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GUIDELINES FOR THE MANAGEMENT OF FISH WASTE OR ORGANIC MATERIALS RESULTING FROM THE PROCESSING OF FISH AND OTHER MARINE ORGANISMS

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Preface

These guidelines are proposed to assist the Contracting Parties to the Barcelona Convention in the implementation of the Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea, hereinafter referred to as the “Dumping Protocol”, with regard to the management of fish waste or organic materials resulting from the processing of fish and other marine organisms. The Protocol was signed by 16 Contracting Parties in 1995.

The Guidelines are intended for use by national authorities responsible for regulating the dumping of wastes and as a guide to national authorities for the evaluation of applications for the dumping of wastes in a manner consistent with the provisions of the Dumping Protocol. Emphasis is given to progressively reducing the need to use the sea for the dumping of wastes. Furthermore, it is recognized that the avoidance of pollution demands rigorous controls on the emission and dispersion of contaminating substances and the use of scientifically based procedures for the selection of appropriate options for waste disposal. When applying these Guidelines, uncertainties in relation to the assessment of impacts on the marine environment will need to be taken into consideration and a precautionary approach applied in addressing these uncertainties. The Guidelines should be applied from the perspective that acceptance of dumping under certain circumstances does not remove the obligation to make further attempts to reduce the necessity for dumping.

It is, however, implicitly recognized that the general considerations and detailed procedures described in these Guidelines are not applicable in their entirety to all national or local situations.

Introduction

During the processing of fish and other marine organisms a large volume of wastes are generated, including fish heads, tails, guts and internal organs. Fish waste can amount to up to 60 per cent of the weight of a fish before processing, depending on the species processed. Until recently, it was common practice to dispose of such waste at sea, with the risk of overloading the ecosystem, creating deleterious effects and harming the quality of human life. These risks are particularly high when waste is dumped in shallow and semi-enclosed water basins.

The organic components of fish waste have a high biological oxygen demand, are susceptible to putrefaction and, if not managed properly, can pose environmental and health problems. It is imperative to consider the time-frame between the 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 putrefaction if not stored properly or disposed of quickly.

The negative impacts of the dumping of waste can be avoided if: (a) a proper dumping site is selected; (b) other methods of disposal are used; or (c) the waste is processed to obtain usable products. If the further processing of waste into fishmeal is considered a viable alternative, it is essential for the waste to be fresh.

I. REQUIREMENTS OF THE DUMPING PROTOCOL

1.1 Under Article 4.1 of the Dumping Protocol, the dumping of wastes or other matter into the sea is prohibited.

1.2 Nevertheless, pursuant to Article 4.2(b) of the Dumping Protocol, an exception is made under certain conditions, inter alia, for the dumping of "fish waste or organic materials resulting from the processing of fish and other marine organisms".

1.3 Under the terms of Article 5, the dumping of the wastes or other matter listed in Article 4.2 requires a prior special permit from the competent national authorities.

1.4 Furthermore, in accordance with Article 6 of the Dumping Protocol, the permit referred to in Article 5 shall be issued only after careful consideration of the factors set forth in the Annex to the Dumping Protocol. Article 6.2 provides that the Contracting Parties shall draw up and adopt criteria, guidelines and procedures for the dumping of wastes or other matter listed in Article 4.2 so as to prevent, abate and eliminate pollution.

1.5 These Guidelines for the management of fish waste or organic materials resulting from the processing of fish and other marine organisms have been prepared for the purpose of providing guidance to the Contracting Parties on:

(a) the fulfillment of their obligations relating to the issue of permits for the dumping of fish waste or organic materials resulting from the processing of fish and other marine organisms;

(b) the transmission to the Organization[1] of reliable data on the input of disposed waste materials in the waters covered by the Dumping Protocol.

1.6 In view of the foregoing, these Guidelines are designed to allow the Contracting Parties to manage fish waste or organic materials resulting from the processing of fish and other marine organisms. These Guidelines relate specifically to the dumping of solid waste from ships and aircraft. They do not concern the dumping of waste materials other than organic (e.g. mollusc shells) or the disposal of waste materials by methods other than dumping from ships (e.g. discharge from the shore by means of pipes).

1.7 The Guidelines are presented in two parts. Part A deals with the assessment and management of fish waste or organic materials resulting from the processing of fish and other marine organisms, while Part B provides guidance on the design and conduct of the monitoring of waste dumping operations. In addition, the technical Annex reviews considerations to be taken into account before deciding to grant a dumping permit.

[1] The United Nations Environment Programme, represented by the Coordinating Unit of the Mediterranean Action Plan (see Article 17 of the Barcelona Convention).

