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## OCEAN FERTILIZATION

### Report of the Legal and Intersessional Correspondence Group on Ocean Fertilization (LICG)

Submitted by the United Kingdom

#### SUMMARY

**Executive summary:** This document contains a summary to the questionnaire distributed by the United Kingdom on 11 February 2008 that addressed the legal issues associated with ocean fertilization, revised in light of the Scientific Groups' review of the specific issues this raised. It presents the views of the Legal and Intersessional Correspondence Group on Ocean Fertilization (LICG) in relation to the issue of large-scale ocean iron-fertilization operations and the applicability of the London Convention and Protocol and other legal instruments.

**Action to be taken:** Paragraph 35

**Related documents:** LC 29/17, paragraphs 4.14 to 4.29; LC 30/INF.2; LC 30/INF.3; LC/SG 31/2/1 and LC/SG 31/16, chapter 2 and annex 2

#### Introduction

1 At the 29<sup>th</sup> Consultative Meeting/2<sup>nd</sup> Meeting of Contracting Parties it was noted that, following consideration of several submissions relating to large-scale iron fertilization of the oceans to sequester CO<sub>2</sub>, the Scientific Groups, at their joint session in June 2007, had developed a "Statement of Concern", taking the view that knowledge about the effectiveness and potential environmental impacts of ocean iron fertilization currently was insufficient to justify large-scale operations and that this could have negative impacts on the marine environment and human health.

2 The Scientific Groups requested the governing bodies to consider the issue of large-scale ocean iron fertilization operations with a view to ensuring adequate regulation of such operations. Following discussion, the Meetings:

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- .1 endorsed the “Statement of Concern” on large-scale fertilization as agreed by the Scientific Groups in June 2007 (LC/SG 30/14, paragraphs 2.23 to 2.25);
- .2 agreed that the scope of work of the London Convention and Protocol included ocean fertilization, as well as iron fertilization;
- .3 agreed that the London Convention and Protocol were competent to address this issue due to their general objective to protect and preserve the marine environment from all sources (Article I of the Convention and Article 2 of the Protocol);
- .4 agreed that they would further study the issue from the scientific and legal perspectives with a view to its regulation; and
- .5 recognizing that it was within the purview of each State to consider proposals on a case-by-case basis in accordance with the London Convention and Protocol, urged States to use the utmost caution when considering proposals for large-scale ocean fertilization operations. The governing bodies took the view that, given the present state of knowledge regarding ocean fertilization, such large-scale operations were currently not justified.

3 The governing bodies established a Legal Intersessional Correspondence Group (LICG) and agreed the following process of future work between this body and the Scientific Groups in 2008:

- .1 the LICG should develop a checklist of legal issues that need to be addressed relevant to whether, and how, the legal framework of the London Convention and Protocol applies to key scenarios on ocean fertilizations and this work should be completed in time for discussion by the Scientific Groups in May 2008;
- .2 the Scientific Groups should, at their May 2008 session, respond to those questions requiring technical input including what would be “contrary to the aims of the Convention/Protocol”;
- .3 after the Scientific Groups’ meeting in May 2008, the LICG should take the technical information from the Scientific Groups’ meeting report to finalize answers to the legal questions; and
- .4 the United Kingdom, which had agreed to act as lead country for the LICG, would summarize the legal views in a document for this session of the governing bodies, recognizing that completion on some aspects would be dependent on the availability of sufficient information from the Scientific Groups.

4 This document summarizes the findings from the legal questionnaire circulated on 11 February 2008 by the United Kingdom<sup>1</sup> and also takes into consideration those revised responses received after input from the Scientific Groups which met from 19 to 23 May 2008 (see documents LC 30/INF.2 and LC 30/INF.3).

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<sup>1</sup> The specific legal questions have been reproduced in an appendix to this document.

