UNITED NATIONS
NEW YORK

UNITED NATIONS ENVIRONMENT PROGRAMME
NAIROBI

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
ROME

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION
PARIS

WORLD HEALTH ORGANIZATION
GENEVA

WORLD METEOROLOGICAL ORGANIZATION
GENEVA

INTERNATIONAL MARITIME ORGANIZATION
LONDON

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA

Global Strategies for Marine Environmental Protection

Can there be a common framework for managing radioactive and non-radioactive substances to protect the marine environment?

IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP
Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP)

GESAMP Reports and Studies No. 45

Addendum 1

Reports and Studies No. 45, Addendum 1

IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP
Joint Group of Experts on the Scientific Aspects
of Marine Pollution (GESAMP)

Global Strategies for Marine Environmental Protection

Can there be a common framework for managing radioactive and non-radioactive substances to protect the marine environment?

IMO
London, 1992

Printed by the International Maritime Organization
4 Albert Embankment, London SE1 7SR

IMO Pub. 219/92

For bibliographic purposes, this document may be cited as:

GESAMP (IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution) 1992: Global strategies for marine environmental protection: Can there be a common framework for managing radioactive and non-radioactive substances to protect the marine environment? *Rep. Stud. GESAMP* (45, Add.1): 13 pp.

Foreword

The GESAMP Working Group on "A Comprehensive Framework for the Assessment and Regulation of Waste Disposal in the Marine Environment" prepared a report entitled *Global Strategies for Marine Environmental Protection*, which was published in 1991 as GESAMP Reports and Studies No. 45.

In 1992, GESAMP, at its twenty-second session (Vienna, 9–13 March 1992), adopted a report of the Working Group entitled "Can There Be a Common Framework for Managing Radioactive and Non-Radioactive Substances to Protect the Marine Environment?" This report is based on the results of GESAMP Reports and Studies No. 45 and provides a response to specific questions posed by the Inter-Governmental Panel of Experts on Radioactive Waste Disposal at Sea (IGPRAD), established within the framework of the London Dumping Convention, concerning the identification and examination of parallels between approaches and assessments of both radioactive and non-radioactive waste disposal at sea.

GESAMP agreed that this report be published as Reports and Studies No. 45, Addendum 1.

Contents

1 Introduction

1.1 In 1989, partly as a result of a request from the Inter-Governmental Panel of Experts on Radioactive Waste Disposal at Sea (IGPRAD), established within the framework of the London Dumping Convention, the IMO/FAO/UNESCO/ WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) formed a Working Group on "A Comprehensive Framework for the Assessment and Regulation of Waste Disposal in the Marine Environment". The report of the Working Group, entitled *Global Strategies for Marine Environmental Protection*, was adopted by GESAMP at its twenty-first session in February 1991, and published as GESAMP Reports and Studies No. 45 (GESAMP 1991). That report deals with marine environmental protection strategy in a broader context than the specific request from IGPRAD. Accordingly, a GESAMP Working Group meeting was convened at IMO Headquarters in London from 2 to 6 September 1991 to prepare a specific response to the IGPRAD request based on GESAMP Reports and Studies No. 45.

1.2 The specific request from IGPRAD that led to this study was to:

> Examine the parallels between the regulatory approaches to, and environmental assessments of, the dumping at sea of both radioactive and non-radioactive wastes to identify opportunities for developing a common, comprehensive and holistic framework for the regulation of dumping at sea of all wastes.

1.3 GESAMP had interpreted the request from IGPRAD in the following way:

1 Are the scientific and technical parameters underlying the respective regulatory approaches adopted for radioactive and non-radioactive wastes fundamentally different?

2 Are there any fundamental obstacles to the development of a common approach for regulating the dumping at sea of all types of waste?

3 Can a common, comprehensive framework be developed that provides a basis for global management of all human activities that potentially have adverse effects on the marine environment?