II. CONDITIONS UNDER WHICH PERMITS FOR THE DUMPING AT SEA OF FISH WASTE OR ORGANIC MATERIALS RESULTING FROM THE PROCESSING OF FISH AND OTHER MARINE ORGANISMS MAY BE ISSUED

PART A

ASSESSMENT AND MANAGEMENT OF FISH WASTE

1. CHARACTERIZATION OF FISH WASTE OR ORGANIC MATERIALS RESULTING FROM THE PROCESSING OF FISH AND OTHER MARINE ORGANISMS

1.1 For the purposes of these Guidelines, the following definitions apply:

- "fish waste or organic materials resulting from the processing of fish and other marine organisms" means solid waste generated by the industrial processing of either wild or cultivated fish and other marine organisms and consisting of unprocessed fish and parts of fish, such as heads, tails, fins, scales, bones, skins, flesh, roe, internal organs, as well as the organic parts and chitinous shells of other marine organisms, such as shellfish, holothurians, etc., hereinafter referred to as fish waste. Any other solid waste, such as packaging materials, gloves, earplugs, rubber bands and other equipment used in industrial processing that may be dumped together with the fish waste is not included in this definition and should not be dumped into the sea. Liquid wastes, as well as the inorganic shells of molluscs, are not included under this definition and should not be dumped into the sea under these Guidelines. Liquid waste originating from a variety of sources, including the unloading, dressing and freezing of fish, the spraying of equipment, the transport of offal and the cleaning of facilities, after appropriate treatment, may be discharged into the sea in the accordance with national water quality regulations and the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources and Activities (LBS Protocol). Wastewater treatment normally consists of fine-mesh screening (1 mm) and de-oiling and degreasing;

- "dumping" means any deliberate disposal from vessels into the sea of fish waste or organic materials resulting from the processing of fish and other marine organisms;

- "dumping" does not include the disposal into the sea of by-catch organisms from fishing vessels during fishing operations. However, it includes by-catch organisms if they originate from a fish processing plant;

- "national authorities" means the authorities of the Contracting Parties responsible for regulating the dumping of waste into the sea; and

- "applicant" means a person or company applying for permission to dump fish waste into the sea.

2. EVALUATION OF THE NEED FOR THE DISPOSAL OF THE WASTE

2.1 The disposal of all solid wastes from fish processing shall primarily be into a by-product recovery facility. In the event of the absence of such a facility, or when the amount of fish waste exceeds the capacity of the by-product recovery facility, or in other circumstances when the by-product recovery facility is unable to take the solid waste, the waste may be disposed on land or dumped into the sea.

In many cases, dumping harms the natural environment, results in a deterioration in the quality of life and has an impact on some economic activities; before taking any decision to grant a dumping permit, consideration should therefore be given to other methods of disposal and/or use. Particular attention shall be paid to the possibility of avoiding dumping in favour of environmentally preferable alternatives. The Contracting Parties are urged to consider other methods of disposal (e.g. land disposal), and to explore all possible beneficial uses of the waste (fishmeal or compost production), before taking any decision to grant a dumping permit (see the Technical Annex). The acceptance of dumping under certain circumstances shall not remove the obligation of a waste generator to make further attempts to reduce the necessity for dumping through the application of Best Management Practice.

In view of the nature of fish waste, the focus of considerations in relation to the dumping of these wastes is the promotion of their biological consumption (i.e., the consumption of the wastes by fish and other marine organisms). Care should therefore be taken to identify sites that render the waste more available for consuming organisms and to minimize adverse impacts on the marine environment and legitimate sea use.

3. THE DECISION-MAKING PROCESS

3.1 The proper selection of a site at sea for the dumping of fish waste is of paramount importance. Site selection should minimize the impact on amenities, marine life, fish stocks and fisheries, as well as on other uses of the sea (e.g. impairment of the water quality), as set out in Part C of the Annex to the Dumping Protocol. (Further guidance for the application of Part C of the Annex is given in section 7 below).

3.2 In order to define the conditions under which permits for the dumping of the fish waste may be issued, the Contracting Parties should develop on a national and/or regional basis, as appropriate, a decision-making process for the evaluation of the fish waste, having regard to the protection of human health and the marine environment.

3.3 The decision-making process is based on a set of criteria developed on a national and/or regional basis which meet the provisions of Articles 4, 5 and 6 of the Protocol and are applicable to fish waste. These criteria should take into consideration the experience acquired on the potential effects on human health, the marine environment and other uses of the sea.

These criteria may be described in the following terms:

(a) quantity and physical and chemical (proximate) composition of the waste;
(b) chemical and biochemical characteristics;
(c) biological characteristics;
(d) persistence;
(e) impacts of the dumping on the marine environment, human health and sea use;
(f) characteristics of the proposed dumping site.