5 Three scenarios, as identified by Dr. Chris Vivian (United Kingdom), Chairman of the Scientific Groups' meetings, were considered. A detailed description of each scenario is given in paragraph 10 below:

6 In the initial responses to the legal questionnaire, 13 were received in total outlining initial legal views. Seven from Contracting Parties to the Convention and Protocol (Australia, Canada, Germany, Italy, Norway, Saudi Arabia and the United Kingdom), a further four from Contracting Parties to the Convention (Brazil, Netherlands, Poland and the United States) and two from observer organizations (Greenpeace International and IUCN).

7 The responses to the questionnaire raised a number of points which were drawn together and addressed to the Scientific Groups. These points were:

- .1 the nature of the source material used for fertilization and, in particular, for iron fertilization, its source;
- .2 the quantity of material to be used and the scale;
- .3 the likely impacts of the material on the marine environment both due to the nature and scale of use;
- .4 the likelihood of the activity achieving its stated purpose;
- .5 a technical view of the applicability of Annex I to the Convention and Annexes 1 and 2 to the Protocol; and
- .6 further details on Scenario 3, with particular regard to the nature, volume and impact of material moving in the pipes.

8 The Scientific Groups considered the findings of the LICG, applying particular focus and comment on the six points identified in paragraph 21 of document LC/SG 31/2/1 (noted above) for each of the three scenarios. This information was communicated back to the LICG. The LICG members were then asked whether they wished to refine or amend their submission following consideration of the views of the Scientific Groups. Five revised responses from parties were received in total: two from Contracting Parties to the Convention and Protocol (Australia and Germany), one from Contracting Parties to the Convention (United States) and two from observer organizations (Greenpeace International and IUCN). The number of responses received in relation to the original questionnaire, and those amended in light of the Scientific Groups' findings, reflects the importance of this issue to many parties. In addition, the responses were of high quality, reflecting the high level of legal insight which had been brought to bear on this issue by respondents.

9 A detailed summary of the responses, and a working document which begins to present the detailed comments against questions raised, are included in the accompanying information papers (LC 30/INF.2 and LC 30/INF.3). An overview is contained here, which provides a summary of the legal opinions received (those revised in light of the Scientific Groups' response and those that were unchanged).

## Scenarios

10 The questionnaire was based on the following three scenarios:

### **Scenario 1 – Ocean fertilization with the addition of iron, a micro-nutrient**

This concept involves the addition of relatively small amounts of iron to the ocean in areas where a lack of iron prevents the utilization of nutrients. In these areas, such additions have been demonstrated to cause large phytoplankton blooms. Proponents of this concept have promoted its use primarily as a climate mitigation measure through a significant proportion of the carbon produced by the bloom sinking into deep waters (e.g., see <http://www.climos.com/>). It will increase productivity in surface layers of the ocean that could also potentially have some other benefits, e.g., to fisheries. However, there are significant uncertainties over its effectiveness and its environmental impacts. To be effective as a climate mitigation measure, a significant amount of the carbon produced from the bloom directly (dead or decomposed phytoplankton) or indirectly (faecal pellets from zooplankton and dead/decomposed zooplankton) has to sink to such depths in the ocean that it will not return to the surface layers for at least 100 years<sup>2</sup>.

### **Scenario 2 – Ocean fertilization with the addition of nitrogen or phosphorus compounds**

This concept involves the addition of large amounts (1,000 times more nitrogen than iron) of some traditional nitrogen and phosphorus nutrients compounds (e.g., urea, ammonia and phosphate) into areas of the ocean where they are in short supply for at least part of the year, to generate additional productivity. Proponents of this concept have promoted its use primarily as a means of increasing fisheries production but with some climate mitigation benefit as well from a proportion of the carbon sinking into deep waters (e.g., see <http://www.oceannourishment.com/>). It has also been suggested that it could be used for bio-fuel production however there are also significant uncertainties as to the effectiveness and environmental impacts of this concept.