1.4 This document constitutes the response to the IGPRAD request. It summarizes the framework for marine pollution prevention contained in GESAMP Reports and Studies No. 45, reviews the principles and mechanisms designed to prevent excessive exposures to radioactive materials, and demonstrates the compatibility of the two approaches.

2 Contaminants in perspective

2.1 The most recent report on the "State of the Marine Environment" (GESAMP 1990) concludes, *inter alia,* that marine resources and critical habitats are over-exploited in many regions. For example, sewage pathogens in seafood and bathing water constitute a continuing risk to human health, nutrient enrichment is changing the relative abundances of species in local ecosystems, toxin-producing algal blooms are an insidious threat to consumers of marine foodstuffs, and increased riverborne sediment loads and synthetic organic substances have impaired reproduction of some mammals and fish-eating birds. Such impacts are most severe in coastal areas adjacent to or downstream from densely populated areas, particularly in enclosed and semi-enclosed seas in many of the less developed regions of the world.

2.2 It is very clear that radioactive materials are among the expanding list of substances for which there is genuine public concern regarding associated risks to human health and the environment. For many people, the fear of radioactive materials extends to all types of radionuclide although the radiation hazards associated with different radionuclides vary substantially.

2.3 There seems to be a misconception that radionuclides and their effects are in some way unique and that this makes them deserving of distinct and separate treatment. Nevertheless, the modes of action of ionizing radiation on cells or organisms are well understood. Accordingly, the health impacts of radionuclides, as posed by their radioactive properties, can be assessed. Any concerns about their non-radioactive properties can be evaluated on the basis of the properties of stable analogues and chemical periodicity. Thus, there are no intrinsic scientific reasons for treating these substances differently.

2.4 Special concern is directed at wastes containing radioactive materials because, by definition, they have no alternative use and, in some cases, their hazardous properties may persist for long periods. Nevertheless, for the low-level radioactive wastes that are the subject of this document, long-term measurements have not found that the disposal techniques used to date present appreciable risks to humans or other species (IMO 1985). This cannot be said for other classes of radioactive waste or for various types of non-radioactive waste for which the hazards are significantly greater and for which the options for safe disposal are very limited.

2.5 In addressing the practice of the disposal of low-level radioactive waste in the marine environment, this document deals with the problem of managing an existing waste. Many countries are currently generating low-level radioactive wastes, in some cases as a consequence of investment in nuclear power and, more generally, as a result of the use of radioisotopes in industry, medicine and research. In this context there is a need to find practical, environmentally acceptable and permanent solutions to the disposal of these existing wastes. A secondary issue, that may be of greater importance in the longer term, is not addressed by the document – that is the need to review practices which produce low-level radioactive waste in the light of the social benefits, waste management difficulties and the environmental and human health risks they present.

原书缺页

4 GESAMP Reports and Studies No. 45

4.1 This study concluded that the adoption of an overall framework for marine environmental protection, based upon sound principles and a logical hierarchy of goals and activities, would enhance the effectiveness of management activities. Principles and goals are the most important components of such a framework. The relationships among these principles and goals and the elements of environmental management are depicted in figure 1. The environmental management component (figure 2) contains a hierarchical sequence of planning, assessment and regulatory activities, each of which is essential for sensible and effective environmental protection.

4.2 The analysis of principles concluded that the following four principles, derived from the 1972 Stockholm Conference on the Human Environment, the Law of the Sea, and the report of the World Commission on the Environment and Development, provide a sound basis for the protection and management of the marine environment:

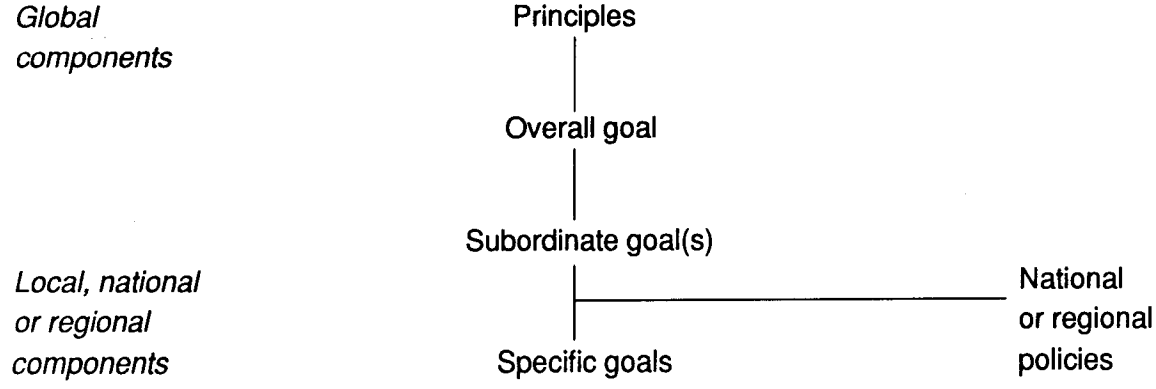
.1 **Sustainable development**: Social and economic developments must be pursued in a manner that does not prejudice options available to future generations for the use of the sea and its amenities.

.2 **Prevention of harm**: All practical steps shall be taken to prevent, and correct, the harmful effects of anthropogenic activities on human health, on living resources, marine life, marine amenities and other legitimate uses of the sea.

.3 **Avoidance of intersectoral transfer of damage**: Measures taken to mitigate harm, or to reduce the risks of harm, to the marine environment shall not result, directly or indirectly, in greater damage or hazards to other sectors of the environment, viz. land, air or freshwater.

.4 **International co-operation**: Co-operation among States, including the harmonization of protection measures, mutual exchange of information, co-ordination of monitoring and the provision of technical and financial assistance, is essential for achieving regional and global objectives for the preservation and protection of the marine environment.

Figure 1: ***Components of a marine environmental protection framework***



4.3 Since environmental protection involves management on many different scales of size and complexity, a hierarchy of goals is needed ranging from those of global relevance to those of entirely local significance. This "pyramid of goals" is reflected in figure 1.

4.4 Clearly stated goals provide a benchmark against which performance can be judged. A frequent problem in environmental monitoring, and with assessments of the quality of the environment generally, is that the information gathered is hard to interpret in a management (i.e. non-scientific) context. Quite simply, it is difficult to decide whether a particular set of environmental conditions is acceptable unless the aspirations of society are explicitly defined.

4.5 Although the continued viability, productivity and diversity of ecosystems is possibly the most important objective of environmental protection, the principles stated above acknowledge the legitimacy, as well as the inevitability, of continued human development and its associated propensity for waste production. Accordingly, they reflect a pragmatic balance between preservation and exploitation and provide a basis for defining an overall goal for protection and management of the environment. Such a goal should be common to all jurisdictions and should constitute a unifying force in the design of marine environmental protection strategies. It is therefore logical that the overall goal for protection of the marine environment should be derived from the principles of global environmental protection and, because of this, it should be essentially the same as the one selected for protecting the environment as a whole (i.e. land, air and water). GESAMP suggests that this overall goal be stated as follows:

> To protect the marine environment against the adverse effects of human activities so as to conserve marine ecosystems and to safeguard human health while providing for rational use of living and non-living resources.

4.6 As figure 1 indicates, it is necessary to define other goals of global relevance, subordinate to the overall goal, that relate to more specific issues. Prevention of marine pollution, for example, is a global issue linked to particular kinds of human activity involving substances and wastes. The following subordinate global goal for *marine* pollution prevention is proposed:

> To manage human activities and social and economic development in a manner that limits contamination of the marine environment by substances and wastes, thereby ensuring that the viability of marine ecosystems and the legitimate uses of the sea are sustained for the benefit of present and future generations.