3.4 The criteria should be derived from available studies of the impacts of the dumping of fish waste into the sea in similar areas.

3.5 When the criteria cannot be met, a Contracting Party should not issue a permit, unless detailed consideration in accordance with Part C of the Annex to the Dumping Protocol indicates that dumping at sea is, nonetheless, the least detrimental option compared with other management options. If such a conclusion is reached, the Contracting Party should:

(a) take all practical steps to mitigate the impact of the dumping operation on the marine environment;

(b) prepare a detailed marine environmental impact hypothesis;

(c) initiate monitoring (follow-up activities) to identify any predicted adverse effects of dumping, particularly taking into account the marine environment impact hypothesis;

(d) issue a specific permit;

(e) report to the Organization on the dumping which is carried out, outlining the reasons for which the dumping permit has been issued.

3.6 With a view to evaluating the possibility of harmonizing or consolidating the criteria referred to in paragraphs 3.2 – 3.4 above, the Contracting Parties are requested to inform the Organization of the criteria adopted, as well as the scientific basis on which these criteria were developed.

3.7 In concluding their assessment of the environmental implications of these operations, prior to issuing a permit, the Contracting Parties should formulate an impact hypothesis in accordance with the guidance provided in Part B, paragraphs 5.1- 5.4. This impact hypothesis will provide the principal basis for the design of post-operational monitoring activities.

4. WASTE CHARACTERIZATION

4.1 A detailed description and characterization of the waste is an essential prerequisite for the consideration of alternatives and for deciding whether waste may be dumped. If the waste is so poorly characterized that a proper assessment cannot be made of its potential impacts on human health and the environment, that waste shall not be dumped.

Quantity and physical composition

4.2 For the waste to be dumped at sea, the following information should be obtained:

- the species of the processed fish or other organisms;
- the origin of the fish waste (cannery, etc.);
- the quantity of waste to be dumped at sea and the rate of disposal (yearly tonnage, average tonnage per day, per week, per each month in the year);
- the average composition of the fish waste (percentage by weight of each component fish or organism);
- average percentage by weight of the solid phase of the waste.

Chemical (proximate) composition and biological characterization

4.3 A chemical and biological characterization of the waste is needed to fully assess the potential impact. The information should be provided by the applicant.

4.4 Fish and other marine organisms, particularly those from acquaculture, may contain various chemicals, such as heavy metals, antibiotics and hormones. Concerns appear warranted regarding the overuse and misuse of certain chemicals, for which a proper risk assessment has not been made in relation to the marine environment.

4.5 Substances in the fish waste may undergo physical, chemical and biochemical changes when deposited in the marine environment. The susceptibility of fish waste to such changes should be considered in the light of its eventual fate and potential effects. In addition, various chemicals contained in fish waste, as well as disease vectors and non-indigenous species, may have adverse impacts on the wild population of fish consuming the fish waste or may be accumulated in the marine sediment. These should be reflected in the impact hypothesis, as well as in the monitoring programme.

4.6 The following information on the chemical (proximate) composition and microbial should be obtained:

a) solid part of the waste:
- average percentage of oils and grease;
- average percentage of proteins;
- average percentage of ash;
- presence of hormones and antibiotics;
- presence of relevant trace metals and pesticides.

b) liquid part of the waste:
- Biological Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- Total Suspended Solids (TSS), nitrogen and phosphorus

c) susceptibility to putrefaction.

d) Microbial (bacteria and viruses)

5. SELECTION OF THE DUMPING SITE

5.1 Matters relating to the criteria for the selection of the dumping site are addressed in greater detail in studies prepared by GESAMP (Reports and Studies No. 16: Scientific Criteria for the Selection of Waste Disposal Sites at Sea, IMO 1982), ICES (Ninth Annual Report of the Oslo Commission, Annex 6) and IMO (Guidelines for the Assessment of Wastes or other Matter that may be considered for Dumping).

The selection of a site for dumping at sea not only involves the consideration of environmental parameters, but also of economic and operational feasibility.

5.2 The proper selection of a site at sea for the dumping of waste is of paramount importance. In order to be able to select the proper site, basic information on the characteristics of the site have to be considered by national authorities at a very early stage of the decision-making process. The information required for the selection of a dumping site should include:

a) The geographical coordinates of the potential dumping area (latitude, longitude).

b) The distance to the nearest coastline, as well as the proximity of the dumping area to the following:

- recreational areas;
- spawning, recruitment and nursery areas for fish, crustaceans and molluscs;

- known migration routes of fish or marine mammals;
- commercial and recreational fishing areas;
- mariculture areas;
- areas of natural beauty or significant cultural or historical importance;
- areas of special scientific, biological or ecological importance;
- shipping lines;
- military exclusion zones;
- engineering uses of the seafloor (e.g. potential or ongoing seabed mining, undersea cables, desalination or energy conversion sites).

c) The physical characteristics of the water column, including temperature, depth, possible existence of a thermocline/pycnocline and how it varies in depth in relation to seasonal 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.

d) The chemical and biological characteristics of the water column, including pH, salinity, dissolved oxygen at the surface and sea bed, nutrients and their various forms, primary productivity and benthic communities.

