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**IMO/FAO/UNESCO/WMO/WHO/IAEA/UN/UNEP  
JOINT GROUP OF EXPERTS ON THE SCIENTIFIC ASPECTS  
OF MARINE POLLUTION  
- GESAMP -**

# **REPORTS AND STUDIES**

**No. 25**

**REPORT OF THE FIFTEENTH SESSION  
NEW YORK, 25-29 MARCH 1985**



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NOTES

1. GESAMP is an advisory body consisting of specialized experts nominated by the Sponsoring Agencies (IMO, FAO, UNESCO, WMO, WHO, IAEA, UN, UNEP). Its principal task is to provide scientific advice on marine pollution problems to the Sponsoring Agencies and to the Intergovernmental Oceanographic Commission (IOC).
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Definition of Marine Pollution by GESAMP

"POLLUTION MEANS THE INTRODUCTION BY MAN, DIRECTLY OR INDIRECTLY, OF SUBSTANCES OR ENERGY INTO THE MARINE ENVIRONMENT (INCLUDING ESTUARIES) RESULTING IN SUCH DELETERIOUS EFFECTS AS HARM TO LIVING RESOURCES, HAZARDS TO HUMAN HEALTH, HINDRANCE TO MARINE ACTIVITIES INCLUDING FISHING, IMPAIRMENT OF QUALITY FOR USE OF SEA WATER AND REDUCTION OF AMENITIES."

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1. OPENING OF THE MEETING

- 1.1 The Joint Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP) held its 15th session at United Nations Headquarters, New York, from 25 to 29 March 1985, under the Chairmanship of Mr. E.D. Gomez. Ms G.D. Howells was Vice-Chairman.
- 1.2 At the opening of the session, Mr. V.S. Pozharski, Assistant Secretary-General of the Department of International Economic and Social Affairs (DIESA) welcomed the participants on behalf of the Department and the United Nations. He noted that this was the second time in GESAMP's fifteen year history that the United Nations had had the privilege of acting as its host. Mr. Pozharski indicated that during these years GESAMP has dealt with a number of matters which have been of particular interest to DIESA such as the marine pollution implications of deep sea bed mining, of coastal area development and of ocean energy development. He further noted that the interdisciplinary nature of GESAMP has made it an outstanding body within the United Nations system and the ability to deal with issues of direct interest and concern to the Member States of the United Nations and to the international community as a whole has been of great value. In conclusion, Mr. Pozharski wished GESAMP every success in its tasks.
- 1.3 The Chairman of GESAMP thanked Mr. Pozharski on behalf of the participants for his good wishes for the success of the session, for hosting the meeting and for the provision of secretariat facilities.
- 1.4 The agenda for the session as adopted by the Group is given in Annex I. The list of documents submitted to the session relating to particular items of the agenda, is given in Annex II.
- 1.5 The list of participants is given in Annex III.

2. REVIEW OF POTENTIALLY HARMFUL SUBSTANCES (WORKING GROUP 13)

- 2.1 The Technical Secretary of WHO indicated that there had been considerable activity within the Working Group during the intersessional period and that meetings had been held in June 1984 and February 1985. During the fifteenth session, the final report for cadmium, lead and tin was distributed. Several documents were considered previously by the Working Group and distributed by the Technical Secretary via mail to the GESAMP members. A preliminary draft of the Report on Impact of Carcinogenic Substances on Marine Organisms and Implications Concerning Public Health prepared by the Chairman of the Working Group in co-operation with the IMO Technical Secretary of GESAMP was available but was not considered by the Group.
- 2.2 The Chairman of the Working Group commenced a detailed discussion of the intersessional activities, a summary of which is appended to the

- report as Annex IV. He noted that the cadmium, lead and tin document had been finalized taking into account all the comments received from the GESAMP membership during the report's circulation. Some concern was expressed by the Chairman of the Working Group with the present procedures for preparation of assessments.
- 2.3 GESAMP members expressed considerable concern that the report on organosilicons had not been completed. The Group noted that it is important that the Working Group obtain as much peer-reviewed information as possible and make their independent assessment. The IMO Technical Secretary indicated a willingness to submit additional material to the Working Group. The Working Group Chairman agreed that the report should be completed in time for its sixteenth session.
- 2.4 The Working Group indicated satisfaction with the arsenic document. However, the evaluation section is not yet finalized. GESAMP members noted that the report was a good compilation of data, but does not provide an adequate risk assessment for the population. To assist in determining the populations at risk, fish consumption data from FAO should, if possible, be employed and supplemented with data from the United States Department of Commerce National Oceanic and Atmospheric Administration (NOAA) and from additional countries, e.g., Japan and the Philippines.
- 2.5 GESAMP members discussed the proper balance between concern for effects on human health, marine organisms and marine ecosystems which appear in each Working Group document. It was recognized that there exists much greater information and understanding of human health effects than there does of effects on marine life. A general conclusion of the discussion was that they are both of importance to GESAMP and the Working Group should focus on data of particular relevance to GESAMP. Working Groups should not repeat work already done, e.g., in preparing criteria documents if they are up to date and available, but rather they should refer to them and briefly summarize the pertinent human health aspects. Several members stressed the importance of making draft WHO documents available to Working Groups which can be accomplished with the understanding that the documents will not be cited until they are released.
- 2.6 The Chairman of the Working Group considered the report on selenium to be satisfactory. However, Working Group members noted some difficulty in gaining access to pertinent criteria documents during report preparation.
- 2.7 Major work remains to be done on the mercury report. This needs to be co-ordinated with the ongoing revision of the WHO Criteria Document for Mercury. Copies of this draft document will need to be made available to working group members.
- 2.8 GESAMP members were informed by the Chairman of the Working Group that two other draft documents were distributed: one on nutrients and one

on carcinogenic substances. The Working Group had not been provided with adequate time to discuss these documents in detail.