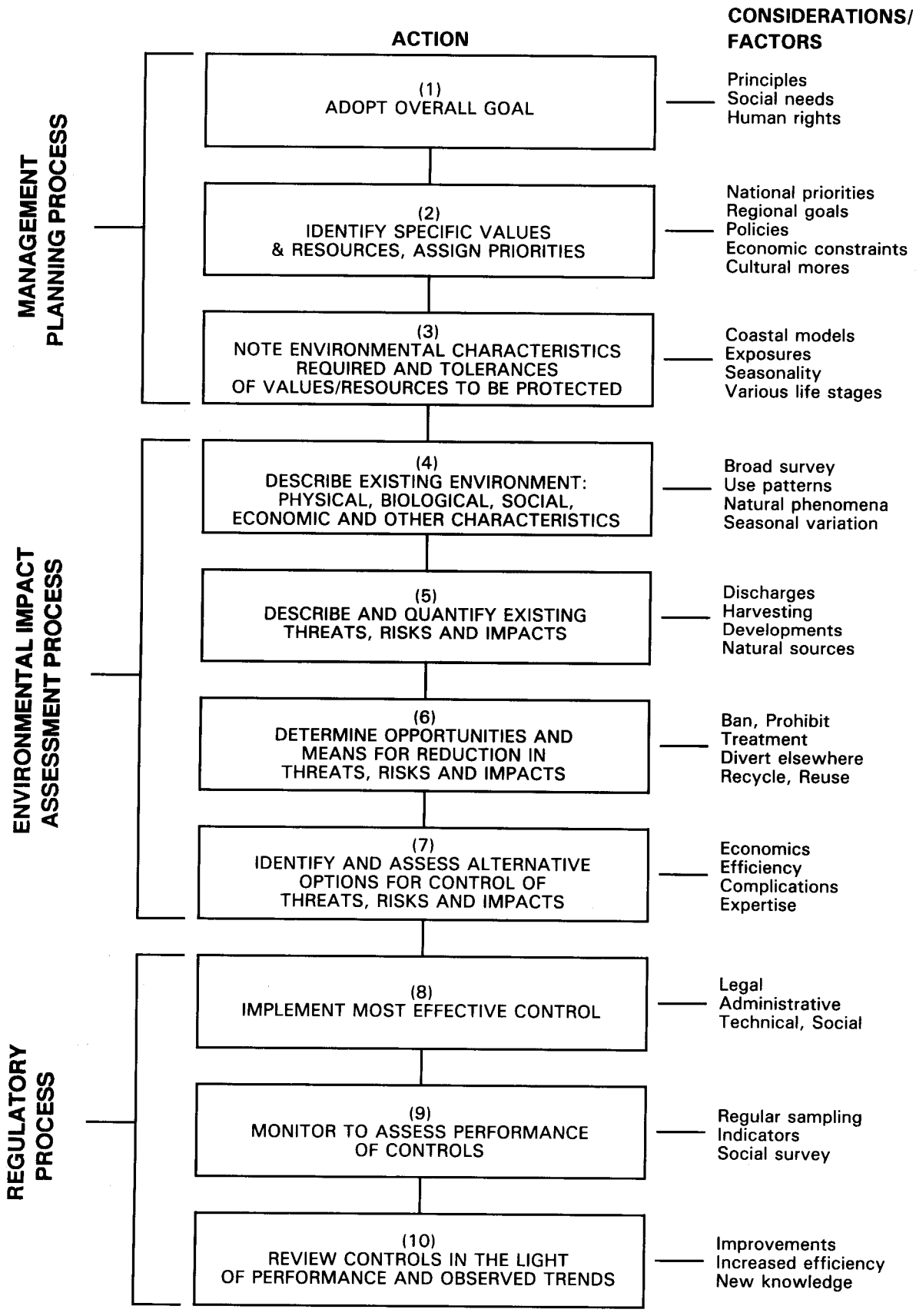
4.7 Specific goals, consistent with these overall goals, are those benefits (including species) or desired conditions which should be preserved in clearly defined marine areas. These goals must reflect local, national or regional aspirations, existing political obligations and the characteristics of the area in question. Examples of specific goals are:

.1 the geographic extent of specific types of habitat such as estuaries, wetlands, mangroves, coral reefs and spawning grounds, that need to be preserved to ensure the sustainability of resources and ecosystems;

.2 the minimum proportion of coastlines that should be designated for recreation and swimming and the required characteristics of beaches and seawater used for these purposes;

.3 the maximum sustainable yields from exploited populations of marine species and the criteria by which these should be determined; and

Figure 2: ***Management process for protection of marine and other environments***



.4 the levels of man-made contaminants in edible species below which the risks to human health would be considered insignificant (Note: The basis for this determination should be stated – it will vary with the assumed rate of fish consumption).

4.8 Once the goals have been established, it should be possible to establish tolerances or standards to ensure that the desired uses and amenities of the environment are protected. This setting of specific targets constitutes the final stage of the management planning process. The subsequent environmental impact assessment process allows the existing state of the environment to be assessed and provides a basis for the formulation of ameliorative/protective measures to reduce or prevent damage. This process also provides an opportunity for assessing the potential impacts of proposed developments and for identifying where intervention can be used to mitigate adverse effects. The final regulatory process involves implementing control measures and monitoring performance to identify the need for any revision of decisions made earlier in the framework.

5 Radiation protection principles

5.1 The fundamental concepts underlying the management of radioactive materials and other sources of ionizing radiation have been developed by the International Commission on Radiological Protection (ICRP). These concepts, which together constitute the "system of dose limitation", have remained essentially unchanged since their inception (ICRP 1977). Rather than present these concepts in the strict and single-disciplinary text of ICRP, the following represents them in common language.

5.2 Protection of human health and environment from the harmful effects of ionizing radiation depends on the application of three interactive concepts – *justification, optimization* and *compliance with exposure limits*:

- **Justification** states that no practice should be adopted by society unless it can be clearly shown that the benefits of the practice outweigh its detrimental effects;

- **Optimization** states that any exposures resulting from an adopted practice should be kept as low as reasonable achievable; in other words, the control measures applied should be directed at ensuring the least detriment in relation to the benefits gained. All reasonable efforts should be taken to minimize exposures;

- **Compliance** requires that dose and dose-rate (exposure) limits be established and that these are applied to the protection of employees in relevant industries, members of the general public, and living resources. Such exposure limits should never be exceeded.

5.3 The calculation of potential exposures in various environmental compartments is often made using the so-called "critical pathway" approach in which the dominant exposure pathways and critical radionuclides are considered. This approach, combined with the use of "critical groups" to represent the most exposed members of the population, incorporates a considerable degree of

pessimism, or precaution, in such calculations. Of particular importance in the application of optimization is the use of so-called "collective doses", which are the sum of doses received by all members of the exposed population. The aim of optimization is largely to minimize the overall exposure of groups of people rather than that of single individuals, who are specifically protected by the application of individual dose limits.

5.4 The system of dose limitation applies to all proposed new anthropogenic practices. Compliance and optimization are also essential for existing practices and are applied continuously, taking account of new regulatory limits and new industrial processes. A justified practice is one for which the combined benefits to society are considered to outweigh the combined detriments. Environmental effects are an integral part of this assessment process. The compliance element of the framework places scientifically derived limits on the changes that are authorized to occur. These limits constitute upper bounds ("dose constraints") to levels of exposure for man and critical components of the environment, due to an increasing number of sources globally. Optimization, which in certain respects is the central concept, demands action to minimize environmental changes resulting from the practice as far below the compliance limits as practical, taking into account social, economic and political considerations. Collective exposure as a measure of detriment is a concept that is not specifically used outside the field of radiological protection but may emerge as one of the most appropriate tools for the assessment of risks resulting from exposures to certain non-radioactive substances.

