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Tirana, Albania, 17-20 December 2017

Agenda item 3: Thematic Decisions

Draft Decision IG.23/15: Updated Guidelines for Regulating the Placement of Artificial Reefs at Sea

UNEP/MAP
Athens, 2017

Note by the Secretariat

Introduction

1. This document addresses the request below from the Meeting of the MAP Focal Points (Athens, Greece, 12-15 September 2017) concerning Draft Decision IG.23/13 Guidelines for Regulating the Placement of Artificial Reefs at Sea as contained in document UNEP(DEPI)/MED WG.443/16.

> "84. The focal points requested the secretariat to provide the Contracting Parties with the legal analysis on whether the deletion of part C of the draft guidelines may have legal implications vis-a-vis less strict relevant provisions of the 2005 guidelines, adopted by the Contracting Parties at their fourteenth meeting. Furthermore, it was requested that the updated draft guidelines also be consulted with biodiversity and integrated coastal zone management experts in order to analyze other implications of placement activities in a holistic manner." (UNEP (DEPI)/MED WG.443/21).

2. This document builds on the advice prepared for the Meeting of the MAP Focal Points (Athens, Greece, 12-15 September 2017), as presented in document UNEP(DEPI)/MED WG. 443/16.

Dumping regime under the Dumping Protocol

3. Article 3.3 of the Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft or Incineration at Sea, 1995 (Dumping Protocol), defines "Dumping" as:

(a) "Any deliberate disposal at sea of wastes or other matter from ships or aircraft,
(b) Any deliberate disposal at sea of ships or aircraft,
(c) Any deliberate disposal or storage and burial of wastes or other matter on the seabed or in the marine subsoil from ships or aircraft".

4. Under Article 4.1 of the Dumping Protocol, the dumping of wastes or other matter is prohibited, with the exception of those listed in paragraph 2 of that Article. This includes "vessels, until 31 December 2000".

5. According to Article 5 of the Dumping Protocol, "The dumping of the wastes or other matter listed in Article 4.2 requires a prior special permit from the competent national authorities".

6. Under Article 6.1 of the Protocol, the permit referred to in Article 5 shall be issued only after careful consideration of the factors set forth in the Annex to this Protocol[1] or the criteria, guidelines and relevant procedures adopted by the meeting of the Contracting Parties pursuant to paragraph 2 below. According to Article 6.2, the Contracting Parties shall draw up and adopt criteria, guidelines and procedures for the dumping of wastes of other matter listed in Article 4.2 so as to prevent, abate and eliminate pollution[2].

Placement regime under the Dumping Protocol

7. Under Article 3.4(b) of the Dumping Protocol, "Dumping does not include (…) "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". This definition restates *verbatim* the definition of placement under Article 3.4(b) of the Protocol for the Prevention and Elimination of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft, 1976 (1976 Dumping Protocol).

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[1] The factors listed in the Annex to the Dumping Protocol refer to: "A. Characteristics and Composition of the Matter", "B. Characteristics of Dumping Site and Method of Deposit" and "C. General Considerations and Conditions".

[2] Guidelines adopted by the meeting of the Contracting Parties for those wastes or other matter listed in Article 4.2 are: (1) Guidelines for the management of the dredged material, 1999; (2) Guidelines for the management of fish waste or organic materials resulting from the processing of fish and other marine organisms, 2001; (3) Guidelines for the dumping of platforms and other man-made structures at sea, 2003; and (4) Guidelines for the dumping of inert uncontaminated geological materials, 2005.

8. Under the Dumping Protocol the placement of matter is permitted, once the activity meets the criteria established under Article 3.4(b), i.e.: (1) the placement is for a purpose other than the mere disposal, and (2) the placement is not contrary to the aims of the Protocol.

9. The aims of the Dumping Protocol are:

a. "protecting the marine environment from this danger [the danger posed to the marine environment by the dumping or incineration of wastes or other matter]" (Preamble); and
b. "(…) to prevent, abate and eliminate to the fullest extent possible pollution of the Mediterranean Sea caused by dumping from ships and aircraft or incineration at sea" (Article 1).

10. Article 5 of the 1995 Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention), follows the same wording as Article 1 of the Dumping Protocol, by requesting Contracting Parties to take all appropriate measures "to prevent, abate and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area caused by dumping from ships and aircraft or incineration at sea".

11. Specific obligations under the Dumping Protocol should be read in conjunction with the General Obligations laid down in Article 4 of the Barcelona Convention. This includes the obligation of the Contracting Parties to:

> "take all appropriate measures in accordance with the provisions to this Convention and those Protocols in force to which they are party to prevent, abate, combat and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area and to protect and enhance the marine environment in that Area, so as to contribute towards its sustainable development".

12. Through Article 4 of the Barcelona Convention, the aims of the Dumping Protocol are framed within the broad context of the Barcelona Convention and the rest of its Protocols, including the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean, 1995 (SPA/BD Protocol) and the Protocol on Integrated Coastal Zone Management in the Mediterranean, 2008 (ICZM Protocol).

Use of vessels as artificial reefs within the framework of the Updated Guidelines on Placement for Artificial Reefs

13. The dumping of vessels is prohibited by Article 4.2 of the Dumping Protocol. However, its placement is allowed under Article 3.4(b) of the Dumping Protocol provided that: (1) the placement is for a purpose other than the mere disposal, and (2) it is not contrary to the aims of the Protocol. As long as the requirements established in Article 3.4(b) of the Dumping Protocol are met, vessels could be therefore placed in the Mediterranean Sea Area. From that perspective, the use as artificial reefs of vessels would fall under Article 3.4(b), should the placement of vessels serve the legitimate purpose of an artificial reef.

14. As currently drafted, the Updated Guidelines play a key role in assisting Contracting Parties to reach a decision on whether any proposed operation does indeed constitute "placement of matter for a purpose other than the mere disposal thereof" rather than dumping, and on whether it may be contrary to the aims of the Protocol and the Barcelona Convention.

15. The Updated Guidelines ensure that placement is not used as an excuse for disposing wastes or other matter without a permit or disposing of waste or other matter the dumping of which would otherwise be prohibited. By issuing guidance on permitting, cleaning and monitoring requirements for placement, the Updated Guidelines provide an assessment framework for Contracting Parties to satisfy themselves that any proposed placement operation, such as the use as artificial reefs of vessels, is legitimate, and that it is not a disposal operation which ought to be subject to the controls or prohibitions laid down under the Dumping Protocol. In addition, the Updated Guidelines should be read in the context of global and regional relevant developments in the area such as the London

Convention and Protocol/UNEP Guidelines for the Placement of Artificial Reefs and the FAO-GFCM Practical Guidelines.

16. In this regard, the Updated Guidelines set out a broad range of factors to be addressed when considering the use of vessels as artificial reefs, with particular emphasis on potential impacts on the marine environment, including protected species and habitats and on other legitimate uses of the sea.

Distinctive elements of the Updated Guidelines

New elements in comparison with the 2005 Guidelines

17. One of the distinctive elements of the Updated Guidelines in comparison with the 2005 Guidelines is the incorporation of the MAP Ecological Objectives related to the placement of artificial reefs as well as the overall goal of achieving and/or maintaining Good Environmental Status (GES) of the Mediterranean Sea Area, in line with the MAP Ecosystem Approach (paragraphs 3 and 6). In the same spirit to reflect the most recent and relevant developments in the UN Environment/MAP system, the Updated Guidelines link the monitoring operations for placement to the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP) (paragraph 104) .

18. All this adds to the following new elements included in the Updated Guidelines in comparison with the 2005 Guidelines:

(1) further elaboration of the legal basis for action, to accurately reflect the relevant provisions of the Dumping Protocol (introduction);

(2) refinement of the definition of artificial reefs, putting it in line with the definition of the London Convention and Protocol/UNEP Guidelines for the Placement of Artificial Reefs (paragraphs 8 to 10);

(3) expansion of paragraph 14 to add the sentence: “Vessels structures could be placed, under the provisions of the Protocol, provided that the instructions of these Updated Guidelines are properly implemented”;

(4) inclusion of a new factor to consider “previous dumping sites in the area” when assessing the proposed artificial reef location (paragraph 20 (m));

(5) addition of three new requirements to be included in the permit application: “the purpose for the placement of the artificial reefs”, “the impact hypothesis” and “the design, which includes selecting appropriate materials and designing the detailed structure, based both on the purpose of the reef” (paragraph 33);

(6) deletion of the condition for issuing a permit under which in the event that the determined criteria cannot be met, a Contracting Party should not issue a permit unless a detailed assessment shows that placement at sea is nonetheless the least detrimental option; and

(7) limitation of the consultation procedure to those cases where transboundary impacts are indicated in the impact hypothesis (section 2.5);

(8) new Part C included addressing the “Placement of Vessels Hull and Superstructure” and addition of the following three new sections under Part C: 1. “Benefits”, 2. “Limitations and drawbacks” and 3. “Recommendations and Considerations”. Of particular relevance is the new section on Recommendations and Considerations, which covers different type of elements, including environmental considerations.

SPA/RAC and PAP/RAC input

19. Following the MAP Focal Points Meeting and consultations with their Focal Points, SPA/RAC revisited the Updated Guidelines and proposed a number of changes as detailed below.