- 2.9 It was explained that the nutrients document particularly dealt with were nitrogen and phosphorus compounds, and the state of knowledge on their relationship to algal blooms and the problems caused by such blooms. The human health concerns had been thoroughly reviewed in a recently published WHO criteria document and were mainly caused through the consumption of sea food contaminated by various toxic species of phytoplankton. In briefly discussing the draft document, GESAMP members pointed out that the formation of nitrosamines and the causes of ciguatera were not adequately discussed. It was also suggested that phytoplankton blooms might be associated with the decline of oysters in certain areas. It was also pointed out that seminars had been held on the same problem in the Western Pacific. It was agreed that the Working Group should continue its work on this subject.
- 2.10 The Group briefly considered the preliminary study on the impacts of carcinogenic substances on marine organisms and implications concerning public health which had been prepared jointly by WHO (human aspects) and IMO (marine organisms). The Group noted that there is growing evidence of incidences of fish diseases in polluted marine environments; however, any conclusions which may be drawn are still largely presumptive. On the other hand there is good evidence that substances known to be carcinogenic to mammals and humans do accumulate in marine organisms and have similar effects on marine life. It was also noted, however, that preliminary study does not identify scientific evidence to suggest that carcinogenic substances are currently of major concern in the marine environment.
- 2.11 The Group agreed that an in-depth study should be carried out. As a first step towards such an exercise, the document submitted jointly by WHO and IMO will have to be discussed in detail by the Working Group on the Review of Potentially Harmful Substances. The IMO Technical Secretary emphasized that the preparation of those parts of the study referring to marine organisms had been based on only a limited number of scientific publications, and invited GESAMP members to provide comments and additional material that might be relevant to complete the picture. The Group recommended that co-operation with IARC and ICES should be sought in this field. The Group expects that a revised preliminary study or a more detailed study, depending on the workload of the Working Group, should be submitted for consideration at GESAMP XVI. Several members of the Group expressed their view that this subject item should be considered of high priority.
3. EVALUATION OF THE HAZARDS OF HARMFUL SUBSTANCES CARRIED BY SHIPS (WORKING GROUP 1)
  - 3.1 The IMO Technical Secretary informed the Group that the Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships

had met twice during the intersessional period, once in London (21 to 25 May 1984) and once in Plymouth, United Kingdom (11 to 15 February 1985). He indicated that the work of producing and reviewing hazard profiles of substances carried by ships had been continued and that efforts have also been made towards completing and refining the Guidelines for Evaluating Threshold Values for Fish Tainting.

- 3.2 The Chairman of the Working Group introduced the reports of the Working Group. A definition of "tainting" had been developed by the Working Group for use in connection with its guidelines. This definition would be reconsidered by the Working Group when more data resulting from tests carried out in accordance with the Guidelines became available and also when the text of a definition of "tainting" currently under preparation by the ISO becomes available. The Group, in commenting on the definition prepared by the Working Group, proposed several minor amendments for future consideration by the Working Group.
- 3.3 The Group noted a number of comments which have been made by members of the Working Group itself as well as by experts from outside the Working Group, aiming at the improvement of the Guidelines. These included the assessment of the dose/effect relationship by defining a TC 50 which is the median tainting concentration.
- 3.4 Several members of the Group brought forward additional proposals and comments, such as a recommendation to the Working Group to develop dose/response curves for various chemicals. They also suggested that even when applying a set of guidelines there still remained a highly subjective element in the evaluation of tainting arising from the variation in the experience of the members of tasting panels and the location, time and detailed test conditions. The Group recognized that it was not possible to obtain objective tainting data; however the development of tainting testing guidelines was a great improvement compared with previous practices where tainting data had been based solely on experience from spillage incidents. However, it was noted that the development of dose/response relationships on tainting was a difficult, lengthy and costly task which might be desirable in connection with the preparation of a detailed scientific study of tainting processes. It was pointed out that the Working Group is concerned with the identification of those substances which, at a certain concentration (arising from operational discharges from ships and accidental spillages from chemical tankers), are liable to taint seafood. It was therefore agreed that the development of a dose/response curve on tainting was not a requirement that was relevant to the work of the group.
- 3.5 The Group was informed of the problems encountered by the Working Group in assigning hazard profiles to mixtures transported under trade-names. The Working Group had assigned hazard profiles to such substances provided that adequate relevant information on the properties of these substances had been supplied and that assurance had been given that their composition would remain constant within stated



limits. In a number of cases details on trade-named substances had been provided by the chemical industry to the Working Group in confidence and as a matter of principle such data had not been made available outside the Working Group. In light of these problems, the Working Group had declared at its sixteenth session that it could no longer either accept or retain data under conditions of confidentiality. It was therefore proposed that any background information used for assigning hazard profiles would be made available to any scientist, institution or administration wanting to study the scientific findings of the Working Group.

3.6 The Group noted that the above statement had been subject of many discussions within IMO bodies. The Working Group, taking into account the proposals submitted to solve the problems at its seventeenth meeting reconsidered the question. The Working Group had agreed that it would in future evaluate the environmental hazards of substances:

- (i) for which a request for hazard evaluation has been brought forward through maritime administrations or appropriate national authorities of the chemical producer's home country;
- (ii) for which relevant information (which may be confidential) is submitted to the Working Group. In case of mixtures this should include a statement that the composition of the substances would remain constant within given limits;
- (iii) which have proper chemical names or chemical names defining the composition of mixtures.

The Working Group would submit its results to the administrations concerned. Confidential background material would be retained by the IMO Technical Secretary of GESAMP for future reference which may be needed by the Working Group but would not be transmitted to any third party. Any queries which would be made in connection with the evaluation process carried out by the Working Group would be transmitted to the administrations or national authorities concerned. The latter would be responsible for deciding (after consultation with the chemical manufacturers concerned) if the confidential material kept in their files could be released.

3.7 The Group reluctantly accepted that this was the only practical way forward and endorsed the views of the Working Group as expressed in paragraph 3.6 above. It was, however, regrettable that any data would have to be regarded as confidential.

3.8 The Group noted that, in response to the discussion at GESAMP XIV, the Working Group had included some minor amendments in the legend of the hazard profiles in order to emphasize that "tainting" might not in every case fall under processes generally described as "bioaccumulation", and also in order to cover potentially serious long-term health hazards. In this connection several members of the

Group queried the approach and evaluation used by the Working Group and also asked for details of how the evaluation process is carried out by the Working Group. The Group accepted the explanation that the procedure followed by the Working Group had to a very large extent been embodied in the text of the International Convention for the Prevention of Marine Pollution from Ships (MARPOL 73/78). A detailed explanation of how the Working Group carried out its hazard evaluation had been provided in GESAMP Reports and Studies No. 17 which will be updated in light of improved knowledge and experience gained since publication of the report, probably in about two years time.