5.3 The size of the dumping site is an important consideration. It should be large enough to assimilate the anticipated volume of waste without significant accumulation at the level of the sea bed.

The dumping of the fish waste should not interfere with or affect the value of legitimate commercial and economic uses of the marine environment. The selection of dumping sites should take into account the nature and extent of both commercial and recreational fishing, as well as the presence of aquaculture areas and spawning, nursery and feeding areas.

5.4 The basic assessment of a new or existing site includes consideration of the effects that may arise from other activities in the dumping area.

The current level of pressure on biological communities resulting from such activities should be evaluated before any new or additional dumping operations are authorized.

The possible future uses of resources and amenities in the dumping area should be borne in mind.

5.5 Information from baseline and monitoring studies at existing dumping areas are important for the evaluation of any new dumping activity at the same site or nearby.

6. ASSESSMENT OF POTENTIAL EFFECTS

6.1 The 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". This provides a basis for deciding whether to approve or reject the proposed disposal option and for the determination of environmental monitoring requirements. As far as possible, waste management options which cause deleterious impacts on the marine environment, harm human health and impair planned uses of the sea should be avoided and preference should be given to techniques that prevent deleterious effects.

6.2 The assessment should take into account information on the characteristics of the fish waste and the conditions at the proposed dumping site(s), and should specify the potential effects on human health, living resources, amenities and other legitimate uses of the sea. It should define the nature, spatial extent and duration of the expected impacts based on reasonably conservative assumptions.

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

6.4 In constructing an impact hypothesis, particular attention should be given, but not limited to potential impacts on amenities (e.g., the presence of floatables), sensitive areas (e.g., spawning, nursery or feeding areas), habitat (e.g., biological, chemical and physical modification), migratory patterns and the 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 the traditional uses of the sea.

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

6.6 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 can be no doubt as to the variables to be measured during field monitoring. In the latter context, it is essential to determine "where" and "when" the impacts can be expected.

6.7 Each disposal option should be analysed in the light of a comparative assessment of the following concerns: human health risks, environmental costs, hazards (including accidents), economic factors and the 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 interpretation of the comparative assessment shows the dumping option to be less preferable, a permit for dumping should not be issued.

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

6.8 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.

Physical and aesthetic impacts and odours

6.9 The waste may have significant physical and aesthetic impacts at the point of disposal. These impacts include a temporary reduction of seawater transparency, colouring

of the water column, a localized increase in the levels of suspended solids and the covering of the seabed. The fish waste may be accumulated on the shoreline or float on the surface of the water. In addition, the dumping of waste may cause the occurrence of scum and oil slicks on the sea surface.

The degradation of waste creates an unpleasant odour

6.10 The physical and aesthetic impacts may also extend to zones outside the actual dumping zone, as a result of the movement of dumped material due to wave and tidal action and residual current movements, especially in the case of materials of low specific density. In particular, the negative impact is pronounced if solid parts, scum or oil slicks reach the shore.

Chemical impact

6.11 In relatively enclosed basins with shallow water, dumped material may adversely affect the oxygen regime of receiving systems. In the same way, the dumping of waste may significantly affect the nutrient fluxes and subsequently, in extreme cases, contribute significantly to the eutrophication of the receiving zone.

Various chemicals, primarily heavy metals and chlorinated hydrocarbons contained in the fish waste, may be accumulated in marine sediments and subsequently released into the water column under specific circumstances, thereby becoming available to marine organisms.

Bacteriological impact

6.12 The waste is subject to a rapid degradation process under the effects of heterotrophic bacteria. Waste which is not consumed by marine organisms becomes an object for the activity of heterotrophic bacteria. Continuous dumping of the waste would lead to an increase in the density of heterotrophic bacteria in the dumping area.

Biological and health impact

6.13 The immediate biological consequence of the dumping of waste is the attraction of seagulls, fish and other species, which consume the waste. Unconsumed waste, by settling on the seabed, may affect benthic flora and fauna.

Eutrophication induced by the dumping of waste changes the structure of plankton and benthic communities. In critical conditions, oxygen depletion may have detrimental impacts, causing mass mortality.

Nevertheless, in some instances, after the cessation of dumping activities, there may be a modification of the ecosystem,

In certain special circumstances, the dumping of waste may interfere with the migration of fish or crustaceans.

