additional information will be required by the licensing authority before any final decision on the permit application is made.

43 The permitting authority is encouraged to take account of relevant research information in the design and modification of monitoring programmes. The measurements can be divided into two types - those within the zone of predicted impact and those outside.

44 Measurements should be designed to determine whether the zone of impact and the extent of change outside the zone of impact differ from those predicted. The former can be answered by designing a sequence of measurements in space and time that ensures that the projected spatial scale of change is not exceeded. The latter can be answered by the acquisition of measurements that provide information on the extent of change that occurs outside the zone of impact as a result of the dumping operation. Frequently, these measurements will be based on a null hypothesis - that no significant change can be detected.

45 The results of monitoring (or other related research) should be reviewed at regular intervals in relation to the objectives and can provide a basis to :

- .1 modify or terminate the field monitoring programme;
- .2 modify or revoke the permit;
- .3 redefine or close the dump-site; and
- .4 modify the basis on which applications to dump wastes are assessed.

15.1.8 PERMIT AND PERMIT CONDITIONS

46 A decision to issue a permit should only be made if all impact evaluations are completed and the monitoring requirements are determined. The provisions of the permit shall ensure, as far as practicable, that environmental disturbance and detriment are minimized and the benefits maximized. Any permit issued shall contain data and information specifying:

- .1 the types, amounts and sources of materials to be dumped;
- .2 the location of the dump-site(s);
- .3 the method of dumping; and
- .4 monitoring and reporting requirements.

47 If dumping is the selected option, then a permit authorizing dumping must be issued in advance. It is recommended that opportunities are provided for public review and participation in the permitting process. In granting a permit, the hypothesized impact occurring within the boundaries of the dump-site, such as alterations to the

physical, chemical and biological compartments of the local environment is accepted by the permitting authority.

48 Regulators should strive at all times to enforce procedures that will result in environmental changes as far below the limits of allowable environmental change as practicable, taking into account technological capabilities as well as economic, social and political concerns.

49 Permits should be reviewed at regular intervals, taking into account the results of monitoring and the objectives of monitoring programmes. Review of monitoring results will indicate whether field programmes need to be continued, revised or terminated, and will contribute to informed decisions regarding the continuance, modification or revocation of permits. This provides an important feedback mechanism for the protection of human health and the marine environment.

16 WASTE SPECIFIC GUIDELINES

The following guidelines are included with the training set as separate documents to facilitate replacement as they are updated from time to time.

16.1 Specific guidelines for the assessment of dredged material

16.2 Specific guidelines for the assessment of sewage sludge

16.3 Specific guidelines for the assessment of fish waste, or material resulting from industrial fish processing operations

16.4 Specific guidelines for the assessment of vessels

16.5 Specific guidelines for the assessment of platforms or other man-made structures at sea

16.6 Specific guidelines for the assessment of inert, inorganic geological material

16.7 Specific guidelines for the assessment of organic material of natural origin

16.8 Specific guidelines for the assessment of bulky items primarily comprising iron, steel, concrete and similarly unharmed materials for which the concern is physical impact, and limited to those circumstances where such wastes are generated at locations, such as small islands with isolated communities, having no practicable access to disposal options other than dumping.

17 LIST OF EXPERTS

As this list is subject to change, an updated list will be provided prior to course delivery.

18 SUPPLEMENTARY INFORMATION ON SPECIFIC TOPICS

18.1 *United States of America Ocean Disposal Information*

The United States has developed a series of guidance documents and manuals dealing with ocean pollution prevention specifically related to meeting the broader objectives of the London Convention. All these documents were accessible through the Internet at <http://www.wes.army.mil/el/dots>. This Web site includes:

- ❑ searchable data and information bases regarding dredged material and contaminated sediment management;
- ❑ ocean disposal management, monitoring testing and assessment manuals;
- ❑ an interactive contaminant tissue/residue effects database for interpreting bioaccumulation effects;
- ❑ manuals describing the risk based decision/management process for contaminated sediments;
- ❑ an interactive ocean disposal site information database; and
- ❑ a comprehensive information database concerning beneficial uses of dredged material.

18.2 *Guidance for Characterisation of Dredged Materials*

The document, *WASTE ASSESSMENT GUIDANCE: DEVELOPMENT OF SAMPLING GUIDELINES FOR DREDGED MATERIAL CHARACTERIZATION*^{xii} is available from the London Convention Office, and on line at <http://www.LondonConvention.org>. It presents draft guidelines for the development and implementation of sampling plans to enable the evaluation of sediment, mainly dredged material. It reviews general sampling methods, statistical design and quality assurance/quality control principles, as well as sampling equipment and methods that can be applied globally.

18.3 *Guidance for Selection of Waste Disposal Sites*

A guidance document, *SCIENTIFIC CRITERIA FOR THE SELECTION OF WASTE DISPOSAL SITES AT SEA*, is available from the London Convention Office.^{xiii}

^{xii} WASTE ASSESSMENT GUIDANCE: DEVELOPMENT OF SAMPLING GUIDELINES FOR DREDGED MATERIAL CHARACTERIZATION: Sampling Guidelines for Dredged Material Characterization. Report of the Correspondence Group to the 24th Meeting, of the Scientific Group, 21 - 25 May 2001.

^{xiii} Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP). Scientific Criteria for the Selection of Waste Disposal Sites at Sea. Reports and Studies No. 16.