- 3.9 The Group requested the IMO Technical Secretary to make available to the members of the Group by mail the Composite List of Hazard Profiles which are prepared annually for IMO Committees and Sub-Committees.
  - 3.10 The Group noted the results of the evaluation of the long-term health effects of phthalate esters. As requested by the Group at its fourteenth session these results have been made available to the Working Group on the Review of Potentially Harmful Substances.
  - 3.11 It was noted that there was still some difficulty in obtaining relevant data for the evaluation of hazards of certain substances, particularly on their aquatic toxicity. The Group requested the IMO Technical Secretary to inform the IMO bodies concerned of these problems. It was also proposed that IMO members should increase their efforts in carrying out the necessary laboratory tests with a view to filling the gaps in the hazard profiles.
  - 3.12 The Group approved the reports of the Working Group including the lists of hazard profiles of substances set out in the annexes to the reports and approved the future working programme of the Working Group. A summary of the reports of the Working Group is set out in Annex V.
4. INTERCHANGE OF POLLUTANTS BETWEEN THE ATMOSPHERE AND THE OCEANS  
(WORKING GROUP NO. 14)
- 4.1 The WMO Technical Secretary informed the Group about activities of the Working Group during the intersessional period which included, (1) an Expert Consultation on the Atmospheric Transport of Pollutants into the Mediterranean Region, held in Athens, Greece, from 21 to 25 January 1985, (2) preparation of draft proposals on the scientific bases for international programmes for the monitoring of contaminant levels in the atmosphere near the sea surface and contaminant fluxes across the air-sea interface and (3) revision of the second report on the interchange of pollutants between the atmosphere and the oceans which has been issued as GESAMP Reports and Studies Number 23.
  - 4.2 The Chairman of the Working Group introduced an interim Report on the Atmospheric Transport of Pollutants into the Mediterranean Region prepared at the Expert Consultation in Athens (1985) and including the

main outcome of the fourth and fifth meetings of the Working Group (Monte Carlo, 1982 and Athens, 1983). The report was prepared in accordance with the two first terms of reference of the Working Group adopted by GESAMP XIV and provided a review of the knowledge on the physical, chemical and biological processes controlling the air-sea exchange of pollutants, along with a brief description of programmes existing in some other regions, as well as overview of the present understanding of atmospheric transport of contaminants into the Mediterranean based on the limited data available, including levels of atmospheric contaminants over the Mediterranean, emissions, evaluation of pathways and trajectories, and modelling of fluxes. The report also gives recommendations for future work and a pilot project on monitoring the atmospheric transport of contaminants into the Mediterranean Sea. Annex VI presents a summary of the report of the Working Group.

- 4.3 The Group expressed concern about the reliability and comparability of data used in the report for assessing the significance of atmospheric input of contaminants into the Mediterranean Region in comparison with input into other regions or from other sources. For some of these data, it was pointed out that there was a lack of information on data collection techniques and on levels of data quality control. It was also recommended that the terms "contaminant" and "contamination" be used in the document instead of "pollutant" and "pollution" in order to be in line with the GESAMP definition of "marine pollution". Following a thorough discussion, the Group approved the draft version of the document, with the provision that the final version, revised in accordance with the Group's advice, be published by WMO as GESAMP Reports and Studies Number 26.
- 4.4 In order to address process modification by contaminants and its relevance to climate and the energy balance of the oceans, revised terms of reference for the Working Group were proposed. It was also proposed that a study of the atmospheric transport of pollutants toward and into specific regions be continued.
- 4.5 To accommodate these tasks, the following revised terms of reference for the Working Group were adopted by the Group:
  - (i) to provide a continuing review of air-sea material interchange with emphasis on the pollutant modification of atmosphere and ocean-related processes, especially those pertinent to climate, and the energy balance of the oceans;
  - (ii) to study certain properties of the ocean mixed layer and the surface microlayer which are modified by pollutants to clarify mechanisms of mass and energy transfer between the atmosphere and the oceans, and to assess the potential for the remote detection of pollutants as a result of these surface and near-surface effects;

- (iii) to review and prepare recommendations and/or manuals on the use of suitable standardized measurement technique for the determination of pollutants in the marine atmosphere, taking into account the need to minimize sampling and analytical artefacts;
- (iv) to describe atmospheric transport processes towards and into specific regions, and to review the scientific literature and assess the atmospheric pathways and fluxes of important pollutants into a specific region for which adequate information on other pathways for the introduction of such pollutants exists.

5. LAND-SEA BOUNDARY FLUX OF POLLUTANTS (WORKING GROUP 22)

- 5.1 The UNESCO Technical Secretary informed the Group that the first session of the Working Group had been held in Mazatlan, Mexico 3-7 April 1984 under the Chairmanship of Mr. H. Windom with only a few full members in attendance but with the support of co-opted members attending parallel meetings of the IOC. A summary of the Report of this session appears as Annex VII. The Session was seen largely as a preliminary meeting to develop the approach to be followed and review the terms of reference.
- 5.2 The intersessional period subsequent to the meeting had been largely devoted to the circulation of a questionnaire, with the assistance of the agencies of GESAMP, to as many focal points as possible. This questionnaire attempted to solicit information on scientific studies of river inputs of contaminants to the global ocean. The returns from the exercise had proven to be encouraging and allowed the Chairman to reach a preliminary analysis of the information and an assessment of the ongoing activities and coverage. This summary was presented for consideration by GESAMP.
- 5.3 As of 1 March 1985, 111 responses to the questionnaire had been received. Responses came from organizations/individuals conducting studies of river systems throughout the world representing every major land mass. The rivers being studied vary from the very largest, such as the Amazon, Mississippi and Yangtze, to those having drainage basin areas less than 500 sq km and discharges of as low as 1 cubic meter per second. Most of the studies being conducted on river transport address either trace metals and/or nutrients. Very few studies address synthetic organic contaminants, petroleum hydrocarbons or radionuclides. There appears to be no common basis of approach in the studies described by the respondents.
- 5.4 Difficulties encountered by organizations/individuals studying river systems appear to be related mostly to discharge and composition variability. Of the respondents attempting to estimate material fluxes in rivers most feel that they have inadequate information on hydrology.