6.14 Various disease vectors contained in the fish waste may have severe negative effects on the health of commercially important marine organisms, as well as other marine organisms and the entire ecosystem.

Non-indigenous species may cause significant changes in local benthic and pelagic communities.

Economic impact

6.15 An important consequence of the dumping of waste is interference with tourism and recreation due to the possible deterioration of seawater quality and the occurrence of an unpleasant odour.

7. WASTE DISPOSAL PRACTICES

7.1 It is imperative to consider the time-frame between the 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.

7.2 Solid wastes to be disposed into the sea must be ground to 1.25 cm particle size and oily water removed prior to discharge. There must be no discharge of floating solids, visible foam or oily wastes which produce a sheen on the surface of the receiving water. There must be no accumulation of the dumped fish waste on the shoreline and/or the sea bottom of the receiving water. All discharges must be in compliance with national water quality standards.

7.3 Any dumping must occur while the vessel is underway a sufficiently distance from the shoreline to avoid waste accumulation on the shoreline.

8. PERMIT AND PERMIT CONDITIONS

Permit application

8.1 When applying for a dumping permit, the applicant should include in the permit application information on waste characteristics, waste transport to the dumping area and, in the event that the dumping area is not designated in advance or the applicant would like to propose another site for dumping, on the proposed dumping area:

a) The characterization of the fish waste:

- the quantity of the fish waste to be dumped;
- the physical, chemical and biological analysis results of the fish waste;
- a description of the quality control procedure adopted.

b) The transport of the fish waste to the dumping area:

- identification information of the transport vessel(s);
- navigation schedule(s) and route(s);
- port permit(s);
- technical information concerning the storage of the waste in the vessel(s).

c) Information on the proposed dumping area:

- the dumping procedure;
- geographical and historical description of the dumping area;
- hydrochemical, hydrophysical and hydrobiological description of the dumping area;
- physical, chemical and biological characteristics of the dumping area.

Evaluation of the permit application

8.2 The national authority shall establish and apply criteria for reviewing and evaluating permit applications and, in establishing or revising such criteria, shall consider, but not be limited in its consideration to the following:

- the need for the proposed dumping;

- the effect of such dumping on human health and welfare, including economic, aesthetic and recreational values;

- the effect of such dumping on fisheries resources (particularly with regard to the health risk due to the possible presence of disease vectors), plankton, fish, shellfish, wildlife, shorelines and beaches;

- the effect of such dumping on marine ecosystems, particularly with respect to:

  (a) the transfer, concentration and dispersion of the waste and its by-products through biological, physical and chemical processes;

  (b) potential changes in the diversity, productivity and stability of the marine ecosystem; and

  (c) species and community population dynamics;

- the persistence and permanence of the effects of the dumping;

- the effect of dumping particular volumes;

- appropriate locations and methods of disposal or recycling, including land-based alternatives and the probable impact of requiring the use of such alternative locations or methods upon considerations relating to the public interest;

- the effect on other uses of the sea, such as scientific study, fishing and other forms of exploitation of living and non-living resources.

8.3 A decision to issue a permit should only be made if all impact evaluations are completed and the monitoring requirements determined. Particular attention should be given to cases in which the fish waste contains organisms which, for any reason, are not suitable for human consumption. The provisions of the permit shall ensure, in so far as practicable, that environmental disturbance and detriment are minimized and benefits maximized.

8.4 The national authority shall, in a manner consistent with the established criteria, designate sites or time periods for dumping. The dumping sites or time periods for dumping shall be designated in such a way that the adverse impact on the environment is mitigated to the greatest extent practicable.

8.5 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, the authority responsible for issuing the permit shall require the production of additional information before any final decision is taken on the permit application.

Permit conditions

8.6 Permits issued for the dumping of fish waste shall designate the following:

- the type of waste to be dumped;
- the area where dumping will occur (longitude and latitude);
- the speed of the vessel(s) and loading rate;
- monitoring and surveillance of the fish waste (frequency of sampling and observation, type of analysis, statistical procedure) and the impacts of dumping (frequency of sampling, sampling sites, types of samples and parameters);
- the validity of the permit.

8.7 Any permit issued shall be reviewed periodically and, where appropriate, revised. The national authority may limit or deny the issuance of permits, or it may alter or revoke partially or entirely the terms of permits which have been issued where it finds, based upon monitoring data from the dumping site and the surrounding area, that the waste cannot be dumped in a manner which is consistent with the criteria and other factors which are to be applied in evaluating the permit application.

8.8 A permit to dump waste shall be refused if the national authority determines that appropriate opportunities exist to process or treat the waste on or off the site 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 covering both the dumping and the alternatives.

