ANNEX II

INCINERATION AT SEA

THE SECOND CONSULTATIVE MEETING,

RECALLING Article I of the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, which provides that Contracting Parties shall individually and collectively promote the effective control of all sources of pollution of the marine environment,

HAVING NOTED the increasing use of incineration at sea as a means of disposal of wastes containing highly toxic substances and the consequent risks of marine and atmospheric pollution which may result from this process,

DESIRING to prevent such pollution and to minimize the risk of hazards to other vessels or interference with other legitimate uses of the sea which could arise from uncontrolled incineration operations at sea,

HAVING CONSIDERED the Report of the Consultation on Incineration at Sea held at IMCO Headquarters, London from 21 to 25 March 1977 including, in particular, the recommendations of the experts concerning the Technical Guidelines on the Control of Incineration of Wastes at Sea,

RECOMMENDS Contracting Parties:

(a) to implement the Guidelines, the text of which is set out in the Annex, for the purpose of controlling incineration operations at sea as soon as possible; and

(b) to report to the Secretary-General of the Inter-Governmental Maritime Consultative Organization any experiences which may be gained in applying the provisions of the Guidelines with a view to their future revision by the Consultative Meeting,

DECIDES that the provisions for the control of incineration at sea should be implemented by Contracting Parties on a mandatory basis in the form of a legal instrument adopted within the framework of the London Dumping Convention, and, to this end, invites Contracting Parties to submit proposals for such a legal instrument for consideration and, if possible, adoption by the Third Consultative Meeting.

ANNEX

TECHNICAL GUIDELINES ON THE CONTROL OF INCINERATION OF WASTES AT SEA

1. Introduction

1.1 The incineration of wastes at sea by Contracting Parties to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter must be controlled in such a way that the incineration products and the unburnt residues which may enter the marine environment are in compliance with the London Convention and Annexes I, II and III of the Convention.

1.2 The technical guidelines in this document have been drafted with this objective and are based on the existing scientific knowledge on the incineration process and on a knowledge of current technology. Although the state of knowledge on the incineration of liquid organohalogen wastes in existing vessels has enabled specific guidelines to be drawn up covering the incineration of these wastes, there remain types of waste where knowledge is insufficient at present. Scientific work is, however, proceeding in several countries and consequently these guidelines should need to be kept under review as the results of further research and investigations become available.

1.3 Additionally, it is important not to exclude the development of new techniques provided that it can be clearly shown that they improve the efficiency of destruction.

2. Definition of "Incineration at Sea"

For the purposes of the present Guidelines:

"Incineration at sea" means the deliberate combustion of wastes or other matter on board vessels, platforms or other man-made structures at sea for the purpose of their thermal destruction."

Note: This definition is wider than is necessary to cover the existing vessels which load wastes for the purpose of incineration and is so drafted to ensure that controls on incineration at sea should apply also to vessels, platforms or other man-made structures which might at some future date carry out factory operations and generate wastes which could be incinerated at sea. Activities incidental to the normal operation of ships (e.g. combustion of ship-generated garbage) or platforms (e.g. flaring of gas from oil production or exploration platforms) should be excluded from the scope of this definition.

3. Scope of the Technical Guidelines

3.1 The incineration of a waste at sea must be controlled to safeguard a number of uses of the marine environment as laid down in Annex III of the Convention. Thus, the practice of incineration and the residues from it must not harm marine life nor must they interfere with shipping, fishing, amenities, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the sea.

3.2 Additionally the resolution of the first Consultative Meeting of Contracting Parties to the Convention recognized that the risks of atmospheric pollution should also be taken into account.

3.3 In order to achieve this objective it is necessary to adhere to technical guidelines on the following aspects:

(a) the specifications, controls and approval of the incinerator;

(b) the control over the nature of the wastes incinerated;

(c) the selection of the site of incineration;

(d) the control on the ship and its operation;

(e) methods of ensuring compliance with regulations;

(f) forms of report to the Organization.

Note: It is also necessary to first consider the practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the matter less harmful, before issuing a permit for incineration at sea according to these guidelines. Bearing this in mind, incineration at sea should in no way be interpreted as discouraging progress towards other environmentally better solutions.

4. Controls and Approval of the Incinerator

4.1 Every vessel which it is proposed to use for the incineration of waste at sea should comply with the technical provisions of this section and should be subject to the surveys specified below. These should be carried out by the Flag State if it is a Contracting Party (in collaboration with other Contracting Parties as necessary) or by another Contracting Party's appropriate authority.