20. It is worth to mention that among the priority actions of SAP BIO to prevent impact of fisheries on biodiversity include the developing of management techniques such as artificial reefs to prevent illegal towed gears. Requirements from the Guidelines for impact assessment on seagrass meadows, elaborated under the Action Plan for the Conservation of Marine Vegetation were also

taken into account, taking into account that artificial reefs are more frequently used to protect habitats (mostly seagrass meadows) than for anything else. Other suggested changes are based on SPA/RAC expert judgement, based on its experience in the conservation of threatened species and key habitats and the establishment and management of MPAs.

21. It has to be noted that practical guidelines for « The Use of Artificial Reefs In the Mediterranean and the Black Sea » are produced by FAO-GFCM, that provide an up-to-date information and guidance regarding specific management practices for the planning, siting, construction and anchoring of artificial reefs in the Mediterranean and the Black Sea, for monitoring their effectiveness from an ecological and socio-economic point of view.

22. Changes proposed are put in square brackets and presented in track change mode in the Updated Guidelines. They refer to:

(1) refinement of paragraph 7(f) by including the term “MPAs”, to specify that one of the uses of artificial reefs is creating fish aggregation areas for “MPAs”;

(2) refinement of the definition of artificial reef by highlighting the role of artificial reefs in enhancing biological diversity (paragraphs 8 and 11);

(3) modification of paragraph 20(h), firstly by inclusion of the term “marine” before key habitats, so that “marine” key habitats are considered when assessing the proposed artificial reef location, and secondly by moving the last sentence of paragraph 20(h) “Specially Protected Areas cover by the provisions of the Protocol concerning Specially Protected areas and Biological Diversity in the Mediterranean” to the first line of the paragraph;

(4) inclusion of a new paragraph stating that special attention should be paid to the technical possibility of removing or reforming the artificial reef once it is placed, and that in relation to this, placement of artificial reefs in deep sea beds should be avoided (paragraph 22);

(5) refinement of paragraph 25 by adding the term “MPAs” in the third line, so that the potential effects on MPAs are considered when carrying out the assessment for placement;

(6) refinement of paragraph 26 by including the term “MPAs” in the second line, so that the potential impacts on “MPAs” are considered when constructing an impact hypothesis;

(7) addition of a new paragraph providing for a detailed impact assessment and an updated MPA management plan in cases of placement of artificial reefs in MPAs (core or buffer area) (paragraph 29);

(8) expansion of paragraph 33(d), so that the requirements for a permit application consider the location of the placement site(s) “and distance from MPAs and fishing shoals”;

(9) rewording of paragraph 34(a)(i) to include the consideration of possible impacts of the installation of an artificial reef on marine key habitats and the environment of the site and the wider surroundings;

(10) refinement of paragraph 102 to highlight that the monitoring programme should be in line with the IMAP for the relevant Ecological Objectives; and

(11) inclusion of the reference to IMAP and fishing related Ecological Objectives numbers 3 and 4 in paragraph 104.

23. After the MAP Focal Points Meeting and in consultation with their Focal Points, PAP/RAC also revisited the Updated Guidelines, and in light of input received by PAP/RAC National Focal Points, concluded as follows. The review of the Updated Guidelines by PAP/RAC is relevant due to the geographical coverage (Article 3) of the ICZM Protocol defined by its landward and seaward limits, and due to a number of provisions that have to be respected in order to comply with the Protocol. In particular, these are: Objectives of ICZM (Article 5), and General Principles (Article 6), Economic Activities (Article 9), Specific Coastal Ecosystems (Article 10), Participation (Article 14), Monitoring (Article 16), Environmental Assessment (Article 19), Coastal Erosion (Article 23), Transboundary Cooperation (Article 28) and Transboundary Environmental Assessment (Article 29).

24. PAP/RAC concluded that the Updated Guidelines are not in contradiction with the ICZM Protocol and that its requirements are respected and covered by the Guidelines in particular in the sections related to: Definitions (paragraph 10), Placement (paragraphs 18-20), Assessment of potential effect-impact hypothesis (paragraphs 24-26, 28 and 30), Requirements for a permit application (paragraph 33), Criteria for the evaluation of a permit application (paragraph 34), Conditions for issuing a permit (paragraph 37) and Supplemental conditions (paragraph 40), Consultation procedure in case of transboundary impacts (paragraphs 40-50), Recommendations and Considerations (paragraph 56), and in the Part D (paragraphs 101-102).

25. During the consultation process, three Contracting Parties expressed their reservations on the Updated Guidelines. Based on the above, and in response to one set of comments by one Contracting Party, the following changes are proposed. They are put in square brackets and presented in track change mode in the Updated Guidelines. They refer to:

(1) addition of the sentence "including health and safety considerations" at the end of paragraph 33 (b), so that the impact hypothesis includes health and safety considerations;

(2) addition of "the proposed corrective and mitigating measures" as a new requirement when considering a permit application (paragraph 33 (h)); and

(3) new sentence added at the end of paragraph 38 to specify that "In this regard, the permit should specify preventive or mitigating and corrective measures aiming at preventing or mitigating a potential impact".

26. Finally, the following changes are proposed for insertion:

a. Reference to the 1995 SPA/BD Protocol in the fifth preambular paragraph in the draft decision;

b. One new preambular paragraph in the draft decision which reads: "*Recognising* the need to pay special attention to the effects of artificial reefs placement in marine protected areas, including SPAMIs, frequently embracing outstanding vulnerable ecosystems less affected by humans in the past," and

c. Taking into account that Contracting Parties may have adopted legislation under which the use of vessels as artificial reefs is not allow, the following paragraph is suggested to be inserted in the draft decision and in the text of the Updated Guidelines (paragraph 5bis): "The Updated Guidelines on Placement for Artificial Reefs shall be without prejudice to stricter provisions with respect to the placement for artificial reefs in the Mediterranean Sea Area contained in other existing or future national or international instruments or programmes".

[Draft decision IG.23/13

Updated Guidelines for Regulating the Placement of Artificial Reefs at Sea~~Updated guidelines on placement for artificial reefs~~

The Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean and its Protocols at their twentieth meeting,

Having regard to the 1995 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 1995 Dumping Protocol", and in particular article 3 (4) (b) thereof, which excludes from the definition of dumping the placement of matter for a purpose other than mere disposal, provided that such placement is not contrary to the aims of the 1995 Dumping Protocol,

Recalling the 2005 Guidelines for the Placement at Sea of Matter for Purpose other than the Mere Disposal (Construction of Artificial Reefs), adopted by the Contracting Parties at their fourteenth meeting, and acknowledging the progress achieved and lessons learned in their implementation,

Recalling also decision IG.22/20, adopted by the Contracting Parties at their nineteenth meeting, whereby the Contracting Parties mandated the updating of the 2005 Guidelines,

Recognizing the need to assess proposals for the placement of artificial reefs in the Mediterranean Sea area on the basis of scientifically sound criteria and to develop an appropriate framework for the environmentally sound management of the placement of artificial reefs in the Mediterranean Sea area,

Bearing in mind that placement of matter for a purpose other than the mere disposal in the Mediterranean Sea area is not contrary to the aims of the 1995 Dumping Protocol, and that, in line with the object and purpose of the 1995 Dumping Protocol, the 1995 SPA/BD Protocol -and the Barcelona Convention, placement activities must not be used to legitimize the dumping of waste or other matter that is prohibited under the 1995 Dumping Protocol,

Bearing in mind also that, subject to the entry into force of the 1995 Dumping Protocol, the dumping of vessels in the Mediterranean Sea area has been prohibited since 31 December 2000 under article 4 (2) (c) of the Protocol,

Taking into account the most recent developments on placement of artificial reefs, in particular under the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its Protocol,

Recognising the need to pay special attention to the effects of artificial reefs placement in marine protected areas, including SPAMIs, frequently embracing outstanding vulnerable ecosystems less affected by humans in the past,

Committed to further streamlining the Mediterranean Action Plan ecological objectives, in particular those related to pollution, litter, biodiversity, and coast and hydrography and associated Good Environmental Status targets, as well as relevant provisions of the Regional Plan on Marine Litter Management in the Mediterranean, within the scope of application of the 1995 Dumping Protocol,

Having considered the report of the meeting of the focal points for the Programme for the Assessment and Control of Marine Pollution in the Mediterranean held in Rome in May 2017,

1. *Adopt* the updated Guidelines on Placement for Artificial Reefs, set out in the annex to the present decision, which replace the 2005 Guidelines;

2. *Request* the Contracting Parties to make every effort to ensure their effective implementation, keeping in mind that the Updated Guidelines on Placement for Artificial Reefs shall be without prejudice to stricter provisions with respect to the placement for artificial reefs in the Mediterranean Sea Area contained in other existing or future national or international instruments or programmes;

~~1.~~3. *Urge* the Contracting Parties to report on placement activities in the Mediterranean Sea area in a timely manner, using the online Barcelona Convention reporting system;

~~2.~~4. *Request* the secretariat to facilitate the work of the Contracting Parties for the implementation of the Guidelines on Placement for Artificial Reefs by further strengthening cooperation and synergies in that area with the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and its Protocol and other relevant instruments of the International Maritime Organization, and by sharing information with regional and global agreements and programmes on the progress and achievements of the Mediterranean Action Plan Barcelona Convention system in that area.]