### **Scenario 3 – Ocean fertilization by bringing water up from the depths using physical devices introduced into the ocean, e.g., pipes**

This concept involves putting long open-ended tubes in the ocean hanging vertically down from the surface to between 100 and 1,000 metres. Surface wave action, aided by one-way valves in the tubes, would pump cold, high-nutrient water (with high levels of CO<sub>2</sub>) to the surface to promote phytoplankton blooms. Proponents of this concept have promoted its use primarily as a climate mitigation measure (e.g., see <http://www.atmocean.com/> and Lovelock and Rapley, Nature, 27 September 2007). Additional benefits are claimed by Atmocean from the cooling of surface waters and by Lovelock and Rapley from enhanced growth of clouds resulting from the production of dimethylsulphide by phytoplankton thus reflecting additional solar radiation away from the earth. To be significant on a global scale, thousands and more probably, millions of tubes would be needed. There are also significant uncertainties over the effectiveness and environmental impacts of such proposals.

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<sup>2</sup> This statement also applies to the other 2 scenarios.

## Responses

11 This summary of responses in respect of each scenario and the applicability of the London Convention and Protocol and other legal instruments, aims to aid the considerations of this session. It should be noted that certain responses were nuanced and a summary cannot hope to bring out all the points highlighted in individual responses. The detailed summary of responses by question and the full responses received, including those provided following the Scientific Groups' session in May 2008 (see documents LC 30/INF.2 and LC 30/INF.3), should also be consulted to understand the variety of views presented.

### In respect of the London Convention

12 The questionnaire attempted to understand whether, under the Convention, for the scenarios identified, ocean fertilization was dumping, i.e. a deliberate act of disposal, or one which was exempt from being considered as such by exclusions and so considered as a placement activity or exempted and so excluded from the Convention's remit. If ocean fertilization was considered dumping then the applicability of the annexes was to be considered.

13 Similar approaches were generally adopted when considering scenarios 1 and 2 by respondents. Between respondents, however, there were a number of divergent views. When considering whether the activity could fall within the placement exception, some respondents identified that there were likely to be purposes (such as climate change mitigation and other environmental or commercial reasons, such as fisheries enhancement) that was for a purpose other than mere disposal. However, many thought it had potential to "*create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea*" and as a result would be "contrary to the aims of the Convention". The other exclusions were generally not thought to apply though one Party identified an exclusion related to exploration, exploitation or associated offshore processing also.

14 The source and quantity of material was of particular concern and relevant to consideration as to how the activity should be defined. Where the material was industrial waste or of large scale then this was felt to be a material consideration. Many thought the activity was likely to be considered dumping if the source material was industrial waste or disposed of in large quantities. Different considerations would apply where the material was specifically formulated for the activity or disposed of in smaller quantities. The Scientific Groups identified potential sources of iron, nitrogen, phosphorous and sea water that could be used in ocean fertilization proposals. The possibility of impurities and trace metals being present for scenarios one and two was noted, though detailed information was not readily available.

15 Where the activity was considered dumping, the applicability of the annexes was thought by some to be determined by the source and nature of the material being disposed of. Where the source was industrial waste, particularly when considering Scenario 1, many thought the material to be prohibited under Annex I. Where the material had been specifically manufactured for the purpose of fertilization, then some thought that it would fall under Annex II and that special care would be required in issuing any permits. Some of the respondents thought that it might fall under Annex III.

16 The views of the Scientific Groups were sought by the LICG on the applicability of Annexes I and II with respect to the nature of the material used. They concluded that the materials outlined as potential materials for ocean fertilization (LC/SG 31/16, annex 2) are not likely to fit within any of the exemptions to the definition of "industrial waste" of Annex I to the

London Convention, specifically noting that it should not be considered as “uncontaminated organic materials of natural origin”.

17 With respect to Scenario 3, views often considered both the introduction of the pipes themselves and the movement of water and nutrients through the pipes. Where the pipes were considered this was thought by most respondents to be outside of the scope of the Convention as not being a deliberate act of disposal or, if deliberate, being a placement activity. For the movement of water, many respondents took similar views as for pipes, however, a number of respondents felt that the movement of fluids within the pipes would be deliberate and so fall within the Convention, though any consideration of whether they were dumping would relate to the fluids impact and whether it was considered pollution. For many respondents consideration of the movement of water needed further information as to its nature and impact. Further views were sought from the Scientific Groups on the nature and impact of fluid moved in the pipes, and they considered that many of the impacts would be similar to those they addressed for scenario 1 (changes to marine ecosystem structures, ocean acidification, etc.) with an additional risk of releasing carbon dioxide from the deep ocean into the atmosphere. The Scientific Groups considered that there is insufficient information about potential activities of this nature to advise on the technical application of Annex I to the London Convention.