(a) An initial survey before the vessel, platform or structure is put into service to ensure that the incinerator system will meet the technical guidelines and:

(i) to approve the siting and types of control thermocouples;

(ii) to approve the gas sampling and analytical devices and the manner of recording;

(iii) to define the wall temperature at which waste is automatically shut off;

(iv) to approve the device by which waste is automatically shut off.

(b) Periodic surveys, not exceeding every two years, which should ensure that the incinerator continues to comply with the technical guidelines.

4.2 After any survey has been completed, no significant change which could affect the performance of the incineration system should be made without approval of the appropriate authority. Following the satisfactory completion of the survey, a form of approval should be issued if the incineration system is found to be in compliance with the technical guidelines by the Flag State or other appropriate authority.

5. Technical Specifications for the Incinerator

5.1 Means of Introducing the Waste into the Incinerator

5.1.1 The rate and quantity of liquid waste and fuel which is fed to the combustion system should be measured and recorded by a suitable continuous flow measuring device.

5.1.2 Until such devices are installed on existing vessels, an interim method of control should be based on a continuous display of the waste and fuel pump status supplemented by manual checks of the amount of waste burnt every hour, to be recorded in the ship's log.

5.1.3 Where solid wastes are burnt the rate of input should also be recorded.

5.2 Control of the Air Feed to the Incinerator

5.2.1 The amount of air entering the incinerator must be sufficient to ensure that a minimum of 3 per cent excess oxygen is present in the combustion gases near the incinerator stack exit.

5.2.2 The requirement to provide excess air should be monitored by a continuous automatic oxygen analyser to record the oxygen concentration. The position of the gas sampling probe within the incinerator should be approved by the appropriate authority.

5.2.3 Although existing incinerator vessels employ a fixed air input rate, future incinerator vessels may use a variable air feed in which case this rate should be recorded.

5.3 Definition of Control Temperatures and the Method of their Recording

5.3.1 The operation of the incinerator should be controlled so as to ensure that the incineration of wastes may not take place at flame temperatures of less than 1200°C and is normally in the range 1300°-1600°C.

5.3.2 Temperature records and controls will however be based on the measurement of wall temperature by thermocouples which will have a relationship to the flame temperature which is unique to each incinerator. The appropriate authority should therefore establish the relationship between the readings of each wall thermocouple and the flame temperature, and define the position and type of thermocouples which are to act as control thermocouples. Unless otherwise determined by the appropriate authority, there should be three or more control thermocouples for each incinerator.

5.3.3 From the relationship between wall and flame temperatures, the authority should define:

(a) the wall temperature below which the flow of waste to the incinerator shall be automatically shut-off via approved equipment (corresponding to a minimum flame temperature of 1200°C);

(b) the normal operating wall temperatures (corresponding to flame temperature of 1300°-1600°C).

The temperature readings of the control thermocouples should be measured and recorded automatically as a continuous and permanent record.

5.4 Residence Time of Incinerator

5.4.1 The residence time of all wastes in the incinerator should be of the order of 1 second or longer at a flame temperature of 1200°C.

5.5 Efficiency of the Incinerator

5.5.1 The efficiency with which the waste is burnt in the incinerator should be based on:

(i) the combustion efficiency which should be at least 99.9 per cent based on

$$\text{Combustion efficiency} = \frac{C_{CO_2} - C_{CO}}{C_{CO_2}} \times 100$$

where C_{CO_2} = concentration of carbon dioxide in the combustion gases

C_{CO} = concentration of carbon monoxide in the combustion gases.

(ii) The destruction efficiency which is based on a determination of the amount of the organohalogens added to the furnace which is not destroyed.

5.5.2 The routine measurement of the combustion efficiency should be made using automatic analysers for carbon monoxide and carbon dioxide in the combustion gases based on a gas sampling point and analytical apparatus approved by the appropriate authority.

5.5.3 The measurement of destruction efficiency requires further technological development before it can be used routinely or on periodic surveys. However, it is considered that the destruction efficiency of the incinerator should be determined during the initial vessel survey and that this should be in excess of 99.9 per cent.

5.5.4 Although the primary controls on the effectiveness of incineration are through paragraphs 3.3(a) to (e), an additional operational guideline is that there should be no continuous or intermittent flame extension above the plane of the stack or presence of black smoke. In the future it may be possible to routinely measure the total particulate matter in the combustion gases.

5.5.5 Where an appropriate authority proposes to licence the incineration of solid wastes or organohalogen wastes over which doubts as to the efficiency of combustion exist (e.g. PCBs, PCT, TCDD, BHC, DDT), the incinerator operation should be subject to the intensive stack monitoring associated with the initial vessel survey (i.e. including the measurement of O_2, CO, CO_2, chlorinated organic content, total hydrocarbon content) plus the monitoring of total particulate matter emitted in the combustion gases.