5.5 Various agreements dealing with the prevention of marine pollution from anthropogenic radioactive materials identify the IAEA as the competent agency, and the primary source of advice, regarding the practical application of ICRP principles and the 1972 Stockholm Conference recommendations in respect to the management of radioactive wastes. Pursuant to its responsibilities, the IAEA has periodically formulated recommendations, established internationally acceptable regulations, safety standards and release-rate limits applicable to marine environmental protection. The IAEA stresses that nothing in its publications should be construed as encouraging the release of radioactive waste and other radioactive matter into the environment. IAEA guidance is provided to assist national authorities in the selection of practical waste management options that result in the least hazard to human health and minimize adverse impact on the environment and its resources. In a complementary fashion, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) keeps under continuous review the effects of ionizing radiation on living organisms through, *inter alia,* periodic assessments of anthropogenic sources of radioactivity in the environment and their associated doses to human populations. It must be stressed that all countries using nuclear material are Member States of the IAEA, but not all of these are Contracting Parties to conventions for the prevention of marine pollution. Thus, the application of IAEA recommendations extends to a wider area than that covered by such conventions.

6 Discussion

6.1 The system of dose limitation recommended by the ICRP constitutes an inherently holistic protection mechanism for application to all practices involving, *inter alia,* the production, use, transport, storage and disposal of radioactive materials. The system of dose limitation is applicable to all kinds of radionuclides, whatever their physical and chemical forms. Diversity in the characteristics of radioactive

materials encompasses all the physical and chemical attributes common to non-radioactive materials as well as the properties of nuclear decay and radiation emission peculiar to radioactive matter. Accordingly, this system has potential for wider application to environmental management and protection. Although details of the application of the ICRP system of dose limitation have been periodically revised as a result of the continued review and analysis of the effects of radiation, the basic concepts have not needed revision since their inception. Misadventures in the peaceful applications of nuclear energy are not attributable to weaknesses in the system of dose limitation but to a lack of its observance.

6.2 Although developed at different times and for different purposes, there are no incompatibilities between the protection system proposed by ICRP and that recommended by GESAMP as a comprehensive strategy for protection and management of the marine environment. Both systems require the development of, and compliance with, criteria for the protection of exposed organisms and rely fundamentally on science for the prediction of impacts.

6.3 Both systems also recognize the need for prior assessments of the benefits and detriments associated with major new practices to ensure that they are acceptable to those affected (i.e. that the benefits outweigh the detriments). The GESAMP framework does this within the environmental impact assessment (EIA) process, which can be applied both to totally new developments and to existing practices. The EIA process is subordinate to common principles, goals and policies that should be seen as fundamental considerations in justifying practices that potentially affect the environment. It would be wrong to suggest that there are any formal, or universally applicable, procedures for justifying actions that cause widespread changes to the environment. What is necessary, however, is that environmental managers and decision makers should accept their obligation to consult as widely as possible before reaching decisions and to inform the public of the basis for those decisions.

6.4 The application of optimization as a means of reducing impacts to the extent reasonable is not specifically embodied within the GESAMP framework. Nevertheless, GESAMP's statement of the overall goal for protecting the environment from the adverse effects of substances and wastes, which emphasizes the need to minimize contamination of the environment generally, expresses a concept very similar to optimization as conceived by ICRP.

6.5 Both systems are designed to facilitate human development and also to ensure appropriate levels of protection for the environment including man. They recognize the need for caution, both in terms of conducting prior assessments of the impacts (and benefits) of proposed activities and in conducting such assessments in a way that demands precaution (pessimism) to accommodate scientific and technical uncertainty.

6.6 In order to resolve the difficulties of co-ordinating approaches to environmental protection and management, it is essential to identify and evaluate the underlying pressures on the environment resulting from human activities. The Advisory Committee on Marine Pollution of the International Council for the Exploration of the Sea (ICES, 1989), in addressing the topic of waste management, summarizes its position as follows:

> It is most improbable that strategies for assessing and controlling human impact on the environment will be effective if they permit the development of an unrestricted array of new practices, products and waste materials. There are already indications that regulatory mechanisms are as vulnerable to "overloading" as the environment itself. Furthermore, it is

obvious that environmental quality, which will allow sustained development, cannot be achieved through case-by-case assessments alone, or through control strategies that are subject to constant change. The need for a re-appraisal of existing strategies, and agreement on the future role of science in the environmental protection process is urgent.