[ANNEX

Updated Guidelines for Regulating the Placement of Artificial Reefs at Sea~~Updated Guidelines on Placement for Artificial Reefs~~

Table of Contents

Field Code Changed

List of Abbreviations / Acronyms

BEP	Best Environmental Practice
CFCs	Chlorofluorocarbons
CPs	Contracting Parties
COP	Conference of the Parties
FAO	Food and Agriculture Organization of the United Nations
GFCM	General Fisheries Commission for the Mediterranean
GES	Good Environmental Status
IMAP	Integrated Monitoring and Assessment Programme
IMO	International Maritime Organization
MAP	Mediterranean Action Plan
MED POL	Programme for the Assessment and Control of Marine Pollution in the Mediterranean Sea
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PCBs	Polychlorobiphenyls
RAC/SPA	Regional Activity Centre for Specially Protected Areas
SPAMIs	Specially Protected Areas of Mediterranean Importance
UNEP	United Nations Environment Programme
UNEP/MAP	United Nations Environment Programme/Mediterranean Action Plan

PART -A- REQUIREMENTS OF THE DUMPING PROTOCOL AND BARCELONA CONVENTION

1. Introduction

1. Under Article 4.1 of the Dumping Protocol, the dumping of wastes or other matter into the sea, with the exception of those listed in Article 4.2, is prohibited. Article 3(4b) of the amended Dumping Protocol excludes from the definition of "dumping" the placement of matter for a purpose other than the mere disposal provided that such placement is done in accordance with the relevant provisions of the Protocol.

2. In this regard the 'relevant provisions of the Convention' include the general obligations in Article 4, in particular the obligation that Contracting Parties shall, in accordance with the provisions of the Convention, take all possible steps to prevent and eliminate pollution and to protect the marine area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected (Article. 4.2, 4.3). More specifically, the provisions of Article 5 of the Convention, requires that: "The Contracting Parties shall take all appropriate measures to prevent, abate and to the fullest possible extent eliminate pollution of the Mediterranean Sea Area caused by dumping from ships and aircraft or incineration at sea".

3. Moreover, and at the outset of the adoption of Ecosystem Approach for the conservation of the marine ecosystems of the Mediterranean Sea, the CP's shall consider in their placement activities the Operational objectives and Good Environmental Status definitions relating to trace metals and selected organics, as included in the Decision IG.21/3, adopted by the COP18, in 2013.

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.

5. These updated Guidelines are prepared in pursuance to Article 3(4, b) of the amended Dumping Protocol of 1996. Their purpose is to assist Contracting Parties in:

(a) Considering the consequences for the marine environment of the placement of artificial reefs on the seabed. Construction of artificial reefs is one example of 'placement' and the Guidelines that follow contain elements that are relevant for a wide range of other coastal and offshore developments that have potential to cause adverse effects in the marine environment and that, therefore, should fall under the control of appropriate national authorities.
(b) Fulfilling their obligations relating to the issue of permits for the placement of matter
(c) Transmitting to the Organization reliable data on the input of matter covered by the Dumping Protocol.

[5bis The Updated Guidelines on Placement for Artificial Reefs shall be without prejudice to stricter provisions with respect to the placement for artificial reefs in the Mediterranean Sea Area contained in other existing or future national or international instruments or programmes]

6. Data and information provided by national authorities, in the framework of reporting exercise to IMO and MAP based on the respective London and Barcelona Conventions, indicate that the placement of vessels is, besides dredging, one of the major dumping activities in the Mediterranean coastal zones. In addition, considering the scientific findings which indicate a number of drawbacks in the placement of matter, and specifically of vessels, for reefs development and the resulting risks for tourist and ecosystems purpose and working in the framework of precautionary principle, the basic concept of these updated Guidelines is to provide instructions on the placement of artificial reefs for ecosystems enhancement and recommendations to ensure the stability of barges, small fishing boats,

tow and tug boats, small ferry boats etc. and, in general all vessels, under 30 m long which are placed at depth of less than 40 m, due to their possible human risks. These updated Guidelines provide as well ample information on placement of vessels in general, and clean-up procedures, which should be implemented before placement of all types of vessels to prevent pollution of the marine ecosystems and to contribute in achieving/maintaining GES in line with the Ecological Objectives 1, 2, 6, 7, 8, 9, and 10 and related GES definitions and targets.

2. Scope

7. Artificial reefs are used in coastal waters in many regions of the world for a range of coastal management applications. The development of artificial reefs in the maritime area is growing. . Among the uses being examined by the scientific community are:

(a) reduction of flooding and coastal erosion due to tidal waves;
(b) providing sheltered anchorages for shipping and small boats;
(c) development of habitat for crustaceans' fisheries (e.g. lobsters), particularly in conjunction with juvenile restocking;
(d) providing substrate for algae or mollusc cultivation;
(e) providing means of restricting fishing in areas where stocks or ecosystems are in need of protection;
(f) creating fish aggregation areas for [MPAs,]fisheries, sport anglers and diving;
(g) replacing habitats in areas where particular substrates are under threat;
(h) mitigation for habitat loss elsewhere (e.g. consequence of land reclamation);
(i) production of marine resources.

3. Definitions and Purpose

8. An artificial reef is a submerged structure deliberately constructed or placed on the seabed to emulate some functions of a natural reef such as protecting, regenerating, concentrating, and/or enhancing [biological diversity and/or] populations of living marine resources.

9. Objectives of an artificial reef may also include the protection, restoration and regeneration of aquatic habitats, and the promotion of research, recreational opportunities, and educational use of the area.

10. The term does not include submerged structures deliberately placed to perform functions not related to those of a natural reef - such as breakwaters, mooring, cables, pipelines, marine research devices or platforms even if they incidentally imitate some functions of a natural reef.

11. These Guidelines address those structures specifically built for protecting, regenerating, concentrating and/or increasing [biological diversity and/or] the production of living marine resources, whether for fisheries or nature conservation. This includes the protection and regeneration of habitats.

12. Any authorization for the creation of an artificial reef should identify clearly the purposes for which it may be created.

PART-B- ASSESSMENT AND MANAGEMENT OF PLACEMENT OPERATIONS AT SEA

1. Requirements for Construction and Placement

1.1 Materials

13. Artificial reefs should be built from inert materials. For the purpose of these Guidelines, are considered those which do not cause pollution through leaching, physical or chemical weathering and/or biological activity. Physical or chemical weathering of structures may result in increased exposures for sensitive organisms to contaminants and lead to adverse environmental effects.

14. Materials used for the construction of permanent artificial reefs will of necessity be bulky in nature, for example geological material (i.e. rock), concrete or steel. Vessel structures could be placed, under the provisions of the Protocol, provided that the instructions of these updated Guidelines are properly implemented.

15. No materials should be used for the construction of artificial reefs which constitute wastes or other matter whose placement at sea is otherwise prohibited.[3]

1.2 Design

16. Modules for artificial reefs are generally built on land unless they consist solely of natural materials placed in an unmodified form. The materials chosen for the construction of artificial reefs will need to be of sufficient engineering strength, both as individual units and as an overall structure to withstand the physical stresses of the marine environment and not break up, potentially causing serious interference problems over a wide area of the seabed. Artificial reefs must also be constructed and installed in such a way as to ensure that the structures are not displaced or overturned by force of towed gears, waves, currents or erosion processes for their objectives to be fulfilled at all times.

17. Artificial reefs should be designed and built in such a way that they could be removed, if required. The design of the artificial reef should strive to achieve its objectives with minimum occupation of space and interference with the marine ecosystems.

1.3 Placement

18. The placement of artificial reefs should be done with due regard to any legitimate activity underway or foreseen in the area of interest, such as navigation, tourism, recreation, fishing, aquaculture, nature conservation or coastal zone management.

19. Prior to placement of an artificial reef, all groups and individuals who may be affected or interested, should be informed on the characteristics of the artificial reef as well as on its location and depth of placement. They should be given the opportunity to make their views known in due time prior to its placement.

20. The location of a proposed artificial reef and the timing of its construction/placement should be carefully considered by the competent body at an early stage in the planning, especially with regard to:

(a) distance to the nearest coastline;
(b) coastal processes including sediment movement;
(c) recreational areas and coastal amenities;
(d) spawning and nursery areas;
(e) known migration routes of fish or marine mammals;

[3] This provision provides a stricter framework for action than the Protocol

(f) sport and commercial fishing areas;
(g) areas of natural beauty or significance cultural, historical, or archaeological importance;
(h) areas of scientific or biological importance (e.g. [marine] key habitats, [Specially Protected Areas cover by the provisions of the Protocol concerning Specially Protected areas and Biological Diversity in the Mediterranean,] SPAMIs, protected areas designated under Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna and Council Directive 79/409/EEC on the conservation of birds and under International Conventions or corresponding legislation of other Contracting Parties, [~~Specially Protected Areas cover by the provisions of the Protocol concerning Specially Protected areas and Biological Diversity in the Mediterranean~~]);
(i) shipping lanes or anchorages;
(j) designated marine placement sites;
(k) old military exclusion zones, including closed dumpsites;
(l) engineering uses of the seafloor (e.g. potential or ongoing seabed mining, seabed pipelines; undersea cables, desalination or energy conversion sites).
(m) previous dumping sites in the area

21. While in many cases the aim should be to avoid conflict with the above interests, the management objectives for an artificial reef could be directed specifically at interference, such as discouraging the use of certain types of fishing gear. It will also be important to consider information on the following:

(n) water depths (maximum, minimum, mean);
(o) influence on stratification;
(p) tidal period;
(q) direction and velocity of residual currents;
(r) wind and wave characteristics;
(s) impact on coastal protection;
(t) influence of the structure on local suspended solid concentrations.