6. Control over the Nature of Wastes Incinerated

6.1 Every incineration operation at sea should be subject to a permit issued by the appropriate authority or authorities in which the wastes to be incinerated should be specified.

6.2 Before issuing a permit relating to the incineration of waste at sea in an approved incinerator, the information on the characteristics of the waste listed in Appendix A should be required.

6.3 In determining whether to grant a permit, the appropriate authority may, if necessary, analyse representative samples of the producers' waste. Samples may be taken from storage tanks when a number of wastes are mixed before loading on to the ship.

6.4 The appropriate authority should also ensure that the incineration of a waste containing Annex I substances should not result in the introduction of Annex I substances into the marine environment unless these are rapidly rendered harmless or are present as trace contaminants. Based on current scientific knowledge on the environmental effects of incinerating liquid organohalogen compounds, this requirement is considered to be met if the guidelines of Section 4 are observed.

7. Selection of the Site of Incineration

7.1 In selecting a site for the incineration of wastes, the licensing authority should have regard to the following:

(a) the area's geographical position, depth of water, and distance from the nearest coast;

(b) its location in relation to biologically sensitive areas, breeding, spawning and fishing grounds, shellfish breeding grounds or passage areas of living resources in adult or juvenile phases;

(c) its location in relation to other sensitive areas including beaches and other amenity areas, areas of population, shipping, recreation, mineral extraction, desalination, and other areas of special importance and other legitimate uses of the sea;

(d) types and quantities of wastes proposed to be incinerated;

(e) existence of areas where other incineration activities take place;

(f) the atmospheric dispersal characteristics of the area (including such parameters as wind speed and direction, atmospheric stability, frequency of inversions and fog, precipitation types and amounts, humidity, etc.) in order to determine the potential impact on the surrounding environment of pollutants released from the incineration vessel, giving particular attention to the possibility of atmospheric transport of pollutants to coastal areas;

(g) oceanic dispersal characteristics of the area (e.g. effects of currents, tides, wind, horizontal transport and vertical mixing) in order to evaluate the potential impact of pollutants introduced into the ocean through atmospheric plume interaction with the water surface;

(h) the possible presence of submarine cables or pipelines if the vessel is to anchor in the incineration area.

8. General Controls on the Vessel and its Operation

8.1 Disposal of Residues

8.1.1 There must be no means of discharging liquid wastes from the vessel's tanks except by means of the incinerator during normal operations. Consequently where facilities to empty the tanks exist on an incinerator vessel, these should be sealed by the national authority at the port of loading. Breaking of the seal to discharge wastes at sea should subsequently be justified by the master of the vessel on the grounds of force majeure (Article V(1)).

8.1.2 Tank washings should be incinerated at sea in accordance with these guidelines or discharged to port facilities in consultation with the relevant national authorities.

8.1.3 In the combustion of containerised solid wastes, certain residues may remain as ash in the incinerator which may require periodic removal. Such residues should not be removed from the incinerator except while the vessel is in harbour where they should be removed for safe disposal to land. They should not be dumped in the sea from the incinerator vessel.

8.2 The Loading of Wastes

8.2.1 Liquid wastes should not be transferred from barges or other vessels outside harbour limits.

8.2.2 Solid wastes in damaged containers should not be taken on board.

8.2.3 Unless the regulations in the "International Maritime Dangerous Goods Code" prescribe otherwise, containerised solid waste should be stowed on the tween-decks or in the lower hold for new incinerator vessels. With existing incinerator vessels where storage below deck is not possible, containers stored on deck must be held securely within special enclosures to be approved by the Flag State or appropriate authority.

8.2.4 Measures should also be taken to ensure that containers loaded on board are adequately labelled and that they and their contents can only be discharged via the incinerator.

8.3 Prevention of Hazards to other Vessels

8.3.1 In licensing the incineration of wastes on approved incinerator vessels, the appropriate authority should have regard to the need to avoid hazards to other vessels by selecting a proper location of the incineration zones concerned and by ensuring that the relevant maritime authorities are notified of the vessel's date of sailing and intended schedule, as well as its intended movements during incineration (whether underway, at anchor, etc.).

8.3.2 The co-ordinates of permanently designated incineration zones and recommended off-shore incineration routes should be widely promulgated to maritime interests including the marking on navigational charts at the discretion of coastal Administrations.

8.3.3 Regular radio warnings should be broadcast during the period of incineration. The vessel shall respond promptly to radio calls from other vessels or shore stations at all times during the incineration.