6.7 Similarly, GESAMP's examination of existing international instruments concluded that there was inadequate use of basic environmental management procedures, and a tendency to manage each environmental sector and each practice separately. In conjunction with poor enforcement, this is indirectly responsible for much of the continued degradation of the environment. These deficiencies outweigh existing inadequacies in international instruments for marine environmental protection.

6.8 GESAMP also concluded that there is a need to manage all forms of human activity which may affect the marine environment, whether these occur at sea, in coastal areas, in the atmosphere, or in the hinterlands of continents. This implies that the international community should aim for better integration of the design, as well as the implementation, of environmental protection measures. In other words:

> Effective marine environmental protection requires the adoption of a global and holistic environmental protection strategy that deals with all sectors of the natural environment. This strategy should embody a common set of fundamental principles, goals and major policy elements.

6.9 The environmental problems of the oceans are considerable but they are not insurmountable. If governments are universally committed to taking action nationally, and adopt a common strategy to guide such action, then, with mutual support and the assistance of international agencies, degradation of marine and coastal environments can be reversed and replaced by a management system that ensures sustainable use of marine resources. International agreements and international co-operation have a large part to play in this process as both catalysts and co-ordinators of national action. However, it is equally important that international agreements, whether bilateral, regional or global, pursue a common approach to environmental protection and management.

6.10 Application of the strategic framework developed by GESAMP will help in identifying practices, as well as substances, that require some level of control. Specific control measures will require the formulation and application of criteria for protecting human health and the marine environment. The framework proposed by GESAMP is for managing the use of the marine environment and, as such, the management processes it describes are continuous institutional functions rather than functions that are merely triggered by individual development proposals.

6.11 It would be both desirable and opportune to introduce more specific goals for international co-operation and to modify regulatory approaches and methodologies to render them more effective in terms of environmental protection and sustainable development. To this end, GESAMP believes that the strategic framework for marine environmental protection and management, which contains elements that are essential to national programmes, should also be reflected in the structure and content of relevant international agreements.

6.12 Natural environmental processes dictate that long-term protection of the oceans requires a balanced approach to controlling both land and sea-based components of a practice. Consequently,

waste management must be developed and conducted as part of a broad holistic approach – one that considers all environmental sectors and that minimizes the adverse impact of anthropogenic activities on the environment as a whole. Programmes for waste reduction, and incentives to develop and use low-waste or "clean" technologies, must be a central and permanent feature of national strategies for environmental protection – a principle adopted by the 1972 United Nations Conference on the Human Environment and others. The success of managerial and regulatory elements in protecting marine and other environments from remaining substances and wastes will be contingent on these measures. However, where waste generation is unavoidable, it is important to accept in principle that use of marine environments for waste disposal is both reasonable and legitimate, even if these environments are increasingly controlled to avoid pollution.

6.13 In principle, a reduction of emissions is likely to be the most effective means of achieving the common goal of human health and environmental protection, and this approach has received very strong endorsement by many countries. Source reduction is already an active component of many national programmes for pollution control. In practice, however, the lowest levels of emissions that can be achieved, and the time-scales for achieving them, depend on technological feasibility and socio-economic conditions. The framework proposed by GESAMP, which is applicable under all technical, socio-economic and environmental conditions, provides for those circumstances in which emissions cannot be eliminated, as well as those in which there is a pressing need for socio-economic development to alleviate human deprivation and thus, on occasion, to extend the time-scales for source reduction. In all cases, the framework encourages the use of sound scientific techniques, and established and sensible procedures of environmental management, in regulating emissions. It also helps to ensure that financial resources available for environmental improvements are concentrated on measures that are likely to yield the greatest benefits to the environment and human health.