- 5.5 Respondents to the questionnaire provided copies and/or citations of reports and papers on studies they have conducted. These will be compiled for use by the Working Group in assessing the state of knowledge on sources, pathways and fate of substances across the land/sea boundary.
- 5.6 During the ensuing discussion of the Working Group report the rationale for the choice of pollutants to be considered by the Working Group was questioned. It was pointed out by the Chairman of the Working Group that the pollutant classes chosen were those of common concern as was substantiated by the results of the questionnaire.
- 5.7 A number of members requested clarification of various aspects of the questionnaire. Several members suggested additions to the questionnaire that would have provided more specific information on such items as coastal currents, tidal amplitude and anthropogenic activities in, or associated with, river systems. The Chairman of the Working Group reemphasized that only three members were able to attend the first Working Group meeting so obviously a limited number of topics were covered. The Chairman of the Working Group indicated, however, that the report of the results of the questionnaire would be recirculated among respondents so that additional information could be requested and included. He indicated that this would be done after the next meeting of the Working Group when other members would have a chance to contribute to any additional requests for information.
- 5.8 Some clarification of the discussion of the land/sea boundary given in the Working Group report was requested since some GESAMP members interpreted this to imply that marginal seas were excluded from consideration by the Working Group. The Chairman of the Working Group assured the Group that marginal seas would certainly be included and that they represented one type of boundary along with estuaries and continental shelves. He stated that it was his view and the view of the Working Group that the major effort of the group would be to address the processes by which contaminants move to and through estuaries, continental shelves and marginal seas. This would include refluxing of materials within these environments.
- 5.9 The Chairman of the Working Group was asked to what extent characteristics of drainage basins of rivers would be taken into consideration by the Working Group. He indicated that it was his intent to see that natural characteristics such as geology and climatology would be considered but that specific anthropogenic characteristics probably would not.
- 5.10 A number of other points and suggestions were made by GESAMP members and noted by the Chairman of the Working Group. These concerned the types of processes that would and would not be addressed, the quality of the data that would be assessed and approaches to integrating gross river fluxes. Suggestions of additional sources of information were

also offered by members. The Chairman of the Working Group also pointed out that anthropogenic modifications of coastal areas, such as those related to dredging, would not be considered.

- 5.11 The Group agreed that it was essential that the Working Group meet during the next intersessional period with a full complement of members to enable it to address its terms of reference properly. The Chairman of the Working Group expressed his interest and intention to hold a Working Group meeting in July 1985.
6. METHODOLOGY AND GUIDELINES FOR THE ASSESSMENT OF THE IMPACT OF POLLUTANTS ON THE MARINE ENVIRONMENT (WORKING GROUP 23)
  - 6.1 The Group was informed by the FAO Technical Secretary that the Working Group had held its Second Session in Bangkok, Thailand, from 29 October to 9 November 1984. The Chairman of the Working Group, Mr. V. Pravdic, introduced the Report, a summary of which is given in Annex VIII.
  - 6.2 The Group noted with satisfaction the considerable achievement made by the Working Group in its first task, the description of the basic concepts of utilizing the environmental capacity approach for the assessment of impact of pollution on the marine environment. It also noted that the Working Group had accomplished its second task, to describe parameters and processes to be taken into account when assessing impacts of pollutants. The third task, to describe techniques to be used in the process, however, needs more elaboration to become applicable.
  - 6.3 The case study appended to the report was considered of only limited value for the validation of the environmental capacity approach and of the applicability of the guidelines (see Annex VIII). It was suggested that, to be useful, case studies would have to be much simpler and should concentrate initially on a specific activity or pollutant relating to a single specific development project.
  - 6.4 The Group supported the approach taken by the Working Group to develop guidelines for the assessment of the impact of pollutants on the marine environment and endorsed the main body of the report, subject to some amendments and improvements as suggested by the Chairman of the Working Group and by members of the Group.
  - 6.5 The Group proposed that work on the report should continue during the forthcoming intersessional period. Within unchanged Terms of Reference, the main task would be to concentrate on providing practical advice to developing countries. Specific tasks to be accomplished would be:
    - (i) to verify the applicability of the approach taken through simple examples from case studies to be done on specific pollutants and known development projects, where environmental data were readily available.

- (ii) to add to the report a chapter on techniques to identify critical processes and targets, and to quantify parameters and critical rates used in the impact assessment process, and on a general methodology how to apply in practical terms the guidelines given for assessing potential impacts of development projects. In this latter respect it must be borne in mind that in many situations where the guidelines will be applied, the data base on which to make the assessment will be very limited.
7. INTEGRATED GLOBAL OCEAN MONITORING (WORKING GROUP 24)
- 7.1 The Technical Secretary of UNEP informed the Group that the Working Group had not met in the past intersessional period. However, as part of the intersessional activity, the Chairman of the Working Group had prepared a draft document (presented for information to the Group as document GESAMP XV/7/1) to serve as the basic background document for the first meeting of the Working Group. In addition, as requested by the 14th session of GESAMP from Working Group No. 14, a draft document on "Scientific Bases for International Programmes for Monitoring of Pollutant Levels in the Atmosphere Near the Sea Surface and Pollutant Fluxes Across the Air-sea Interface" was prepared as another background document to be considered at the first meeting of the Working Group.
  - 7.2 The Chairman of the Working Group briefly reviewed the present situation and future activity of the Working Group and also mentioned the contents of document GESAMP XV/7/1 which reflects her views on subjects expected to be considered at the first meeting of the Working Group.
  - 7.3 Several members of GESAMP felt that the terms of reference were so broad as to imperil the timely completion of the tasks of the Working Group. It was strongly advocated by those members that the terms of reference be dealt with systematically and, above all, sequentially. If, at any stage, it becomes apparent that there exist major problems in the completion/resolution of a particular step in the terms of reference, the Working Group should seek guidance at the next GESAMP session before attempting to tackle further aspects or stages of the task. The Group suggested strongly that the Working Group should investigate the on-going or planned programmes in this field by other international agencies and avoid any duplication of terms of reference.
  - 7.4 It was emphasized that some current monitoring programmes were initiated on a pragmatic basis, without proper consideration for their methodological feasibility and scientific rationale. The scientific bases and strategy for any such programme, in either small or large spatial scales, should have a sound and defensible scientific foundation. The difficulties in determining the "ecological consequences of pollution" were emphasized and the Working Group was cautioned to use the terms "pollution" and "contamination" in the context of GESAMP's definitions for these terms.