22. [Special attention will be paid to the technical possibility for future physical access to the reef in case of need, notably with regard to its maximum depth, to allow removing or reforming it once placed. In relation to this, placement of artificial reefs in deep sea beds should be avoided.]

23. The competent authority to issue the permit should ensure that the position surveyed, depth and dimensions of the artificial reef is indicated on nautical charts. In addition, the authority should ensure that advance notice is issued to advise mariners and hydrographic surveying services of the placement.

1.4 Assessment of potential effects-impact hypothesis

24. Assessment of potential effects should lead to a concise statement of the expected consequences on the marine environment, i.e., the "Impact Hypothesis". It provides a basis for deciding whether to approve or reject the proposed placement option and for defining environmental monitoring requirements.

25. The assessment for placement should integrate information on matter characteristics, conditions at the proposed placement-site(s), proposed placement techniques and specify the potential effects on human health, living resources, [MPAs], 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.

26. In constructing an impact hypothesis, particular attention should be given to, but not limited to, potential impacts on [MPAs,] amenities, 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.

27. All matter 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 hypothesis may not address all possible scenarios such as unanticipated impacts. It is therefore, imperative that the monitoring programme be linked directly to the hypothesis and serve as a feedback mechanism to verify the predictions and review the adequacy of management measures applied to the placement operation and at the placement-site. It is important to identify the sources and consequences of uncertainty. The only effects requiring detailed consideration in this context are physical impacts on biota.

28. The expected consequences of placement 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. Emphasis should be placed on biological effects and habitat modification as well as physical and chemical change. The following factors should be addressed:

(a) physical changes and physical effects on biota; and
(b) effects on sediment transport.

29. [Whenever an artificial reef placement is intended to be done within the limits of an MPA (either its core or buffer area), a detailed impact assessment specifically intended for that case has to be done; and a related update of the MPA management plan undertaken before the physical placement works take place.]

30. Where the impact hypothesis indicates any transboundary impacts a consultation procedure should be initiated in accordance with Section 2.5.

1.5 Scientific Experiments

31. Trials involving smaller scale[4] placement for scientific purposes may be required before proceeding with a full scale deployment in order to evaluate the suitability of artificial reef and to assess the accuracy of the predictions of its impact on the local marine environment. As the use of artificial reefs develops, scientific experiments may be carried out. In these cases, full justification referred to under section 3 of Part A “Definitions and Purposes” may not be possible or necessary.

1.6 Management and Liabilities

32. Authorisations for constructing artificial reefs should:

(a) specify the responsibility for carrying out any management measures and monitoring activities required and for publishing reports on the results of any such monitoring;
(b) specify the owner of the artificial reef and the person liable for meeting claims for future damage caused by those structures and the arrangements under which such claims can be pursued against the person liable.

[4] In the planning phase for a full scale artificial reefs scientists usually carry out small scale placement experiments before proceeding with a full scale deployment in order to evaluate the suitability of the artificial reef and to assess the accuracy of the impacts hypothesis on the local marine environment

2. Requirements for the authorization of placement at sea of matter

2.1 Requirements for a permit application

33. Any application for a permit has to contain data and information specifying:

(a) the purpose for the placement of the artificial reefs,
(b) the impact hypothesis, [including health and safety considerations]
(c) the types, amounts and sources of the matter to be placed;
(d) the design – which includes selecting appropriate materials and designing the detailed structure, based both on the purpose of the reef
(d) the location of the placement site(s) [and distance from MPAs and fishing shoals];
(e) the history of previous placement operations and/or past activities with negative environmental impacts;
(f) the method of placement; and
(g) the proposed monitoring and reporting arrangements
~~(g)~~(h) [the proposed corrective and mitigating measures].

2.2 Criteria for the evaluation of a permit application

34. Artificial reefs should only be established if, after due consideration of all environmental costs and socio-economic aspects (e.g. undesirable impacts or alteration), a net benefit can be demonstrated, in relation to the defined objectives. In such assessment of potential effects (which may have to be a formal environmental impact assessment if major impacts cannot be ruled out) the following steps should be followed:

(a) Studies should be carried out that yield the information required to assess:
   i. Possible impacts of the installation of an artificial reef on the indigenous fauna and flora, [marine key habitats and the environment of the site and the wider surroundings;]
   ii. The benefits expected to be obtained from the installation of an artificial reef;
(b) The best alternatives for the design and placement of the artificial reef should be identified. At this stage, the benefits of all options including that of no action should be assessed in relation to their environmental costs and socio-economic aspects ;
(c) Before installing an artificial reef, baseline studies should be conducted to provide benchmark data for the subsequent monitoring of the effects of an artificial reef on the marine environment.

35. Where the comparative assessment reveals that adequate information is not available to determine the likely effects of the proposed placement option, including the potential long-term harmful consequences, then this option should not be considered further. In addition, where analysis of the comparative assessment shows that the placement option is less preferable than other option, a permit should not be issued for the placement.

36. Each assessment should conclude with a statement in support of a decision to either issue or refuse a permit for placement. Opportunities should be provided for public review and participation in the permit evaluation process.

2.3 Conditions for issuing a permit

37. A decision to issue a permit should be based on the elements provided by the preliminary survey. If the characterisation of these conditions is insufficient for the formulation of an impact hypothesis, additional information will be required before any final decision is made with regard to issuing a permit.

38. A decision to issue a permit should only be made where all the impact assessments are complete, taking into account the defined criteria, and where the monitoring requirements have been determined. The conditions set out in the permit should be such as to ensure, in so far as practicable, that environmental disturbance and detriment are minimized, and that benefits are maximized. [In this regard, the permit should specify preventive or mitigating and corrective measures aiming at preventing or mitigating a potential impact.]

39. Regulators should strive at all times to enforce procedures which ensure that environmental changes are as far below the limits of allowable environmental change as practicable, taking into account technological capacities and economic, social and political considerations.
The authority responsible for issuing the permit should take into consideration relevant research findings when specifying permit requirements.

2.4 Supplemental conditions for issuing a permit for an existing placement site

40. The issuing of a permit for placement at a site where past placement activities were carried out should be based on a comprehensive review of results and objectives of existing monitoring programmes. The review process provides an important feedback and informed decision-making regarding the impacts of further placement activities, and whether a permit may be issued for further placement on site. Furthermore, such a review will indicate whether the field-monitoring programme needs to be continued, revised or terminated.

2.5 Consultation procedure in case of transboundary impacts

41. With reference to Section 1.4 of Part B and in case the impacts hypothesis indicates any transboundary impacts a consultation procedure should be initiated at least 32 weeks before any planned date of a decision on that question by sending to the Secretariat a notification containing:

(a) an assessment prepared in accordance with Part B to this Guidelines, including the summary in accordance with Part B of these Guidelines;
(b) an explanation why the relevant Contracting Party considers that the requirements of Section 1.4 of Part B of these Guidelines may be satisfied;
(c) any further information necessary to enable other Contracting Parties to consider the impacts and practical availability of options for re-use, recycling and placement.
(d) MAP Secretariat shall immediately send copies of the notification to all Contracting Parties.

42. If a Contracting Party wishes to object to, or comment on, the issue of the permit, it shall inform the Contracting Party which is considering the issue of the permit not later than the end of 16 weeks from the date on which the MAP Secretariat circulated the notification to the Contracting Parties, and shall send a copy of the objection or comment to the MAP Secretariat. Any objection shall explain why the Contracting Party which is objecting considers that the case put forward fails to satisfy the requirements of Section 1.4 of Part B of these Guidelines. That explanation shall be supported by scientific and technical arguments. MAP Secretariat shall circulate any objection or comment to the other Contracting Parties.

43. Contracting Parties shall seek to resolve by mutual consultations any objections made under the previous paragraph. As soon as possible after such consultations, and in any event not later than the end of 22 weeks from the date on which the MAP Secretariat circulated the notification to the Contracting Parties, the Contracting Party proposing to issue the permit shall inform the MAP Secretariat of the outcome of the consultations. The MAP Secretariat shall forward the information immediately to all other Contracting Parties.

44. If such consultations do not resolve the objection, the Contracting Party which objected may, with the support of at least two other Contracting Parties, request the MAP Secretariat to arrange an ad hoc meeting as appropriate to discuss the objections raised. Such a request shall be made not later than

the end of 24 weeks from the date on which the MAP Secretariat circulated the notification to the Contracting Parties.

45. The Secretariat shall arrange for such an ad hoc meeting to be held within 6 weeks of the request for it, unless the Contracting Party considering the issue of a permit agrees to an extension. The meeting shall be open to all Contracting Parties, the operator of the installation in question and all observers to MAP Secretariat. The meeting shall focus on the information provided in accordance with section 1 of Part B of these Guidelines.

46. The chairman of the meeting shall be MAP Coordinator or a person appointed by MAP Coordinator. Any question about the arrangements for the meeting shall be resolved by the chairman of the meeting.

47. The chairman of the meeting shall prepare a report of the views expressed at the meeting and any conclusions reached. That report shall be sent to all Contracting Parties within two weeks of the meeting.