18.4 Parties to the London Convention 1972 and the 1996 Protocol

18.4.1 Parties to the London Convention as of August, 2001

Afghanistan	Greece	Pakistan
Antigua & Barbuda	Guatemala	Panama
Argentina	Haiti	Papua New Guinea
Australia	Honduras	Philippines
Azerbaijan	Hungary	Poland
Barbados	Iceland	Portugal
Belarus	Iran (Islamic Republic of)	Republic of Korea
Belgium	Ireland	Russian Federation
Bolivia	Italy	Saint Lucia
Brazil	Jamaica	Seychelles
Canada	Japan	Slovenia
Cape Verde	Jordan	Solomon Islands
Chile	Kenya	South Africa
China	Kiribati	Spain
Costa Rica	Libyan Arab Jamahiriya	Suriname
Cote d'Ivoire	Luxembourg	Sweden
Croatia	Malta	Switzerland
Cuba	Mexico	Tonga
Cyprus	Monaco	Tunisia
Dem. Rep. of the Congo	Morocco	Ukraine
Denmark	Nauru	United Arab Emirates
Dominican Republic	Netherlands	United Kingdom
Egypt	New Zealand	United States
Finland	Nigeria	Vanuatu
France	Norway	Yugoslavia
Gabon	Oman	Hong Kong, China (Associate Member)
Germany		

18.4.2 Contracting Parties to the 1996 Protocol as of August 2001

Australia	South Africa
Canada	Spain
Denmark	Sweden
Georgia	Switzerland
Germany	Trinidad and Tobago
Ireland	United Kingdom
New Zealand	Vanuatu
Norway	

19 GLOSSARY OF TERMS AND ACRONYMS

accede to; accession	Accession is the act whereby a state accepts the offer or the opportunity to become a party to a treaty already negotiated and signed by other states. It has the same legal effect as ratification. Accession usually occurs after the treaty has entered into force. (from http://untreaty.un.org)
advection	movements of a fluids (such as gas or liquid) in a mixture whereby lighter (usually warmer) components rise and heavier components sink.
bioaccumulation	accumulation of contaminants in tissues of biota
biomagnification	increasing bioaccumulation in successive trophic levels
biota	living organisms
bioturbation	disturbance and mixing of seabed sediment by biota
coming into force	International conventions usually have a period of time after they are first negotiated and signed by member countries, during which countries can make the internal arrangements (including ratification and passage of domestic laws) necessary to become a full member. The London Convention 1972 came into force when 15 states became Parties to the Convention in 1975. The 1996 Protocol has not yet (August, 2001) come into force.
Contracting Parties	States that are party to the London Convention 1972 and the 1996 Protocol
detection limit	The level below which a substance can not be detected by a chemist (usually measured as a concentration of the contaminant in parts per million or parts per billion). The detection limit varies with many factors including the analytical equipment, the skill and care exercised by the technician, and the presence or chemical characteristics of other substances in the material being tested. See "trace."
dredgeate, dredgings	Sediment and other material dredged from the sea bottom, usually for the purposes of deepening a waterway for shipping; also referred to as dredge "spoils."
EEZ	Exclusive Economic Zone.
FAO	Food and Agricultural Organization.
Fauna	Animals.
internal waters	Internal waters of coastal states are all waters landward from the "baseline" that defines the territorial sea. The baseline is generally from the low tide line (UNCLOS provides precise definition of these terms).

territorial sea	The ocean between the baseline, a line 12 nautical miles seaward (UNCLOS provides precise definition of these terms).
PCB	Polychlorinated biphenyl.
POP	Persistent Organic Pollutants, including certain organohalogen pesticides, other synthetic organic compounds such as PCB, and some naturally occurring but very toxic and very persistent compounds such as polychlorinated dibenzo- <i>p</i> -dioxins and polychlorinated dibenzo- <i>p</i> -furans.
pycnocline	The transition between a salty water layer and a less salty water layer in an ocean or lake.
ratification	Ratification defines the international act whereby a state indicates its consent to be bound to a treaty if the parties intended to show their consent by such an act. In the case of bilateral treaties, ratification is usually accomplished by exchanging the requisite instruments, while in the case of multilateral treaties the usual procedure is for the depositary to collect the ratifications of all states, keeping all parties informed of the situation. The institution of ratification grants states the necessary time-frame to seek the required approval for the treaty on the domestic level and to enact the necessary legislation to give domestic effect to that treaty. (from http://untreaty.un.org)
spoils	See “dredgeate”.
stickwater	liquid waste from fish and shellfish processing plants, characteristically with high concentrations of biochemical oxygen demand and undecomposed organic material of animal origin.
thermocline	The transition between a warmer water layer and a colder water layer in an ocean or lake.
trace	At concentrations near the detection limit, chemists can often discern the presence of a contaminant without being able to measure its concentration. These are reported as trace concentrations. See “detection limit.”
trophic	of or pertaining levels levels of a food chain with primary producers (mostly plants that produce starch through photosynthesis) at the bottom and top predators at the top
UNCED	United Nations Conference on Environment and Development, Rio de Janeiro, 1992.
UNCLOS	United Nations Convention on Law of the Sea
UNEP	United Nations Environment Programme.
Vibrocore	A type of sampling device that collects an intact vertical cylinder of benthic sediment so that researchers can

analyse individual layers of substrate (the device vibrates to facilitate insertion into the substrate).