### **In respect of the London Protocol**

18 The questionnaire again attempted to understand whether, under the Protocol, for the scenarios identified, ocean fertilization was a deliberate act of disposal. If it was considered to be an act of disposal:

- whether it was to be considered as dumping;
- exempted by exclusions and so considered as a placement activity; or
- exempted entirely.

The questionnaire also asked whether ocean fertilization was considered pollution. In addition, consideration was given to the relevance of the Protocol’s objectives and general obligations. Applicability of, and considerations under Article 4 and the annexes to the Protocol were also considered.

19 Again, a similar approach was taken by most respondents to scenarios 1 and 2. A similar divergence of views as for the Convention was also seen, such views focussing on whether the activity was a deliberate act of disposal but not to be considered dumping or one where the act was deliberate but seen as a placement activity. Many of the considerations noted the importance of the nature of the source material and the scale of activity. Some thought that such considerations could only be applied on a case-by-case basis. Most respondents did not consider this activity as related to exploration or exploitation of associated offshore processing and was generally not thought to be storage.

20 Six of the respondents thought that the act was placement. Some noted that it was contrary to the objectives and general obligations of the Protocol and a number noted the importance of the application of the Precautionary Approach here, where information was unknown. It was thought that where the placement would be contrary to the aims of the Protocol, the act would need to be considered as dumping.

21 In determining whether the activity was considered pollution, respondents again took differing views. The source of material and its nature were again described as relevant, as was

the quantity of material and its likely impact on the environment. It is worth noting that concern was raised that it should not be considered that only such dumping activities that caused pollution fell under the scope of the Protocol as such an interpretation would be against the legal structure of the Protocol – all dumping of wastes and matters not listed under Annex 1 is prohibited.

22 The importance of the general obligations and objectives of the Protocol was addressed by a number of respondents. Differing opinions were expressed, determined by views on the likely impacts of the activity and the probability of the activity achieving its stated purpose. In addition, concerns were raised by some respondents in terms of the obligation not to transfer damage from one part of the environment in respect of removing CO<sub>2</sub> from the atmosphere and transferring this to the marine environment.

23 Where respondents considered the act to be dumping, it was generally not seen to be captured by Annex 1 (which allows the dumping of certain wastes or other matters with a permit) unless the iron could be classified as an “inert, inorganic geological material”. Guidance on this was requested from the Scientific Groups, who responded, and specifically noted, that it should not be considered as ‘inert, inorganic geological material’.

24 With respect to scenario 3, a similar consideration as made under the Convention was presented by respondents. Further information was sought from the Scientific Groups on the nature, scale and impact of the fluid moving within the pipes and the probability of success. The Groups considered that there was insufficient information about the potential activities of this nature to advise on the technical application of Annex 1 to the London Protocol.

### **In respect of other legal instruments**

25 The over-arching nature of the 1982 United Nations Convention on the Law of the Sea was noted by most respondents, and its relevance to the protection of the marine environment. Many responses also noted the importance of the regional seas conventions which were often more wide ranging and as a result considered the regulation of other activities. The Lima, HELCOM and OSPAR Conventions were noted, as well as potential conflicts to their general aims from proposed fertilization measures.

26 A concern was noted by several respondents that each of the scenarios might be unregulated activities and that though the Convention and its Protocol were the most appropriate legal instruments to regulate this activity, it was not suited to this at this point and amendment would be required to achieve the regulation of the activity necessary. The need to move to address land-based arisings was viewed as an important step in furthering marine protection by some respondents. There was also mention of the EU Water Framework Directive and the coming EU Marine Strategy Directive that are aimed at transitional, coastal and marine waters having good ecological status. It was thought by some that these Directives might be a tool for regulating these Scenarios for Contracting Parties or Convention Members where relevant.