- 7.5 The Group expressed the hope that the above comments will help the Working Group focus the discussions at their first meeting in the forthcoming intersessional period, within the terms of reference adopted at the 14th session of GESAMP.
- 7.5 The Group noted that UNEP will become the "lead agency" for the Working Group, with support of WMO as the "co-operating agency".

## 8. FUTURE WORK PROGRAMME

### 8.1 Coastal Modeling (Working Group 25)

8.1.1 A proposal for the establishment of a new working group on coastal modelling applicable to the disposal of wastes in coastal waters was presented by the IAEA Technical Secretary. In the development of standards for levels of material disposed of in the coastal marine environment, including continental shelves, below which no special care techniques are required and may therefore be considered for dumping under a general permit under the London Dumping Convention, it is essential to evaluate the possible modelling techniques appropriate to the solution of such a problem. The opinion has been expressed by a number of oceanographic experts that generic values for such numerical standards are not scientifically possible. Coastal marine environments vary so widely in their parameters, that the problem may only be approached from a site specific basis.

In order to assist in the development of standards and criteria for waste disposal in coastal waters, the Group agreed to establish a Working Group with the following terms of reference:

- (i) to evaluate the state of the art of coastal (including continental shelf) modelling relevant to waste disposal in such waters;
- (ii) to determine what parameters are site specific and what parameters are generic to a number of coastal situations; and
- (iii) to make recommendations as to the types of models appropriate for specific coastal situations.

8.1.2 The Group noted that the IAEA will be the lead agency for this Study. The Technical Secretaries of UNEP, UNESCO and IMO indicated that their organizations would support the work. Mr. J.M. Bowers has been appointed as an interim chairman, with Mr. J. Blanton to chair the Working Group after he has been nominated at GESAMP XVI to be a member of the Group.

### 8.2 Working Group on the State of the Marine Environment

8.2.1 The Technical Secretary of UNEP introduced the proposal for the preparation of the new review of the health of the oceans (document GESAMP XV/8/1) and a UNEP observer outlined the scope of the proposed review.



8.2.2 Concern was expressed by the Group about the scope of the proposed work which, some experts felt, was too broad. Some experts felt that, although the selection of the proposed topics was not objectionable, a common conceptual approach to these topics, as the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) had developed for its own purposes, was not evident. It was noted that one of the major aims of the new review was the identification of environmental trends and the assessment of their adverse or beneficial effects, particularly in coastal areas and marginal seas.

8.2.3 In spite of some concern expressed about the timeliness of the proposed activity, the Group concluded that it would be worthwhile to initiate the proposed work, taking into account the work carried out by several GESAMP working groups.

8.2.4 After detailed discussion of the proposal contained in the document GESAMP XV/8/1 and considering the explanations provided by the Technical Secretary of UNEP, the Group decided to establish the Working Group on the State of the Marine Environment (Working Group 26) with the following interim terms of reference:

- (i) to prepare, by the 18th session of GESAMP, a draft report consisting of a succinct critical review (up to 40 pages) of the state of the marine environment following as far as possible the pattern of UNSCEAR reports and making full use of the results and conclusions of other GESAMP working groups as well as of the data provided by relevant international and national programmes assessing the state of the oceans;
- (ii) to examine and assess in the draft, global and regional trends, current and/or anticipated, arising from ongoing and planned human activities that, through changes of the oceans' chemical or physical state, may affect:
  - (a) the productivity of the oceans at all trophic levels;
  - (b) the quality of the ocean resources for human use;
  - (c) the integrity of the role of the oceans in the energy balance of the earth;
- (iii) to base its draft on detailed technical annexes that will become part of the report.

8.2.5 Furthermore it was agreed that:

- (i) the timing of the review should be closely tied to the schedules of the current GESAMP Working Groups, in particular those directly relevant to the Working Groups (WGs 13, 14, 22, 23, 24) so that their findings can be fully taken into account in preparing the review.

- (ii) the production and presentation of the review should take advantage of the experience of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in the preparation of its reports to the United Nations General Assembly because, though dealing with different subjects, the review will cover similarly broad and diverse areas of technical expertise and will be addressed, like the UNSCEAR reports, to a dual audience of specialists and laymen;
- (iii) outside GESAMP, special attention will have to be given to the results of the activities of the Regional Seas Programme of UNEP, of GIPME of IOC and of other ongoing regional and global programmes sponsored by other bodies (Helsinki, Paris and Oslo Commissions, ICES, CIESM, etc.). These are likely to provide the bulk of the data on marine pollution and its effects;
- (iv) for the 16th session of GESAMP the Working Group should prepare an outline of the review (about 15 pages) and the outline of its annexes (about 5 pages per annex). On the basis of this outline, the Group will decide on the future course of action and on the final terms of reference of the Working Group.

8.2.6 It was noted that the agreed name of the Working Group does not exclude the possibility of using "Health of the Oceans" as the title of the final report.

8.2.7 Mr. A.D. McIntyre was proposed and agreed to as the Chairman of the Working Group. It was noted that UNEP would be the "lead agency" of the Working Group. IMO, FAO, WMO, WHO, IAEA and United Nations expressed their interest to be associated with the Working Group as co-operating agencies. The Technical Secretary of UNEP assured the Group that no UNEP funds intended to be allocated to ongoing working groups supported by UNEP will be used for the Working Group on the State of the Marine Environment. Furthermore, he has confirmed that UNEP would provide the Secretariat support for the Working Group and would be ready to bear a major share of the total costs related to the preparation of the review.