8.4 Construction of the Incinerator Vessel

8.4.1 For the carriage of liquid wastes, the incinerator vessel must carry a valid "Certificate of Fitness" as is required under the IMCO Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk.

8.4.2 The incinerator vessels should comply with the requirements for a Type II ship of the IMCO Code and should adhere to such other provisions as may be defined on the carriage of dangerous chemicals.

9. Methods of Ensuring Compliance with Regulations

9.1 Any vessel used for the incineration of wastes at sea should provide for photographic or other methods as may be approved by the Flag State or appropriate licensing authority of recording essential control variables during each voyage. These records should be reviewed by the national authorities which have granted the incineration permits.

9.2 These records should provide independent confirmation of the following parameters by recording automatically (at a frequency of at least every 15 minutes):

Wall temperature measurements of approved control thermocouples

The oxygen concentration in combustion gases

The date and time of incineration

The vessel position by appropriate navigational means (e.g. LORAN or DECCA NAVIGATION SYSTEMS)

The status of waste, fuel and air pumps (i.e. on/off).

9.3 Additionally, a number of records are to be maintained for inspection by licensing authorities. These are:

Records of the CO and CO_2 concentration in combustion gases

Ship's course and speed (if applicable)

Meteorological conditions, e.g. wind speed and direction

The tank from which waste is taken

The rate of waste input to the furnace

Copies of incineration permits issued by the appropriate authority

Future parameters which may be required subject to satisfactory technical development with regard to measurements, destruction efficiency and total particulate matter in the combustion gases.

10. Notification of Permits to Incinerate Wastes at Sea

10.1 The Organization should be notified immediately following the issuing of a permit to incinerate waste at sea. The form of report for notification is given in Appendix B.

10.2 For the purposes of reporting the details of permits received to Contracting Parties, the Organization should treat notifications of incineration permits in the same way as notifications of general permits to dump (i.e. shall prepare an annual summary of the permit details received for circulation to Contracting Parties).

APPENDIX A

INFORMATION OF RELEVANCE TO APPLICATIONS FOR A PERMIT FOR INCINERATION OF WASTE AT SEA

(a) Quantities of substances to be incinerated in each operation. Frequency of incineration operations (daily, weekly, monthly).

(b) Form in which the waste is to be incinerated, i.e. solid, sludge, liquid, in bulk or in containers. When waste is packed in containers, give the shape, size and nature of the containers.

(c) Origin of waste, i.e. industrial processes and/or type of production, from which it comes.

(d) Composition of the waste (detailed analysis including, as necessary, data on toxicity, persistence and other properties such as reactivity). Information should relate to the following substances:

(Specify whether the analysis relates to dry or wet weight. For low concentrations, give the above information in ppm).

- principal organic compounds
- organohalogens
- other components, e.g.

Hg	Ni
Cd	V
As	Fe
Pb	
Cu	
Zn	Organosilicons
Be	
Cr	

(e) Physical properties of the waste:

- specific gravity
- pH (if relevant)
- ash content
- calorific value
- solids in suspension
- viscosity
- flashpoint

Other properties which may be of interest to authorities (gel point, vapour pressure, freezing/melting point, solubility, physical stability, etc.)

(f) Chemical and physical transformation of the waste after incineration, in particular subsequent formation of new compounds, composition of ashes or unburnt residues if possible.

APPENDIX B

FORM OF REPORT TO THE ORGANIZATION ON PERMITS FOR INCINERATION AT SEA

It is proposed that the following information be sent to the Secretariat immediately following the issuing of an incineration permit:

1. General Details

   (a) Authority responsible for issuing permit and inspecting records

   .....

   (b) Name of vessel used .....

   (c) Period of Permit .....

   (d) Area of incineration (geographical location, distance from nearest coast)

   .....

   (e) Total quantity of waste licensed to be burnt during the period in (b) .....

   (f) Special conditions on the operation of the incinerator and/or vessel outside those specified in the technical guidelines on the incineration of waste at sea

   .....

   .....

   .....

   (g) Special conditions attached to the permit, e.g. monitoring investigations

   .....

2. Details of the Wastes to be Burnt

   For each waste to be incinerated during the period of the incineration permit, the following information should be included:

   (a) Quantity of waste .....

   (b) Physical form .....

   (c) Bulk or containers (size, labelling etc.) .....

   (d) Industrial process giving rise to the waste .....

(e) Composition of the waste:
(Specify whether the analysis relates to dry or wet weight either in % or ppm)

Principal organic components .....

.....

Organohalogens .....

Incombustible residues (Hg, Cd, As, Pb, Zn, Cu, etc.) .....

(f) Physical properties of the waste:

Specific gravity .....

Calorific value .....

(g) Other properties .....

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