### **Other issues highlighted**

27 The majority of respondents concerns were caught within their responses, however it was brought to our attention that there have been concerns about ocean fertilization raised by other Organizations, most notably at the 9<sup>th</sup> Conference of Parties to the Convention on Biological Diversity and at the 41<sup>st</sup> Session of the Executive Council of the Intergovernmental Oceanographic Commission (UNESCO-IOC), which are extracted below:

**9<sup>th</sup> Conference of Parties to the Convention on Biological Diversity (May 2008)**

*“The Conference of the Parties,*

*Notes the work of the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1972) and the 1996 London Protocol, welcomes the decision of the twenty-ninth Consultative Meeting of the Contracting Parties held from 5 to 9 November 2007, which: (i) endorsed the June 2007 “Statement of Concern regarding iron fertilization of the oceans to sequester CO<sub>2</sub>” of their Scientific Groups, (ii) urged States to use the utmost caution when considering proposals for large-scale ocean fertilization operations and (iii) took the view that, given the present state of knowledge regarding ocean fertilization, large-scale operations were currently not justified:*

- (a) Requests the Executive Secretary to bring the issue of ocean fertilization to the attention of the Joint Liaison Group;*
- (b) Urges Parties and other Governments to act in accordance with the decision of the London Convention;*
- (c) Recognizes the current absence of reliable data covering all relevant aspects of ocean fertilization, without which there is an inadequate basis on which to assess their potential risks;*
- (d) Bearing in mind the ongoing scientific and legal analysis occurring under the auspices of the London Convention (1972) and the 1996 London Protocol, requests Parties and urges other Governments, in accordance with the precautionary approach, to ensure that ocean fertilization activities do not take place until there is an adequate scientific basis on which to justify such activities, including assessing associated risks, and a global, transparent and effective control and regulatory mechanism is in place for these activities; with the exception of small scale scientific research studies within coastal waters. Such studies should only be authorized if justified by the need to gather specific scientific data, and should also be subject to a thorough prior assessment of the potential impacts of the research studies on the marine environment, and be strictly controlled, and not be used for generating and selling carbon offsets or any other commercial purposes;*
- (e) Requests the Executive Secretary to disseminate the results of the ongoing scientific and legal analysis under the London Convention and London Protocol, and any other relevant scientific and technical information, to the fourteenth meeting of the Subsidiary Body on Scientific, Technical and Technological Advice.”*

**41<sup>st</sup> Session of the Executive Council of the Intergovernmental Oceanographic Commission (UNESCO-IOC)**

*“13. The Member States noted the Report of the IOC ad hoc Consultative Group of Experts on Ocean Fertilization, and agreed that proposals to use ocean fertilization to sequester carbon in the ocean is (sic) cause for great concern. They agreed that there is insufficient understanding of the potential impacts of such activities on the marine ecosystem, and that a precautionary approach is appropriate until safeguards can be established.”*



## **Conclusions**

28 There are a number of divergent views over the applicability of the Convention and Protocol and no single consensus has been demonstrated.

29 There was no consensus as to whether the considerations over the different fertilization scenarios could be considered in general terms, with some contending that a case by case basis should be applied.

30 Legal responses to the applicability of the Convention or Protocol to scenarios 1 and 2 were generally similar, though differences in approach were seen for scenario 3. The Scientific Groups' consideration of scenario 3, i.e. that there was little information to support the efficacy of this approach and insufficient information to advise on technical application of the Protocol and Convention, led some respondents to conclude that there was little need to continue to consider scenario 3 further.

31 For the London Protocol, the majority of respondents consider the activity to be one which should be considered as a dumping activity, either directly or indirectly through consideration of exclusions to dumping, in particular, noting the possibility of the activity being contrary to the aims of the London Protocol. However, this was by no means the views of all parties, with some considering this a placement activity.

32 It is noteworthy that the Scientific Groups considered it, as a minimum, premature to assess the likelihood of any scenario achieving the stated purpose of carbon export as a climate mitigation strategy and they indicated implicit support for continued research provided it does not adversely affect the marine environment. The importance of continuing fundamental research was also noted by some parties and it has been suggested that criteria be established for assessment of research projects.