48. The competent authority of the relevant Contracting Party may take a decision to issue a permit at any time after:

(a) the end of 16 weeks from the date of dispatch of the copies under paragraph ~~39~~ 41 (d) of the consultation procedure, if there are no objections at the end of that period;
(b) the end of 22 weeks from the date of dispatch of the copies under paragraph ~~39~~41 (d) of the consultation procedure, if any objections have been settled by mutual consultation;
(c) the end of 24 weeks from the date of dispatch of the copies under paragraph 41~~39~~ (d) of the consultation procedure, if there is no request for an ad hoc meeting;
(d) receiving the report of the ad hoc meeting from the chairman of that meeting.

49. Before making a decision with regard to any permit, the competent authority of the relevant Contracting Party shall consider both the views and any conclusions recorded in the report of the ad hoc meeting, and any views expressed by Contracting Parties in the course of this procedure.

50. Copies of all the documents which are to be sent to all Contracting Parties in accordance with this procedure shall also be sent to those observers who have made a standing request for this to the Secretariat.

[PART-C- PLACEMENT OF VESSELS HULL AND SUPERSTRUCTURE[5]

51. [For the purpose of these updated Guidelines the term vessel applies to the vessel's hull, which is the main body of the vessel and its superstructure, which consists of parts of the vessel that project above her main deck.]

52. Placement of vessels should not be permitted by competent national authorities before securing that cleaning has been completed, in accordance with requirements under section 4 of the part C of these updated Guidelines.

53. Placement of vessels for the creation of artificial reefs is practiced by growing numbers of CPs in the Mediterranean region. This practice has, in principle, many ecosystems, economic and recreational benefits. Nevertheless, experiences from the Mediterranean region and other part of the world revealed several limitations and drawbacks which make vessels placement practices non beneficial to the marine ecosystems, the economy of coastal municipalities, maritime traffic and creating human health risks. Taking into consideration these facts, these updated Guidelines provide recommendations to the CPs to be consider by national relevant authorities before granting a vessel placement permit. It should be read in conjunction with the Art. 3(4b) of Dumping Protocol and offer guidance, based on observation and experience, on how to perform vessels placement. In this respect it is highly recommended to consider the provision of other relevant international Conventions (such as Hong Kong Convention, Basel Convention etc.).

1. Benefits

54. Benefits could be summarized, among others, as follows**:**

(a) Vessels make interesting diving locations for both recreational divers and technical deep diving mixed-gas users. Vessels are also regularly utilized as angling sites by recreational fishermen and the charter fishing industry.
(b) Vessels used as artificial reefs, can, alone, or in conjunction with other types of artificial reefs, generate reef-related economic contributions to coastal municipalities.
(c) Steel-hulled vessels are considered durable artificial reef material when placed at depths and orientations that insure stability in major storm events. Large vessels have life spans as artificial reefs that may exceed 60 years, depending on vessel type, physical condition, location of deployment, and storm severity.
(d) Reuse of large steel-hulled vessels as artificial reefs may be more economical than scrapping the vessels domestically.
(e) Vessels, due to high vertical profile, attract both pelagic and demersal fishes. Vertical surfaces produce upwelling conditions, current shadows, and other current speed and direction alterations that are attractive to schooling forage fishes, which in turn attract species of commercial and recreational importance, resulting in increased catch rates for fishermen.
(f) Vessels, like other artificial reef material, can augment benthic structure which locally increases shelter opportunities and reef fish carrying capacity in locations

[5] Pending submission of the legal advice by the Secretariat to the meeting of MAP Focal Points with the view to ensure that the placement of vessel hulls and superstructures for the purpose of artificial reefs is not in contravention with Article 4 of the Dumping Protocol which prohibits the dumping of ships in the Mediterranean Sea area since 2000.

where natural structure is sparse, or create structure which is more preferable or attractive to certain fish species than locally less complex hard bottom.

(g) Steel-hulled vessel reefs that are not well publicized, located far offshore, or otherwise difficult to access for fishing and diving because of depth and currents may, if properly sited, provide important refuge for reef fish species. Such vessels can provide important aggregation, shelter, and residence sites for reef fish species that have been traditionally over-fished.
(h) Vessels under certain conditions may provide habitat for spawning aggregations of some managed reef fishes.
(i) Vessels may provide extensive surface area for epibenthic colonization. This colonization results in the enhancement of lower trophic level biomass at the vessel site.
(j) Under some circumstances, depending on location and season, some vessels may hold greater abundances and higher biomass of fish species, including some recreationally important species (i.e. snappers), than nearby natural reefs.
(k) Vessels may reduce anchor damage and other physical damage by directing a proportion of the reef users away from nearby natural reefs. Similarly, vessels provide diving alternatives to natural reef sites where physical damage to natural reefs through anchor damage, grounding, handling, crawling on, specimen collecting, and spear fishing have accelerated deterioration of natural reefs and their associated fauna.

2. Limitations and drawbacks

55. The literature highlighted number of limitations and drawbacks related to placement of vessels for artificial reefs:

(a) Vessels were originally designed and utilized for purposes other than artificial reef construction. They can be contaminated with pollutants, including: PCBs, radioactive control dials, petroleum products, lead, mercury, zinc, and asbestos. Hazardous wastes and other pollutants are difficult and expensive to remove from ships. Hazardous material itself, once removed must be disposed of under proper Guidelines without any damage to the environment.
(b) Damage to private and public property during cleaning operations or subsequent towing, vessels sinking outside of the designated site creating hazards to navigation, and ships damaging natural habitats due to improper deployment or subsequent movement.
(c) Vessel stability during storms is variable. Vessels placed in shallow depths (less than 50 m) are more susceptible to movement during major storm events than vessels placed at greater depths and local oceanographic characteristics should be taken into account.
(d) Damage to the structural integrity of vessels sunk as artificial reefs can also occur from storms. However, it should be noted that natural reefs, and some other less durable types of artificial reef structures have also experienced storm damage. Some vessels that may resist significant hull movement in a storm can still experience substantial structural damage. Loss of structural integrity can increase hazards to divers on artificial reefs by creating a disorienting environment or increasing potential for snagging equipment or for physical injury from jagged metal, etc.
(e) Removal of hazardous materials, pollutants, and other material not authorized for

artificial reef disposal under the permit requires additional expense, time, and in some cases special equipment and expertise. The cost to safely place a vessel in the sea as an artificial reef increases as the size of the vessel, number of compartments, void spaces, and overall complexity increase.

(f) Vessels typically provide proportionately less shelter for demersal fishes and invertebrates than other materials of comparable total volume. This is because the large hull and deck surfaces provide few, if any, holes and crevices. This lack of shelter from predation greatly reduces the usefulness of a ship as nursery for the production of fishes and invertebrates. Also, while a high vertical profile can be attractive to pelagic fish species, unless a vessel hull is extensively modified to allow for access, water circulation and light penetration, most of the interior of the vessel is not utilized by marine fishes and macro invertebrates.

(g) Use of vessels for artificial reef can result in conflicts between divers and fishermen and any other legitimate use of the sea. Although such conflicts can occur on natural reefs, there is often preferential use of vessels by divers resulting in domination of some vessel reef sites by diving user groups. This is particularly true in areas with large tourist and resident diving populations that are selectively attracted to vessels sunk in shallow, clear and warm water environments.

(h) The surface of a steel hull is a less ideal surface for colonization by epibenthos than rocks or concrete. Sloughing of steel, due to corrosion, results in loss of epibenthic animals.

(i) The placement of vessels has an impact on the integrity of seabed, during the placement operations and their movement during storms.

3. Recommendations and Considerations

56. On the basis of the benefits, limitations and drawbacks it is highly advisable to:

(a) The applicant for a vessel placement should ensure the stability of barges, small fishing boats, tow and tug boats, small ferry boats etc. and, in general all vessels under 30 m long which are placed at depth of less than 40 m due to their possible human risks.

(b) Recommend a buffer zone of about 450 m between any natural hard and soft bottom occupied by protected species or habitats and vessels deployed as artificial reef material in depths less than 50 m. This safety buffer is based upon documented movement of vessels, or parts thereof, in storm events. At depths below 50 m but less than 100 m, a buffer distance of a least 100 m is recommended. For the purposes of these Guidelines, hard bottom includes living natural reefs such as coral reefs, oyster reefs, worm reefs, and areas of naturally occurring hard bottom or rocky outcrops to which are attached well developed varying biological assemblages such as perennial algal species, and/or such invertebrates as sea fans, bryozoans, sea whips, hydroids, ascidians, sponges, or corals.

(c) Literature and regional experiences have demonstrated that it is possible to have a viable artificial reef program without vessels. It is important for managers to assess their objectives when securing a vessel, since cleaning and towing costs, especially when transboundary transport is involved, can be prohibitive.

(d) With the rapid increase in recreational sport diving activities in some areas, ship deployment in certain areas may have greater value to the diving industry than to the recreational hook and- line fishery. Vessels deployed in shallow water (18-30 m) are

especially attractive to recreational SCUBA divers. If the funding source is fishing license revenues, and the site is dominated by divers, this issue should be considered.

(e) If the intent of developing an artificial reef is to provide recreational fishing opportunities with some level of fishing success, while at the same time avoiding user conflict, the combined effect of spear fishing and hook-and-line harvest and liability associated with diver accidents during wreck diving, may lead to a recommendation to sink vessels at greater depths (40 to 100 m).

(f) Consider using only those steel hulled vessels which are designed for operating in heavy sea conditions, such as sea tugs, oil rig re-supply vessels, trawlers, and small freighters, which are all structurally sound, the focus should be on structural and habitat complexity of vessels, rather than strictly vertical height or sheer overall length.