6.14 While GESAMP strongly supports the active pursuit of cleaner technologies, and endorses the concept that reduced contamination will contribute to better protection of the marine environment, it does not accept that better waste management and stricter application of source controls will totally obviate the need for regulatory mechanisms that involve responsible use of scientifically based prediction. However clean the technology, it is inevitable that some waste will continue to be produced. Accordingly, it is essential that informed decisions be made in selecting environmentally preferable means of disposal which will, inevitably, involve some consideration of economic cost. For this to be possible, governments should recognize the need for, and encourage the development of, improved predictive capabilities in science as well as environmental economics.

6.15 Protecting the quality of the environment for present and future generations involves a continuous series of social, political, and managerial decisions based on scientific as well as other criteria. These decisions may be designed to facilitate human activities that aid social and economic development but also to regulate, and occasionally to prevent, certain practices. In reaching any such decisions, it is necessary to consider carefully all components of a practice and the areas and populations to which the decisions are relevant and applicable. In principle, the greater the scope or scale of an activity to which a decision applies, the less likely it will be able to take into account the inherent diversity of social, economic and environmental conditions. This will, in turn, have a bearing on the levels of control and enforcement that a society will accept. Accordingly, decisions adopted at global and regional levels to facilitate and regulate practices, should allow some flexibility in the conduct of a practice and/or the circumstances in which the practice may proceed. In contrast, prevention through prohibition is absolute and uniform. This can be entirely legitimate where there

is a high degree of homogeneity in social, economic and environmental conditions such as at local, and occasionally at national and regional, levels. However, it is most unlikely to be appropriate or effective (e.g. enforceable) at the global level.

7 Conclusions

7.1 In response to the terms of reference and associated questions formulated by IGPRAD, there are no fundamentally different technical or scientific elements underlying existing approaches to the management of radioactive and non-radioactive wastes respectively. There are currently differences in respect to the extent of environmental coverage and the specific practices to which they are applied. The framework proposed by GESAMP in GESAMP Reports and Studies No. 45 subsumes the radiation protection concepts and current environmental protection agreements and is applicable to all environments and practices.

7.2 Few human activities result in an equal distribution of the social and economic benefits they provide, or of their negative consequences. Similarly, the environmental changes caused by a particular practice are almost never distributed uniformly within or among environmental sectors. Rules and regulations limiting environmental changes cannot alter these facts; however, they can recognize their existence. Nevertheless, rules and regulations invariably have cross-sectoral impacts of a social, economic and environmental nature. Thus, both from theoretical considerations and from practical experience, there are clearly dangers in regulating human activities on an exclusively sectoral basis and in promulgating environmental protection measures outside a common framework that embodies the overall principles and goals of environmental protection and management. Such a framework will help to introduce greater balance and perspective into the appreciation of environmental issues by the public and to build greater confidence in the processes of planning and regulating for social and economic development.

7.3 The ICRP System of Dose Limitation is inherently multi-sectoral in its application but deals only with practices involving the production, use and disposal of radioactive materials. In contrast, measures for environmental protection, such as those developed within the London Dumping Convention, tend to deal with a variety of materials but only in the context of specific operations (e.g. dumping) and specific sectors of the environment. There is a clear need to harmonize such approaches through the adoption of a framework which is implicitly multi-sectoral and is applicable to all practices, impacts and forms of contamination.

7.4 Because of the global diversity of environmental conditions, development objectives, social aspirations and economic circumstances, there is a limit to the detail in which international agreements can legitimately define environmental protection criteria. Accordingly, as noted by the Stockholm Conference on the Human Environment (1972), global instruments for environmental protection should give priority to fundamental principles, overall goals and codes of practice rather than to setting specific limits for localized practices and environmental conditions.

7.5 Both containment and dispersion techniques for waste disposal can help to minimize impacts on the environment and human health, as implicitly recognized by the drafters of the London