### 8.3 Other intersessional work

Following the above decisions on the establishment of two new working groups, the Group noted that intersessional work would take place on the subjects listed below. The sponsoring organizations responsible for co-ordinating the intersessional work and the GESAMP members assigned to each working group are indicated. Additional members from outside GESAMP are selected by the Chairman in consultation with the relevant organizations.

(a) Evaluation of the Hazards of Harmful Substances Carried by Ships  
(Working Group No. 1)

Lead Agency : IMO  
Co-operating Agency : UNEP  
Chairman : P. Jeffery  
Member : W. Ernst

(b) Review of Potentially Harmful Substances (Working Group No. 13)

Lead Agency : WHO  
Co-operating Agencies : UNEP, FAO and IMO  
Chairman : L. Friberg  
Members : L.P.A. Magos  
M. Bernhard

(c) Interchange of Pollutants between the Atmosphere and the Oceans  
(Working Group No. 14)

Lead Agency : WMO  
Co-operating Agency : UNEP  
Chairman : W.D. Garrett  
Members : V. Koropalov  
V. Pravidic  
M. Waldichuk

(d) Land-Sea Boundary Flux of Pollutants (Working Group No. 22)

Lead Agency : UNESCO  
Co-operating Agencies : UNEP and IAEA  
Chairman : H. Windom  
Members : V. Pravidic  
J.M. Bewers  
E.K. Duursma  
T. Balkas

(e) Methodology and Guidelines for the Assessment of the Impact of  
Pollutants on the Marine Environment (Working Group No. 23)

Lead Agency : FAO  
Co-operating Agencies : UNEP, UNESCO, WHO,  
IMO and IAEA  
Chairman : V. Pravidic  
Members : E.D. Gomez  
E.P. Myers  
G.D. Howells  
W. Ernst  
H. Windom

(f) Integrated Global Ocean Monitoring (Working Group No. 24)

Lead Agency	:	UNEP
Co-operating Agency	:	WMO
Chairman	:	A. Tsyban
Member	:	M. Waldichuk

(g) Working Group on Coastal Modeling (Working Group No. 25)

Lead Agency	:	IAEA
Co-operating Agencies	:	UNEP, UNESCO, IMO
Chairman	:	J.M. Bowers (provisionally)
Member	:	E. Gomez

(h) Working Group on the State of the Marine Environment (Working Group No. 26)

Lead Agency	:	UNEP
Co-operating Agencies	:	UN, IAEA, WHO, WMO, FAO, IMO
Chairman	:	A.D. McIntyre

9. DATE AND PLACE OF NEXT SESSION

9.1 The Group noted that the sixteenth session of GESAMP would be held at IMO Headquarters, London, from 17 to 21 March 1986, commencing on Monday, 17 March 1986 at 2 p.m. The Group urged the Technical Secretaries to distribute documents for consideration at the sixteenth session no later than 15 February 1986.

10 OTHER MATTERS

10.1 The Group noted the efforts made by the Technical Secretaries aiming at wider distribution of GESAMP Reports and Studies in order to make these more easily available to the scientific community (e.g. the publication of summaries of new Reports and Studies in the Marine Pollution Bulletin, listings of previous publications of GESAMP on the last page of each document published in the Reports and Studies, etc.). The Group requested the Technical Secretaries to continue their efforts in this field. The Chairmen of Working Groups were invited to prepare summaries of status and progress reports of their working groups to the editor of the Marine Pollution Bulletin, if they feel it appropriate.

10.2 With regard to the outline of Reports and Studies it was proposed that each document should contain an Executive Summary. It was also proposed that names of experts from outside the membership of Working Groups who had prepared basic material and studies for consideration of a working group should be mentioned in the reports. The Group felt that this was a matter to be decided upon in every case by the Chairman of the Working Group and the lead agency concerned.

- 10.3 Several members of the Group emphasized that in order to increase the multidisciplinary character of the Group more efforts should be made to include physical oceanographers or climatologists in the membership of the Group.
  
- 11 ELECTION OF CHAIRMAN AND VICE-CHAIRMAN FOR THE NEXT INTERSESSIONAL PERIOD AND FOR THE SIXTEENTH SESSION
  - 11.1 The Group unanimously elected Mr. E.D. Gomez as Chairman and Ms. G.D. Howells as Vice-Chairman for the next intersessional period and for the sixteenth session of GESAMP.
  
- 12 CONSIDERATION AND APPROVAL OF THE REPORT OF THE MEETING
  - 12.1 Following the introduction of this agenda item, the question was raised as to how fully GESAMP reports reflected the proceedings of the meeting. In the subsequent discussion, it was agreed that this matter should be raised again at the next GESAMP session. In preparation for this, members were invited to write to the Chariman giving him their views.
  
  - 12.2 The report of the fifteenth session of GESAMP was considered and approved by the Group on the final day of the Session. It should be noted that the Annexes IV to VIII, which are presented for information, were not submitted to the Group for approval.

ANNEX I

AGENDA

Opening of the meeting

- 1 Adoption of the Agenda
- 2 Review of potentially harmful substances
- 3 Evaluation of the hazards of harmful substances carried by ships
- 4 Interchange of pollutants between the atmosphere and the oceans
- 5 Land-sea boundary flux of pollutants
- 6 Methodology and guidelines for the assessment of the impact of pollutants on the marine environment
- 7 Integrated global ocean monitoring
- 8 Future work programme
- 9 Data and place of next session
- 10 Other matters
- 11 Election of Chairman and Vice-Chairman for the next intersessional period and for the sixteenth session
- 12 Consideration and approval of the report of the meeting