8.9 The 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 constitutes an important feedback mechanism for the protection of human health and the marine environment.

8.10 Information received by the national authority in connection with any application or with any permit that has been granted shall be available to the public as a matter of public record at every stage of the proceeding. The final decision of the national authority shall also be available.

8.11 A copy of any permit issued shall be placed in a conspicuous place in the vessel(s) used for the dumping authorized by such permit.

PART B

MONITORING OF WASTE DUMPING OPERATIONS

1. DEFINITION

1.1 Monitoring is defined as all measures whose purpose is to determine the spatial and temporal extent of the modifications undergone by the receiving zone as a result of the activity under consideration by means of the repeated observation and measurement of contaminants or the effects, whether direct or indirect, of the introduction of the waste into the marine environment.

2. RATIONALE

2.1 Monitoring of waste dumping operations is generally undertaken for the following reasons:

(i) to establish whether the permit conditions have been respected (conformity control) and have, as intended, prevented adverse effects on the receiving area as a consequence of the dumping;

(ii) to improve the basis on which permit applications are assessed by improving knowledge of the field effects of major discharges which cannot be directly estimated by a laboratory evaluation or on the basis of the available literature;

(iii) to provide the necessary evidence to demonstrate that, within the framework of the Dumping Protocol, the monitoring measures applied are sufficient to ensure that the dispersive and assimilative capacities of the marine environment are not exceeded, and that damage is not caused to the environment and other legitimate uses of the sea are not interfered with.

3. OBJECTIVES

3.1 The purpose of monitoring is to determine the physical (including aesthetic), chemical and biological effects and consequences for the marine environment of the dumping of the waste.

4. STRATEGY

4.1 Monitoring operations are expensive since they require considerable resources for both measurement, sampling and observation programmes at sea and the subsequent analytical work on the samples.

In order to approach the monitoring programme in a resource-effective manner, it is essential that the programme should have clearly defined objectives, that the measurements and observations are able to meet those objectives and that the results are reviewed at regular intervals in relation to the objectives.

5. IMPACT HYPOTHESIS

5.1 In order to establish such objectives, it is first necessary to derive an impact hypothesis describing the predicted effects on the physical, chemical and biological environment in both the dumping zone and the zones outside it. The impact hypothesis forms the basis for defining the field monitoring and observation programme.

5.2 The aim of an impact hypothesis is, on the basis of the available information, to provide a concise scientific analysis of the potential effects of the proposed operation on human health, living resources, marine life, amenities and other legitimate uses of the sea. For this purpose, an impact hypothesis should incorporate information on the characteristics of the waste and on conditions at the proposed dumping site. It should encompass both temporal and spatial scales of the potential effects.

5.3 One of the main requirements of the impact hypothesis is to produce criteria which describe the specific environmental effects of dumping activities, taking into account the fact that such effects have to be avoided outside the designated dumping zones.

5.4 The impact hypothesis forms the basis for the definition of field monitoring. The measurement programme should be designed to ascertain that changes in the receiving environment are within the predicted limits. The following questions must be answered:

(a) What testable hypotheses can be derived from the impact hypothesis?

(b) What measurements (type, location, frequency and performance requirements) are required to test these hypotheses?

(c) How should the data be managed and interpreted?

6. PRELIMINARY EVALUATION

6.1 The preliminary evaluation should be as comprehensive as possible. The primary areas of potential impact should be identified, as well as those considered to have the most serious consequences for human health and the environment. Alterations to the physical environment, risks to human health, the devaluation of marine resources and interference with other legitimate uses of the sea are often seen as priorities in this regard.

6.2 The expected consequences of dumping (targets) can be described in terms of the habitat, processes, species, communities and uses affected by the dumping. The precise nature of the predicted change, response or interference (effect) can then be described. The target and the effect should be described (quantified) in sufficient detail to eliminate any doubt as to the parameters to be measured during post-operational field monitoring. In the latter context, it may be essential to determine “where” and “when” the impacts can be expected.

7. REFERENCE BASELINE

7.1 In order to develop an impact hypothesis, it may be necessary to conduct a baseline survey, which describes not only the environmental characteristics, but also the variability of the environment.

Where either physical or chemical effects are expected at the level of the seabed, it will be necessary to examine the structure of the benthic community in areas where the waste disperses.

8. IMPACT HYPOTHESIS VERIFICATION: DEFINING THE MONITORING PROGRAMME

8.1 The measurement programme should be designed to ascertain that physical, chemical and biological changes in the receiving environment are within those projected and do not exceed the predicted impact hypothesis.

The measurement programme should be designed to determine:

(a) whether the zone of impact differs from that projected; and

(b) whether the extent of changes outside the zone of direct impact is within the scale predicted.