33 Ocean fertilization has been considered as falling within the scope of the London Convention and Protocol. The majority of respondents agree that there are strong arguments for regulating the activity. For many of those parties who consider the activity to be one that should be regulated it is considered urgent to agree the concept of regulation such that commercially driven activities are prohibited.

## **Recommendation**

34 Further to the Scientific Groups' response to the LICG, advice was requested by them regarding the appropriateness or otherwise of the provisions they had identified as being relevant when considering the phrase "contrary to the aims of the Convention/ Protocol". These being, Articles I, II, VII.2, VII.3 and XII for the Convention and Article 1.10, Article 2, Article 3.3, and Article 3.1 for the Protocol. It is considered that Contracting Parties to the Convention and Protocol should form a view on this for discussion at this session.

## **Action requested of the governing bodies**

35 The governing bodies will be invited to:

- .1 review this report and the supporting information, taking into account the conclusions and recommendation shown in the paragraphs 28 to 34 above; and
- .2 consider further action to be taken based on this review.

**APPENDIX****Questions raised in the questionnaire distributed by the United Kingdom  
on 11 February 2008****(a) London Convention****Scenario 1 Ocean fertilization with the addition of iron, a micro-nutrient**

1. Does iron fertilization fall within the definition of “dumping” in Article III.1(a)(i), i.e., is it “deliberate disposal”?

2. If the answer to Q1 is yes, we need to consider:

Does it fall within any of the exclusions in Article III.1?

- Is the iron fertilization incidental to or derived from “normal operations”? (Article III.1(b)(i))
- Is it “placement of matter for a purpose other than the mere disposal thereof”? (Article III.1(b)(ii))
- Is it excluded under Article III.1(c) as related to exploration, exploitation or associated offshore processing?

3. If the answer to Q2 is no, we need to consider:

- Is it prohibited under Annex I?
- Does it require a special permit under Annex II?
- Or a prior general permit under Annex III?

**Scenario 2 Ocean fertilization with the addition of nitrogen or phosphorus compounds**

1. Does it fall within the definition of “dumping” in Article III.1(a)(i), i.e., is it “deliberate disposal”?

2. If the answer to Q1 is yes, we need to consider:

Does it fall within any of the exclusions in Article III.1?

- Is it incidental to or derived from “normal operations”? (Article III.1(b)(i))
- Is it “placement of matter for a purpose other than the mere disposal thereof”? (Article III.1(b)(ii))
- Is it excluded under Article III.1(c) as related to exploration, exploitation or associated offshore processing?

3. If the answer to Q2 is no, we need to consider:

- Is it prohibited under Annex I?
- Does it require a special permit under Annex II?
- Or a prior general permit under Annex III?

**Scenario 3 Ocean fertilization by bringing water up from the depths using physical devices introduced into the ocean, e.g., pipes**

1. Does it fall within the definition of “dumping” in Article III.1(a)(i), i.e., is it “deliberate disposal”?
2. If the answer to Q1 is yes, we need to consider:

Does it fall within any of the exclusions in Article III.1?

- Is it incidental to or derived from “normal operations”? (Article III.1(b)(i))
  - Is it “placement of matter for a purpose other than the mere disposal thereof”? (Article III.1(b)(ii))
  - Is it excluded under Article III.1(c) as related to exploration, exploitation or associated offshore processing?
3. If the answer to Q2 is no, we need to consider:
    - Is it prohibited under Annex I?
    - Does it require a special permit under Annex II?
    - Or a prior general permit under Annex III?