(g) Some contractors or other organizations tasked with cleaning vessels, or their hired laborers and volunteers have historically not always followed proper hazardous materials and other waste handling and disposal, and/or clean up instructions, including in these updated Guidelines, due to lack of expertise or training, inadequate facilities, equipment and manpower, desire to reduce project time and expenses, or insufficient guidance or over sight provided by the contract or project manager, and focus on removal of salvageable material to the detriment of meeting other cleaning and preparation objectives.

(h) All petroleum products, both liquid and semi-solid must be removed from tanks on ships with follow-up inspection. It is not sufficient to draw the tanks down and then weld the hatch closed. Experience has demonstrated that corrosion of the metal of the ship will eventually release residual fuel into the environment and that relatively small quantities can trigger regulatory and public relations consequences.

(i) Resistance to a 20-year storm event is a minimum acceptable level of stability. For vessels deployed within approximately 900 m of natural coral reefs, well developed hard bottom communities, or oil and gas infrastructures recommend that the vessel stability requirement at the depth placed increase to resistance to movement in a 50-year storm event.

(j) Avoid the use of explosives to the extent possible in sinking vessels under 45m in length where alternate sinking methods (opening sea cocks, flooding with pumps, opening up temporarily sealed pre-cut holes, etc.) are feasible. If explosives must be used for sinking larger vessels with many watertight compartments, there should be careful placement by experts of the minimal amount of structural cutting explosives necessary to sink the vessel safely and efficiently. The minimization of vessel damage and the avoidance of harm to marine life are important vessel sinking objectives. Potential impacts to marine mammals, turtles, and fishes should be considered

(k) It is important to develop and implement cleaning standards for pollutants known to occur on ships; require testing for PCBs on boats and ships constructed prior to 1975 (when PCB manufacture ended); require an asbestos inspection. Identified asbestos that is secured or encased may be left undisturbed, and in place prior to sinking.

(l) Liability issues must be recognized and addressed by permittees who are required to provide long-term responsibility for materials on their permitted artificial reef sites, including ships. Demonstration of this responsibility could include liability insurance, posting a bond or other indemnifying instrument to ensure resolution of liability issues associated with the towing, cleaning and sinking of ships on state submerged lands. This liability includes damages caused by movement of the materials during

storm events.

(m) All constraints that may be placed on sinking a ship (i.e. minimum depth, distance from shore, complexity of vessel that may require additional technical assistance, stability requirements, vessel orientation, cost, time involved in project, etc.) should be reassessed, in order to decide early on whether one or more of these constraints will result in a final outcome that will not be successful in achieving the project's objectives.

(n) It is recommended to establish a national coordinated reefing plan. Prior to the release of any ships under such a program, the national authority should be encouraged to the maximum extent possible to take all necessary steps to ensure the funding of the cleaning, preparation, towing and sinking of vessels in their entirety as a turnkey project, at a location selected by the state reef program designated to obtain the vessel.

4. Vessels Clean up

57. Suggestions for planning work:

a) Gather Information About the Vessel, ship and Boat

58. Several parts of these Guidelines require that information concerning the vessel, ship and boat be provided to the Designated Authority. If this information is not available, the clean-up organization or the permit applicant will have to develop some or all of the information, which typically come at a significant cost. As a condition of purchase of the vessel, ship and boat, permit applicants should collect from the owner of the vessel, ship and boat the following information and certificates (issued by competent authorities):

(a) asbestos certificates, indicating that the vessel, ship and boat is asbestos-free, or detailing the location of asbestos remaining in the vessel, ship and boat;
(b) PCB certificates, indicating that the vessel, ship and boat is PCB-free, or detailing the location of PCBs remaining in the vessel, ship and boat;
(c) for warships and naval auxiliaries, an "ammunition-free" certificate issued by defense authorities;
(d) for warships, naval auxiliaries, vessel, ship and boats that have been engaged as research ships, and other vessel, ship and boats that may have carried radioactive materials, a radiation inspection certificate;
(e) a certificate that refrigerants and halons have been removed from shipboard systems;
(f) other certificates relating to removal/addition of equipment, components or products;
(g) information on hazardous materials left in the vessel, ship and boat;
(h) information on exterior hull paint including paint type, detailed technical information on the paint, and date of application;
(i) information on machinery, compartment and tank layout, ideally in the form of a general arrangement drawing or firefighting compartment diagram;
(j) information on the fuels carried and used by the vessel ship and boat;

b) Develop a Work Plan to Reduce Costs

59. The two main operations (salvage and clean-up) will typically overlap and may proceed in parallel in different sections of the vessel, ship and boat. Experience has shown that it is critical, from an economic perspective, to have a comprehensive plan detailing the activities

to be undertaken. Failure to develop and use a plan has in the past, led to several repetitions of the same cleaning operations, or inability to salvage certain components due to access issues or lack of time. As funding for projects is usually finite, it is important for the viability of the project that efforts are not being wasted or opportunities missed to generate funds through salvage. The Designated Authority will not weaken the requirements as set forth in the Guidelines because the applicant or clean-up contractor has not adequately organized the work. Salvage and clean-up operations that could be considered a success from an economic as well as environmental perspective have required an extensive planning effort.

60. In general terms, salvage operations should come first, aiming to minimize debris and contamination with oils or other products that will have to be cleaned-up at a later stage. Experience indicates that a close link is required between the salvage and clean-up effort. Previous salvage operations that have not considered subsequent clean-up operations have resulted in massive cleaning requirements.

61. Clean-up would typically be the last operation in the continuum of activity. In any given section, clean-up would normally start at the highest part of the compartment or tank and proceed downwards to the bilge.

62. The following general principles have been developed from previous efforts:

(a) deal with the large concentrations of oil and hazardous products early in the operation;
(b) keep compartments clean and make concerted efforts to avoid spillage during salvage and clean-up;
(c) consider removing, instead of cleaning, heavily contaminated machinery and piping;
(d) removal is typically far quicker and allows for less overall effort in clean-up as access is improved and ongoing contamination from drips and seepage is minimized;
(e) maintain a strong project management presence at the site.

c) Maintain Security During Clean-up

63. Security of the vessel, ship and boat and the surrounding site should be addressed in the clean-up and salvage plan. Experience indicates that security issues are not static and need constant attention over the life of the project. However, to assist applicants and ensure the safety, it is recommended that the following issues be addressed:

(a) public safety: Vessel, ship and boat undergoing salvage operations are dangerous sites. The public must be prevented from accidentally or casually accessing the interior of the vessel, ship and boat and the clean-up site.
(b) salvage security: This is closely linked to the public safety issue. Inevitably, some members of the public will actively seek to gain illegal entrance to the site and vessel, ship and boat. This security issue requires constant vigilance and repeated assessment.
(c) -liability insurance should also be considered
(d) -environmental liability: Some of the material removed from the vessel, ship and boat could become a significant environmental liability if it were to be mishandled, disturbed or spilled. Material should not be allowed to accumulate at the site. Personnel involved in clean-up and salvage operations must be aware of environmental due diligence responsibilities.
(e) It is highly recommended that a secure lock-up (for tools, valuable salvage items,

items that are potentially hazardous, etc.) be made available.

d) Prepare for Inspections

64. Under normal circumstances the responsible of the Designated Authority will require a minimum of three weeks' notice to arrange an inspection. It is expected that two inspections will be conducted, with all deficiencies being corrected for the second and final inspection. If subsequent inspections are required these will likely involve further expenses being charged directly to the permit applicant.

65. The inspection team will consist of the responsible of the Designated Authority, plus any necessary specialist support staff. The permit applicant should ensure that the senior personnel from the clean-up team, and the salvage team, if it is a different organization, are onsite for the inspection(s). These personnel should accompany the Designated Authority during the inspection to allow full insight into any findings. The Designated Authority may, but is not obliged to, make suggestions concerning the clean-up effort. Where it is possible to correct minor findings during the course of the inspection, the Designated Authority may, if time allows, re-inspect the particular finding.

66. Special attention needs to be given to questions of access and personnel safety. The Designated Authority needs to inspect every part of the vessel, ship and boat without incurring undue personal risk.

e) General notes on salvage and recycling

67. A notable portion of most vessel, ship and boats is normally economically salvageable. Items that have been salvaged and sold intact in previous clean-up and salvage projects include diesel generators and associated equipment, various types of lockers, anchors and chain, watertight hatches and doors, furniture, and certain galley equipment. Valves, especially those of large diameter, are a further potential source of revenue. Depending on the rated voltage and frequency employed in the vessel, ship and boat, motors may be a further source of revenue. The difference between "used" value and scrap value can be significant. Salvage and clean-up contractors are encouraged to actively seek markets for used equipment and outfit items.

68. Equipment that has no current market may still have scrap value based on the raw material. Commonly found metals that are salvageable include:

(a) Bronze: This metal is typically cast, and is found in propellers, valve bodies, cooler bodies, and various machinery castings.
(b) Brass: Brass is typically found in machined form. Items likely to be found in a vessel, ship and boat include tube plates in coolers, small valves, decorative fittings, flush-deck covers for valves, and various machinery components.
(c) Copper-nickel: Copper-nickel is used extensively in seawater piping systems, and is commonly used as tubing material in coolers and condensers. Both 90-10 (most common) and 70-30 grades have been in use in the marine industry.
(d) Aluminum: Most aluminum is in sheet, plate or stiffener form. It may be found in a wide variety of outfit items including lockers, desks, bunks and shelving. Structural aluminum has been used in some vessel, ship and boats to minimize top weight, and is commonly found in masts and deck-houses.
(e) Copper: Copper is found in electrical cables, small diameter tubing (pressure gauges), motors, generators, and miscellaneous electrical fittings. Copper salvage is generally

a break-even process in economic terms.