ANNEX II  
LIST OF DOCUMENTS

GESAMP NO.	AGENDA NO.	AUTHOR, SOURCE	TITLE
XV/1	1	Administrative Secretary	Provisional Agenda for the 15th Session of GESAMP
XV/2	2	Working Group	Summary, Intersessional activities of the Working Group on the review of potentially harmful substances
XV/2/1	2	Working Group	Hazard evaluation for arsenic
XV/2/2	2	Working Group	Hazard evaluation for selenium
XV/2/3	2	Working Group	Evaluation of nutrients and algal blooms
XV/2/4	2	Working Group	The impact of carcinogenic substances on marine organisms and implications concerning public health
XV/2/5	2	Working Group	GESAMP review of potentially harmful substances; cadmium, lead and tin
XV/3	3	Working Group	Report of the 16th session of the Working Group on evaluation of the hazards of harmful substances carried by ships
XV/3	3	Working Group	Report of the 17th session of the Working Group on evaluation of the hazards of harmful substances carried by ships
XV/3/1 Add.1	3	IMO	Long-term health effects of phthalate esters
XV/4	4	WMO	Report of expert consultation on the atmospheric transport of pollutants into the Mediterranean Region
XV/5	5	Working Group	Report of the 1st session of the Working Group on the land-sea boundary flux of pollutants

GESAMP NO.	AGENDA NO.	AUTHOR, SOURCE	TITLE
XV/6	6	Working Group	Report of the 2nd session of the Working Group on the methodologies and guidelines for the assessment of the impact of pollutants on the marine environment
XV/6/ Add.1	6	Working Group Chairman	Note from the Chairman of the Working Group
XV/6/ Add.2	6	Working Group Chairman	Glossary of terms
XV/6/1	6	WHO/UNEP	Papers presented to the <u>Ad Hoc</u> Working Group of experts on the protection of the marine environment against pollution from land-based sources
XV/7	7	Working Group Chairman	Integrated global ocean monitoring: interim report
XV/8/1	8	UNEP	Proposal for the preparation of the review of the health of the oceans
XV/8/2	8	IAEA	Proposal for establishing a Working Group on coastal modelling applicable to waste disposal in coastal waters



ANNEX III

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ANNEX IV  
SUMMARY OF THE REPORT OF THE WORKING GROUP ON THE REVIEW  
OF POTENTIALLY HARMFUL SUBSTANCES  
(WORKING ROUP 13)

1. Meetings were held from 12 to 13 June 1984 at WHO Headquarters in Geneva and from 6 to 8 February 1985 at the Monitoring and Assessment Research Centre (MARC) in London.
2. The cadmium, lead and tin documents were combined into a single report, and redundant material was removed. Reviews by working group members identified gaps in seafood consumption, analytical control, marine environmental and health effects data. Following correction of these deficiencies the revised report was sent to all GESAMP members for final comments and concurrence. Most reviewers had little criticism and endorsed the document. Suggestions for improvement were implemented, final revisions were made and the report was language-edited. The report has now been reproduced and distributed to the GESAMP membership. A number of additional copies were sent to each of the other United Nations agencies in GESAMP and the originals will be given to UNEP.
3. The marine section of the document for arsenic was revised to improve its presentation and shorten it. Minor revision was made of the health section. Additional suggestions were made at the last working group meeting for improving the text. Some of these improvements were completed in time for the document to be reproduced and distributed to the GESAMP Membership before GESAMP XV. However, more work needs to be done, particularly on the evaluation section. As such further changes are likely in the document, comments by GESAMP Members will be greatly appreciated, and the document in its revised form will be sent to all members before finalization and printing.
4. The marine part of the mercury report was expanded and updated. However, working group members still feel it needs considerably more revision including the addition of reference material and data. Since there was no way to complete this work prior to GESAMP XV, it was the opinion of the Working Group that no report be distributed to the membership at this time.
5. No progress has been made on the organosilicons report, since Mr. A. Jernelöv had been unable to work on the marine section. As such there is nothing to distribute to the membership.
6. Utilizing the draft WHO Environmental Health Criteria Document on Selenium, ICES information and two consultants, a draft report was prepared on Selenium. Working group members, while pleased with this draft document, made some immediate recommendations for inclusion of data in the marine section and improvement of the health effects and human health evaluation sections, and suggested this revised version be

distributed to the GESAMP Membership for information and comments. The Working Group requires another opportunity to review the document and will then pass it to the GESAMP Membership for review and concurrence before printing.

7. A preliminary review has been prepared by consultants for nutrients. Some background information was obtained from the IRPTC data profiles on nitrogen and phosphorous and the WHO Aquatic Biotoxins Criteria Document. The Working Group has had little time to look at this report. A few suggestions were made for its improvement, however, prior to distribution of this draft to GESAMP members for their comments and information. After GESMAP XV, the Working Group anticipates further revision of this document before final review and presentation to GESAMP for approval.
8. A report entitled "The Impact of Carcinogenic Substances on Marine Organisms and Implications Concerning Public Health - Preliminary Study" was prepared by Mr. L. Friberg and Mr. M. Nauke with the assistance of consultants. This preliminary report is distributed to the GESAMP Membership for information and comments. It is acknowledged that more work is needed and the membership will be seeing later revisions.
9. Future work will include completion of the arsenic, mercury, selenium, organosilicon and carcinogen reports. Lead individuals have been identified for all projects. Ideally, separate working groups will be organized to consider the hazard assessments for metals, organosilicons, nutrients and cancer-causing substances.



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ANNEX V

SUMMARY OF THE REPORTS OF THE WORKING GROUP  
ON THE EVALUATION OF THE HAZARDS OF HARMFUL SUBSTANCES  
CARRIED BY SHIPS (Working Group 1)

1. The Working Group met under the Chairmanship of Mr. P. Jeffery in London from 21 to 25 May 1984, and in Plymouth from 11 to 15 February 1985.
2. The Working Group established new hazard profiles of substances and also reviewed existing hazard profiles of substances for which members of the Working Group had undertaken to carry out work during the intersessional period. Background information which had been submitted by national maritime administrations and the chemical industry was also used in the preparation of new and revised hazard profiles.
3. The Working Group continued its activities in the preparation of "Guidelines for Evaluating Threshold Values for Fish Tainting" by including in the guidelines a definition of "tainting" as follows:  
"The development of a flavour or odour in the organisms when caught or harvested which is not typical of the flavour or odour of the organisms themselves".
4. In connection with the preparation of guidelines for evaluating tainting the Working Group had received a large number of proposals and comments from industry, IMO bodies and members of the Working Group. These included the development of tests for linking effects with concentration for a certain exposure of time, the introduction of tests for defining depuration times (with the aim to identify "strong" and "weak" tainters), the introduction of "qualification tests" in order to select suitable candidates for a sensory panel, etc. The Working Group felt it premature to review the draft guidelines at this stage but would consider all the comments and proposals when more results of tainting tests become available. In this regard the increasing activities of chemical manufacturers' associations in the field of tainting testing was very much appreciated.
5. The Working Group considered the problems it had encountered for some time in relation to evaluating mixtures carried under trade-names, summarized as follows:
  - (a) detailed analysis of composition of mixtures have in many cases not been carried out;
  - (b) changes of composition of mixtures occur due to the tailoring of properties to market place requirements;
  - (c) identical mixtures are carried under different names; and
  - (d) relatively small amounts of additives might cause additional or modified hazards.