**(b) London Protocol**

**Scenario 1 Ocean fertilization with the addition of iron, a micro-nutrient**

1. Does iron fertilization fall within the meaning of “dumping” in **Article 1.4.1**?
  - Is it “deliberate disposal” under Article 1.4.1.1?
  - Is it “storage” within the meaning of Article 1.4.1.3?
2. Does it fall within any of the exclusions in Article 1.4.2?
  - Could it come under the “normal” operation exception in Article 1.4.2.1?
  - Could it be “placement for a purpose other than the mere disposal” under Article 1.4.2.2?
3. Is it excluded from the Protocol by Article 1.4.3? (related to exploration, exploitation, and associated off-shore processing of seabed mineral resources)?
4. Is iron fertilization considered “pollution” within Article 1.10?
5. **Article 2: Objectives** – Does Article 2 assist the interpretation and application of Article 1 to these issues?
6. **Article 3: General Obligations** – Does consideration of the general obligations provide any guidance in the interpretation and application of Article 1 to these issues?
7. **Article 4 and Annex 1** – Is the matter used in iron fertilization within the definition of any of the items on Annex 1?
8. If yes to Q7, could it be authorized under Article 4 and Annex 2?

- What would be the main considerations relevant to assessment under Annex 2?
- How should it be regulated?

### **Scenario 2 Ocean fertilization with the addition of nitrogen or phosphorus compounds**

1. Does it fall within the meaning of “dumping” in **Article 1.4.1**?
  - Is it “deliberate disposal” under Article 1.4.1.1?
  - Is it “storage” within the meaning of Article 1.4.1.3?
2. Does it fall within any of the exclusions in Article 1.4.2?
  - Could it come under the “normal” operation exception in Article 1.4.2.1?
  - Could it be “placement for a purpose other than the mere disposal” under Article 1.4.2.2?
3. Is it excluded from the Protocol by Article 1.4.3? (related to exploration, exploitation, and associated off-shore processing)?
4. Is it considered “pollution” within Article 1.10?
5. **Article 2: Objectives** – Does Article 2 assist the interpretation and application of Article 1 to these issues?
6. **Article 3: General Obligations** – Does consideration of the general obligations provide any guidance in the interpretation and application of Article 1 to these issues?
7. **Article 4 and Annex 1** – Is the matter used in ocean fertilization within the definition of any of the items on Annex 1?
8. If yes to Q7, could it be authorized under Article 4 and Annex 2?
  - What would be the main considerations relevant to assessment under Annex 2?
  - How should it be regulated?

### **Scenario 3 Ocean fertilisation by bringing water up from the depths using physical devices introduced into the ocean e.g., pipes**

1. Does it fall within the meaning of “dumping” in **Article 1.4.1**?
  - Is it “deliberate disposal” under Article 1.4.1.1?
  - Is it “storage” within the meaning of Article 1.4.1.3?
2. Does it fall within any of the exclusions in Article 1.4.2?
  - Could it come under the “normal” operation exception in Article 1.4.2.1?
  - Could it be “placement for a purpose other than the mere disposal” under Article 1.4.2.2?
3. Is it excluded from the Protocol by Article 1.4.3? (related to exploration, exploitation, and associated off-shore processing)?
4. Is it considered “pollution” within Article 1.10?

5. **Article 2: Objectives** – Does Article 2 assist the interpretation and application of Article 1 to these issues?
6. **Article 3: General Obligations** – Does consideration of the general obligations provide any guidance in the interpretation and application of Article 1 to these issues?
7. **Article 4 and Annex 1** – Is the matter used in ocean fertilization within the definition of any of the items on Annex 1?
8. If yes to Q7, could it be authorized under Article 4 and Annex 2?
  - What would be the main considerations relevant to assessment under Annex 2?
  - How should it be regulated?

**(c) Other legal regulation of iron and other ocean fertilization**

- Is it regulated by any *other* international legal instruments? Please elaborate.
- If the above analysis concludes that it *is* or in some circumstances *might be* prohibited or regulated by the London Convention/Protocol, how does this regulation fit with other relevant legal instruments? What are the consequences?
- If the above analysis concludes that it is *not* prohibited or regulated by the Convention/Protocol, or in some circumstances *might not be*, and if it is *not* covered by any other legal regime, what are the consequences?
- (If necessary) what possibilities exist for developing appropriate legal regulation?

**(d) Please raise any further issues we have not covered that you consider relevant**

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