(f) Stainless Steel: Stainless steel is most commonly employed in sheet or plate form and is found in food preparation and serving areas, medical facilities, upper deck lockers, and some exterior fittings.
Although steel is not generally economical to salvage, in many instances it will be cheaper and more effective overall to remove and recycle steel piping and equipment. This is a particularly effective strategy where the effort to clean the material in-situ is significant, or the material would cause access problems for the clean-up effort.

f) General notes on personnel safety during clean-up and inspections

69. Clean-up and salvage contractors are advised that their activities in the vessel, ship and boat and at the surrounding site will be subject to national requirements.

g) Notes on vessel, ship and boat stability during clean-up and transits

70. Operations associated with salvage, clean up and diver access have the potential to adversely impact vessel, ship and boat stability. This can be an important issue, especially if the vessel, ship and boat have to be moved to its sinking location. Failure to consider intact and damaged stability during operations could result in premature and uncontrolled capsizing and/or sinking of the vessel, ship and boat. This situation is entirely preventable.

71. Organizations embarking on SCUBA diving attraction projects are advised to obtain the services of a naval architect who is provincially registered to practice as a Professional Engineer, to review salvage plans and serve as a stability consultant.

72. Issues that need to be considered during the planning phase include, inter alia:

(a) Weight Removal: Weight removal will impact on the center of gravity, and hence the stability, of the vessel, ship and boat. In general terms, weight removed low in the ship (ballast bars, bilge piping, etc.) has an adverse impact on stability while weight removed high in the ship has a positive impact on stability.
(b) Hull Openings: Hull openings are often required for salvage efforts but they do present a risk of flooding. Hull openings should be well above the water line. Permit applicants must consider carefully hull breaches, especially if the vessel, ship and boat must be moved after hull openings are made.
(c) Natural roll, list, loll, and the possibility of encountering higher sea states must be borne in mind by the permit applicant.
(d) Watertight Integrity: Internal watertight integrity may not be at initial design Guidelines at the time of vessel, ship and boat disposal and is often further compromised by salvage activity.
(e) Free Surface Effects: Free surface may be an issue if fluids are allowed to accumulate in bilges, or if tanks are kept in a partially full condition. Stability of the vessel, ship and boat should be considered as an integral part of the salvage and clean-up plan. The permit applicant must continuously be aware of vessel, ship and boat stability conditions and be prepared to take action to improve vessel, ship and boat stability when required

h) Tank cleaning

73. Here are several accepted and widely used methods to clean fuel and oil tanks. The best method to use will depend on the type of hydrocarbon in the tank, the amount of residue in

the tank, and the extent of any hard or persistent deposits and residues. In general, lower quality fuels will require more cleaning effort. Similarly, tanks for dirty or water-contaminated oils will require more cleaning effort.

74. When cleaning tanks, the factors that need to be considered are the Guidelines requirements, the machinery and resources available, and the method or facilities available to deal with cleaning residues. It may be necessary to experiment with several cleaning methods to find one that will work in the particular circumstances. Where cleaning is expected to be complex or difficult the permit applicant should consider securing the services of a professional tank cleaning contractor. Options for cleaning tanks include, inter alia:

(a) mechanical cleaning

75. Mechanical cleaning involves mechanical removal of sludge and remaining fluids and wiping down all surfaces with oil absorbent material. Although costly in terms of manpower, it does limit the spread of contamination and minimize production of fluids which are expensive to dispose of.

(b) steam or hot water washing:

76. This method is quite effective, although it requires special equipment and generates large volumes of oily water. If this method is contemplated, the organization should have a plan to deal with the oily water that complies with local regulations and the National Shipping Act. Surfactants (or soaps) are not recommended, as they tend to emulsify any oil present and make the oily water exceptionally difficult to treat. This would likely drive disposal costs higher than necessary. In tanks where deck heads and sides are reasonably free of contamination, pressure washing can cause significant contamination of these otherwise clean surfaces through splashing, misting, and carry-over.

(c) solvent washing

77. Solvent washing may be an option where exceptionally tenacious deposits or films are encountered. Note that the used solvent will require subsequent removal and all of the liquid product generated will require special handling and disposal. In isolated cases, especially where low grade fuels have been stored, it may be necessary to resort to more advanced tank cleaning methods such as ultrasonic or special solvents.

78. It may be advantageous to employ all three methods in any given vessel, ship and boat, depending on the nature and location of the contamination. In general, mechanical cleaning would be the first method to try, followed by steam/hot water washing, then solvent washing in exceptionally difficult cleaning situations.

79. Whichever method is employed, the effluent and waste must be collected and treated. Large volumes will require the services of a pumper truck while smaller quantities may be handled in barrels. Care must be exercised in transfer operations to avoid spills. If large quantities of oil or oil-contaminated liquids are to be transferred the use of a boom around the vessel, ship and boat should be considered.

i) Cleaning compartments with bilges

80. Cleaning bilges is frequently complicated by poor access caused by piping, gratings, and equipment. During the planning phase the clean-up contractor should consider the access issue carefully. In many cases it is cheaper and easier to remove interference items (especially

when they themselves are dirty or contaminated) than it is to attempt to clean the items and the adjacent bilge.

81. Bilges, once clean, are very vulnerable to recontamination. Contractors should be aware of the following types of situations which have given rise to problems in the past:

(a) Piping, valves and fittings in hydrocarbon systems will continue to weep for some time after initial draining. These drips can -over a quite short period of time- lead to a significant rework effort. Drips should be captured whenever possible;
(b) Containers used for clean-up are vulnerable to tipping, especially in the uncertain footing and poor lighting conditions often found in vessel, ship and boats undergoing sinking preparation. Buckets should be removed as they are used, or if they are employed for catching drips, emptied regularly;
(c) Water should not be allowed to enter bilges unless it is part of a planned clean-up campaign. Water generally complicates clean-up of bilges as the water must be handled as oily wastewater. In general, the approach and methods for cleaning bilges is the same as for cleaning tanks.

j) Dealing with piping and fittings

82. Contractors should identify those pipes and fittings that contain fuels, oils and oily water as part of the planning activity. If ship's drawings are not available, it will be necessary to develop this information on site. Authority will generally assume that piping has contained hydrocarbons unless the piping is clearly identified as being part of a non-hydrocarbon system, or there is clear evidence to indicate that the piping was not part of a hydrocarbon system (e.g. sea water piping to coolers, fresh water piping to domestic spaces). As per the Guidelines, piping in the bilge will be assumed to be contaminated with oil until proven clean.

k) Cleaning fitted machinery

83. Cleaning fitted machinery is a lengthy and difficult process. Whenever possible, fitted machinery should be sold into the used machinery market or removed for recycling.

84. The general approach to cleaning diesel engines/generators, gearboxes, compressors, etc. is similar. The clean-up plan should identify the fluids and other contaminants in the machine to be removed. Care should be exercised to capture fluids to avoid further clean-up effort. Fluid types should not be mixed, as this may increase disposal costs. Large reservoirs of fluids should be drained first, followed by smaller accumulations in machinery housings, piping, and fittings. The force of gravity will assist in collecting the fluids over a period of time, and the clean-up plan should allow for an adequate drainage period. The precise period required will vary with internal machinery clearances, length and size of piping, fluid viscosity and temperature. As weeping of oils and fuels will continue for several days or weeks, clean-up plans should recognize the requirement to catch the seepage during this period so as to minimize collateral contamination of bilges, decks, piping bundles, etc. General guidance for specific equipment follows.

l) Combustion Engines

85. External Oil System: Drain the sump. Identify all external oil lines, coolers and other fittings. Open and drain these items. After draining, consideration should be given to removing these items from the vessel, ship and boat to prevent oil weeping from connections. Remove all oil filter and strainer elements, pressure gauges and gauge lines.

86. Fuel System: Remove fuel injectors. Identify all external fuel pressure lines, return lines and fittings. Open and drain these items. After draining, consideration should be given to removing these items from the vessel, ship and boat to prevent fuel weeping from connections. Remove all fuel filters and strainers, pressure gauges and gauge lines. Open and drain any governors.

87. Engine Internals: Open all explosion doors, hand-hole doors, maintenance access panels, etc. On some engines it may be desirable to cut further access openings. Remove heads and clean thoroughly, or drain and remove from vessel, ship and boat—note that heads may have salvage value depending on engine type and condition. Open all internal oil lines and galleries. Remove oil pump or open it and clean it for inspection. Open bearing pedestals and clean. Open turbo charger or supercharger bearings. At this point it is generally desirable to cut open the main oil sump for better access. Wipe out internal surfaces of engine. Persistent weeping indicates an oil or fuel accumulation that requires investigation.