The first question can be answered by designing a sequence of measurements in space and time that circumscribe the projected zone of impact to ensure that the projected spatial scale of change is not exceeded.

The second question can be answered by making physical, chemical and biological measurements that provide information on the extent of the change that occurs outside the zone of impact after the dumping operation has taken place (verification of a zero impact hypothesis).

Before any programme is drawn up and any measurements are made, the following questions should be addressed:

(i) what testable hypotheses can be derived from the impact hypothesis?

(ii) what exactly should be measured to test these impact hypotheses?

(iii) in what compartment or at which locations can measurements most effectively be made?

(iv) for how long should measurements continue to be made to meet the original aim?

(v) what temporal and spatial scale should be applied to the measurements that are made?

(vi) how should the data be processed and interpreted?

8.2 It is recommended that the choice of parameters to be monitored should depend primarily on the ultimate purposes of the monitoring. It is definitely not necessary to monitor regularly all parameters at all sites and it should not be necessary to use more than one substrate or effect to meet each of the aims of the monitoring programme.

8.3 The authority responsible for issuing permits is encouraged to take account of relevant research information in the design and modification of monitoring programmes. Measurements may be divided into two types - those within the zone of predicted impact and those outside it.

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

(1) modifying or terminating the field-monitoring programme;

(2) modifying or revoking the permit;

(3) redefining or closing the dumping site; and

(4) modifying the basis on which applications are assessed for the dumping of wastes.

9. MONITORING

9.1 Where, on the basis of the impact hypothesis, either physical or chemical effects are expected at the level of the seabed, it will be necessary to measure bottom oxygen and nutrient concentrations and examine the structure of the benthic community in areas where the waste disperses. In addition, the sea surface and shoreline shall be observed for the occurrence of oil slicks, scum or floating solids.

9.2 The spatial extent of sampling and observations will need to take into account the size of the area designated for dumping, the mobility of the dumped waste material and water movements which determine the direction and extent of waste transport.

9.3 The frequency of surveying will depend on a number of factors, which in turn depend primarily on the characteristics of the dumping area and the legitimate use of the sea. For example, in developed tourist areas, the surface of the sea and the shoreline should be observed daily.

Where a dumping operation has been going on for several years, it may be possible to establish the effect at a steady state of input and repeated surveys would only be necessary if changes are made to the operation

9.4 If it is decided to monitor the recovery of an area which is no longer used for the dumping of waste, more frequent measurements may be needed.

10. NOTIFICATION

10.1 The Contracting Parties should inform the Organization of their monitoring activities.

Concise reports on monitoring activities should be prepared and submitted to the Organization as soon as they are available, in accordance with Article 26 of the Barcelona Convention.

Reports should detail the measurements made, the results obtained and how these data relate to the monitoring objectives and confirm the impact hypothesis. The frequency of reporting should be at least on a half-yearly basis.

11. FEEDBACK

11.1 Information gained from field observation and measurements can be used to:

(a) modify or, in the best case, terminate the field monitoring programme;
(b) modify or revoke the permit;
(c) refine the basis on which applications for permits are assessed.

TECHNICAL SUPPORT

TECHNICAL ANNEX

CONSIDERATIONS BEFORE TAKING ANY DECISION TO GRANT A DUMPING PERMIT

This technical Annex was prepared bearing in mind that, although the guidelines strictly only apply to the disposal of solid fish waste or organic materials resulting from the processing of fish and other marine organisms, the Contracting Parties are urged to considered other methods of disposal (e.g. land disposal) and to explore all possible beneficial uses of the waste (fishmeal, liquid fertilizer or compost production) before taking any decision to grant a dumping permit (see Part A, para. 2.1). The goal of this Technical Annex is not to examine all the possibilities offered by the various techniques, but to provide some indications about them.

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

(1) types, amounts and relative hazards of the wastes generated;

(2) details of the production process and the sources of waste in that process; and

(3) the feasibility of the following waste reduction/prevention techniques
- product reformulation;
- process modification;
- on- or off-site processing of waste.

In general terms, if the required audit reveals that opportunities exist for waste reduction at source, or through the on- or off-site processing of the waste, an applicant is expected to formulate and implement a waste reduction 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. Decisions to issue or renew permits shall assure compliance with any resulting waste reduction and prevention requirements.

CONSIDERATION OF WASTE MANAGEMENT OPTIONS

Applications to dump fish waste or other materials 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) on- or off-site processing;
(2) treatment to reduce or remove the hazardous constituents; and
(3) disposal on land.

I. BENEFICIAL USES OF THE WASTE

The fishing industry is confronted with the problem of disposing of fish waste in an economically viable and environmentally sound manner. With the restriction or elimination of offshore dumping and landfilling to protect the environment, alternative technologies are

being developed for the management of fish waste. The development of value-added fish waste products would increase utilization and build up markets for seafood wastes.