88. Cooling System: Drain all treated water.

m) gearboxes

89. Gearboxes may be stand-alone items of equipment or integrated into a piece of machinery. The feature in common is a lubricating oil system. Treat initially as for “external oil system” covered under combustion engines. Open all covers and access panels. In most cases it will be necessary to cut further access holes to allow for the interior of the gearbox to be adequately cleaned. Open all internal oil lines. Open bearing pedestals (especially those in a horizontal plane) if there are oil accumulation pockets. The Designated Authority will need to see at least one bearing open to assess construction. Remove or drain gearing sprayers. Wipe down all surfaces.

n) other Machinery

90. Other machinery, often termed *auxiliary machinery*, can be considered in two broad classifications for clean-up purposes. The first group is machinery that does not employ oil lubrication, and does not contain grease other than within sealed rolling element bearings. These machines do not generally require hydrocarbon clean-up unless they were employed pumping fuel or oil, or have large grease reservoirs. Typical pieces of machinery that would usually not require clean-up include small water pumps and ventilation fans.

91. The second broad classification of machinery is equipment that utilizes lubricating oil, or contains greases outside of sealed bearings. While auxiliary machinery (air compressors, refrigerant compressors, circulating pumps, steam turbines, etc.) varies considerably in purpose and construction detail, the individual pieces can be dealt with in a similar manner during clean-up. Any working fluids that are hydrocarbon-based or otherwise hazardous (e.g. CFCs) should be removed first, and the pump-end left open. Fitted lubricating oil systems should be cleaned as noted under the heading “external oil system” in the combustion engine section. If a gearbox is fitted, it should be treated as for the section on gearboxes.

92. Experience indicates that oil sumps in small pieces of machinery will almost always need to be cut open to allow adequate access for cleaning. Wipe down all internal oiled surfaces. Grease packed couplings, stuffing boxes, chain sprockets, worm drives, etc. must generally be opened, unless they meet the restrictive “small quantities” exemption in the Guidelines.

93. The grease is usually best removed by mechanical means, although in some cases of very limited access (such as gun rings), it may be necessary to resort to steam or solvent washing.

94. Basic knowledge of machines and an understanding of the purpose of the specific equipment typically allow the clean-up effort to proceed more efficiently.

o) Suggestions on handling debris

95. Salvage and clean-up operations will generate a large quantity of material that needs to be removed from the vessel, ship and boat.

p) Salvage

96. The salvage and clean-up plan must address separating various types of salvage and debris. Care should be exercised in separating metals for recycling, as contamination with other metals, or with debris, will significantly lower the salvage value. Bins may be considered for salvage materials but access should be controlled. Material that is placed in salvage bins should be clean and free of oils or other products. Failure to observe this guideline may lead to difficulties with control of contaminated run-off at the site.

q) waste and debris

97. Hazardous material must be carefully segregated from the normal waste stream to avoid contaminating the normal stream, thus incurring large costs to dispose of the whole amount as hazardous material.

98. Liquid waste presents special handling problems for clean-up crews. Recovered oils and fuels may be employed for site or vessel, ship and boat heating purposes if suitable, but other liquids will typically need to be processed through licensed hazardous waste contractors. To keep disposal costs in check, waste liquids should not be mixed and containers should be labelled with all available information on the product. Liquid storage and movement around the site must be tightly controlled. Spills will generate significant clean-up costs. Control of run-off from temporary storage sites is an issue and must be addressed in the clean-up plan. A covered area with an impermeable floor and berm is highly recommended and may be required by local authorities.

99. Solid waste requirements vary by province and sometimes by municipality. Local requirements and restrictions must be determined during the planning phase. Items that should be addressed include disposal of used oil absorbent materials, non-asbestos insulation, wallboard, tile, linoleum and underlayment, carpet, and furniture.

100. An area will need to be set aside for oil and fuel pipes, fittings, etc. to drain. This must be done in a covered area and is often best accomplished in a compartment in the vessel, ship and boat set aside for this purpose.]

PART –D- MONITORING OPERATIONS FOR PLACEMENT AT SEA OF MATTER FOR A PURPOSE OTHER THAN MERE DISPOSAL

1. Definition

101. For the purposes of assessing and regulating the environmental impacts of placement operations, monitoring is defined as the repeated measurement of an effect, whether direct or indirect, on the marine environment and/or of interferences with other legitimate uses of the sea.

102. The monitoring programme should also be aimed at establishing and assessing the environmental impacts and/or conflicts of the artificial reef with other legitimate uses of the maritime area or parts thereof [and be in line with IMAP for relevant Ecological Objectives.] Depending on the outcome of such monitoring, it may be necessary to carry out alterations to the structure or to consider its removal. In the case of placements taking extended periods of time (years), monitoring should be concurrent with the construction in order to influence modification of the reef, as required.

2. Objectives

103. In order to carry out the monitoring programme in a resource-effective manner, it is essential for the objectives of the programme to be clearly defined. The monitoring observations required at a placement site tends to fall into two basic categories:

(a) pre- placement investigations designed to assist in the selection of the site or to confirm that the selected site is suitable; and
(b) post-placement studies intended to verify that: the permit conditions have been met; this process is referred to as compliance monitoring; and, the assumptions made during the permit issuing and site selection processes were valid and adequate to prevent adverse human health and environmental effects as a consequence of placement; this process is referred to as field monitoring, with the results of such reviews providing the basis for modifying the criteria for issuing a new permit for future placement operations at existing and proposed placement sites.

104. Whenever possible, the monitoring programme should be aligned with the current MEDPOL monitoring programmes [and IMAP] for the Ecological Objectives 1, 2, [3, 4,] 5, 6, 7, 8, 9, and 10 in line with the Integrated Monitoring and Assessment Programme (IMAP) of the Mediterranean Sea and Coast and Related Assessment Criteria set out in Decision IG. 22/7 of the COP 19.

3. Quality control

105. Quality control is defined as the operational techniques and activities that are used to fulfil requirements relating to quality. These include monitoring criteria and Guidelines, sampling methods, sample locations and frequency, and reporting procedures.

106. Before any monitoring programme is developed and implemented, the following quality control issues have to be addressed:

(a) What testable hypotheses can be derived from the impact hypothesis?
(b) What exactly should be measured?
(c) What is the purpose of monitoring a particular variable or physical, chemical or biological effect?

(d) In what compartment and at which locations can measurements be made most effectively?
(e) For how long should the measurements be carried out to meet the defined aim?
(f) With what frequency should measurements be carried out?
(g) What should be the temporal and spatial scale of the measurements made to test the impact hypothesis?
(h) How should the data from the monitoring programme be managed and interpreted?

107. Monitoring observations are typically concerned with the physical, chemical and biological characteristics of the placement site.

(a) Physical observations consist of hydrological surveys of water mass properties, such as temperature, salinity and density, over the entire water column and extending horizontally over the entire region likely to be affected by the placement of matter.
(b) Chemical observations conducted in and around the placement site need to be related to the type of matter involved. Generally, where it is not possible to remove all potentially contaminating material before placement and where chemical effects may therefore be expected, proper analyses need to be carried out of the surface microlayer of sea, which constitutes an extremely active biological zone in which a wide range of chemicals, such as heavy metals and oil soluble substances, tend to accumulate. Chemical observations also need to be conducted on sea where substances, although not present in the matter placed in major quantities or concentrations may, because of their persistent nature, accumulate either on the seabed or in benthic communities in the vicinity of the placement site.
(c) The frequency of biological observations should depend on the scale of the placement operation and the degree of risk to potential resources. Where physical effects on the seabed are expected, it may be necessary to conduct an assessment of the phytoplankton and zooplankton biomass and productivity prior to placement to establish a general picture of the area. Observations of the plankton immediately following placement can help to determine whether acute effects are occurring. Monitoring of the benthic and epibenthic flora and fauna is likely to be more informative because they tend to be subjected not only to the influence of the overlying water column and any changes that occur in it.

108. Post-placement monitoring should be designed to determine:

(a) Whether the impact zone differs from the zone predicted; and
(b) Whether the extent of changes outside the impact zone differs from those predicted.

109. The former can be ascertained by designing a sequence of measurements in space and time with a view to ensuring that the projected spatial scale of change is not exceeded. The latter can be shown through measurements which provide information on the extent of the change occurring outside the impact zone as a result of the placement operation. These measurements are often based on a null hypothesis, i.e. that no significant change can be detected. The spatial extent of sampling depends on the size of the area designated for placement.

110. However, it must be recognised that long-term variations arise as a result of purely natural causes and that it may be difficult to distinguish them from changes which are induced artificially, particularly in relation to populations of organisms.

111. Where it is considered that effects are likely to be largely physical, monitoring may be based on remote methods (e.g. acoustic measurements, side-scan sonar). It must be

recognized, however, that certain ground measurements will always remain necessary for the interpretation of the remote sensing images.
112. Concise reports on monitoring activities should be prepared and made available to relevant stakeholders and other interested parties. Reports should detail the measurements made, the results obtained and the manner in which these data relate to the monitoring objectives and confirm the impact hypothesis. The frequency of reporting will depend on the scale of the placement operation, the intensity of monitoring and the results obtained.

4. Quality assurance

113. Quality assurance may be defined as all planned and systematic activities implemented to provide adequate confirmation that monitoring activities are fulfilling requirements related to quality.

114. The results of monitoring activities should be reviewed at regular intervals in relation to their objectives in order to provide a basis for:

(a) modifying or terminating the field monitoring programme;
(b) amending or revoking the placement permit;
(c) redefining or closing the placement site; and
(d) modifying the basis for assessing placement permit in the Mediterranean Sea.

115. The results of any reviews of monitoring activities should be communicated to all Contracting Parties involved in such activities. The licensing authority is encouraged to take relevant research findings into consideration with a view to the modification of monitoring programmes

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