So far, the production of fishmeal, compost and liquid fertilizer from fish waste appear to be economically acceptable alternatives. While fishmeal has been produced for a long time, the production of compost and liquid fertilizer is a relatively new approach to the management of fish waste.

Production of fishmeal

Waste resulting from the industrial processing of fish and other marine organisms is rich in animal proteins and fats. It may be processed at the place of origin or transported to a fishmeal plant. Fishmeal, the final product, is used for the production of feed for animals (e.g. poultry, pigs) or fish (in freshwater and marine acquacultura).

When considering this approach to waste management, consideration should be given to the possible markets for the product, as well as the possible negative impacts of a fishmeal plant on the environment, such as:

- fish odour from the receiving area and other work areas in the plant;
- fish odour from the scrubbing system;
- the emission of combustion gases and particulate matter from the boilers;
- the discharge of scrubbing effluent into coastal waters.

Production of compost

The direct use of fish waste for land manuring or spreading is generally discouraged due to the uniquely obnoxious odour of putrefying fish. Such use, even in areas where it is permitted, is therefore mainly restricted to the immediate ploughing in of the waste before or at the time of planting. This process cannot be carried out in summer when crops are standing, even though that is the period when most fish waste is generated. Ploughing is also difficult when the soil is excessively wet.

When fish waste is buried or land filled, its decomposition occurs under the anaerobic conditions which generate particularly malodourous reduced S and N compounds and hydrogen sulphide. The anaerobic composting of fish waste therefore poses problems of smell, transport, application and aesthetic damage, in addition to its adverse environmental impacts. These impacts are mainly due to most of the nitrogen in the product being in forms that can easily be volatilized or washed away, rather than in the form of the stable humus that is formed by aerobic composting.

To achieve aerobic composting, fish wastes need to be mixed with acidic or acidogenic material with a wide C/N ratio, which has a high capacity for absorbing and complexing ammonium and calcium ions, and is fluffy enough to be well-aerated so that the malodours of anaerobic decomposition are not produced. Materials which could be mixed with fish waste for this purpose include horticultural sphagnum (blonde) peat and light brown peat, as well as some wood by-products, such as sawdust and shavings.

II. LAND DISPOSAL

When wastes are buried or land filled, the decomposition of the fish waste occurs under the anaerobic conditions that generate particularly malodorous reduced S and N compounds such as cadaverine and putrescence with evocative names, including hydrogen sulphide (rotten egg gas). The anaerobic composting of fish waste therefore poses problems

of smell, transport, application and aesthetic damage, in addition to its adverse environmental impacts. These impacts are mainly due to most of the nitrogen in the product being in forms that can easily be volatilized or washed away, rather than in the form of the stable humus that is formed by aerobic composting.

Fish proteins, lipids and chitin are easily broken down by (non-living) exoenzymes and autolytic enzymes in dead cells, even under conditions in which the decomposer organisms themselves are not active. The intestines and muscle tissues of fish are particularly rich in enzymes that degrade various components of their flesh, e.g. proteins, scales and skin. Enzymes can act even under sub-optimal conditions for microbial activity.

Fish lipids, being mostly of the unsaturated type, oxidize rapidly in air to produce foul rancid odours.

In addition to the problem of foul odours, land disposal may have a negative impact on ground water.

DRAFT

GUIDELINES FOR THE MANAGEMENT OF FISH WASTE OR ORGANIC MATERIALS RESULTING FROM THE PROCESSING OF FISH AND OTHER MARINE ORGANISMS

List of amendments made to document sent on 30 January 2001

PART A

- Point 4.6 has been modified:

original: "4.6 The following information on the chemical (proximate) composition should be obtained:

a) solid part of the waste:
- average percentage of oils and grease;
- average percentage of proteins;
- average percentage of ash;
- presence of hormones and antibiotics;
- presence of relevant trace metals and pesticides.

b) liquid part of the waste:
- Biological Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- Total Suspended Solids (TSS)

c) susceptibility to putrefaction."

revised: "4.6 The following information on the chemical (proximate) composition *and microbial* should be obtained:

a) solid part of the waste:
- average percentage of oils and grease;
- average percentage of proteins;
- average percentage of ash;
- presence of hormones and antibiotics;
- presence of relevant trace metals and pesticides.

b) liquid part of the waste:
- Biological Oxygen Demand (BOD);
- Chemical Oxygen Demand (COD);
- Total Suspended Solids (TSS*), nitrogen and phosphorus*

c) susceptibility to putrefaction.

d) Microbial (bacteria and viruses)"