6. The Working Group noted that the Marine Environment Protection Committee of IMO had decided that substances carried currently under trade-names would in the near future only be included in the lists of Annex II to MARPOL 73/78 and in the Bulk Chemical codes after having been identified with proper chemical names or chemical names roughly defining the composition of the mixtures.
7. In light of recent problems met by the Working Group with regard to the confidentiality of data submitted by the chemical industry the Working Group agreed that as a matter of principle any request from the chemical industry to the Working Group for evaluating the environmental hazards of its products carried by ships should be submitted to the Group, accompanied by the relevant information, which can be confidential, through maritime administrations or other appropriate national authorities of the home country of the producer. The hazard profiles prepared by the Working Group would be supplied to these administrations or authorities. Confidential background material would be retained by the IMO Technical Secretary of GESAMP for future reference which may be needed by the Working Group but would not be transmitted to any third party. Any queries which would be made in connection with the evaluation process carried out by the Group would be transmitted to the administrations or national authorities concerned which would be responsible for deciding (after consultation with the chemical producer concerned) whether the confidential material kept in their files could be released. A formal request to IMO bodies for assignment of pollution categories and ships types would be made by these administrations or national authorities.
8. The Working Group prepared amendments to the legend of its hazard profiles as follows (amendments underlined):

Column E - Reduction of amenities

Ratings

- |     |  |
|-----|--|
| XXX | Highly objectionable because of persistency, smell or poisonous or irritant characteristics; as a result beaches liable to be closed; also used when there is clear evidence that the <u>substance is a human carcinogen or that the substance has the potential to produce other serious long-term health effects in humans.</u>  |
| XX  | Moderately objectionable because of the above characteristics, but short-term effects leading only to temporary interference with use of beaches; also used when there is credible scientific evidence that the substance is an animal carcinogen but where there is no clear evidence to indicate that the material has caused cancer in humans <u>or when there is evidence from laboratory studies that the substance could have the potential to produce other serious long-term health effects.</u> |

9. The Working Group also amended the heading to column A of the profiles to read: "Column A" - Bioaccumulation and Tainting". In the legend to "T" (tainting), the word "bioaccumulation" was deleted. These amendments were included because the Working Group felt that the process of "tainting might not in every case fall under processes generally described as "bioaccumulation".
  
10. The Working Group evaluated the long-term health effects of phthalate esters and in light of the results of this evaluation reviewed the hazard profiles of phthalates.

PARTICIPANTS OF THE SIXTEENTH SESSION AND LIST OF THE SEVENTEENTH  
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\* Unable to attend the sixteenth session of the Working Group.



ANNEX VI

SUMMARY OF THE REPORT OF THE WORKING GROUP ON THE INTERCHANGE  
OF POLLUTANTS BETWEEN THE ATMOSPHERE AND THE OCEANS  
(WORKING GROUP 14)

1. Members of the Working Group held an Expert Consultation to prepare a report on the atmospheric transport of pollutants into the Mediterranean Region. This meeting took place from 21 to 25 January 1985 at the Co-ordinating Unit for the Mediterranean Action Plan, Athens, Greece.
2. The report prepared at the Expert Consultation and entitled "Interim Report on the Atmospheric Transport of Pollutants into the Mediterranean Sea" is based on papers presented by the members of the Working Group and also includes the main outcomes of the fourth and fifth meetings of the Working Group (Monte Carlo, 1982 and Athens, 1983).
3. The first part of the report provides a review of the knowledge of the physical, chemical and biological processes which control the air-sea exchange of pollutants, along with a brief description of existing programmes in the Pacific Ocean, the North Atlantic, the Baltic Sea, the North Sea and the Mediterranean Sea.
4. The second part of the report discusses existing works relevant to the Mediterranean area. A limited data base exists for pollution of marine concern, with most information on air concentrations of heavy metals (particularly Cd and Pb), PCB's and n-alkanes, and very little information on concentrations in precipitation. The available data indicate that levels of atmospheric pollution over the Mediterranean are comparable to those over other European regional seas and direct and indirect evidence suggests that the sources for some atmospheric pollutants transported into the Mediterranean Sea are quite distant, though natural inputs of some metals are also considered to be important. Flux estimates for some elements, such as Hg, Cd, Pb, Cr, and transuranics elements, indicate that the atmospheric transport of pollutants is at least comparable in magnitude to riverine inputs into the Mediterranean.
5. For evaluation of pathways of pollutants into the Mediterranean back trajectory climatologies have been applied and a Lagrangian, one layer, backward trajectory model suggested to assess the contribution of different source regions to the concentrations and deposition in the Mediterranean area.
6. The Working Group recognized the problems in assessing atmospheric pollutant input into the Mediterranean, identifying in particular the need for more quantitative information on emission sources of pollutants in the region, local climatological data, transport pathways and air-sea exchange rates of pollutants. A strategy for such an assessment was developed in which Cd was recommended as an appropriate pollutant for

study in a pilot project. For such a pilot project, sampling sites, sampling methodology and analytical techniques have been suggested.

7. Following the request of GESAMP XIV a draft document on "Scientific Bases for International Programmes for Monitoring of Pollutant Levels in the Atmosphere near the Sea Surface and Pollutant Fluxes Across the Air-Sea Interface" was prepared by a member of Working Group to be presented to the First Meeting of the Working Group on Integrated Global Ocean Monitoring.

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ANNEX VII  
SUMMARY OF THE REPORT OF THE WORKING GROUP ON THE  
LAND-SEA BOUNDARY FLUX OF POLLUTANTS  
(WORKING GROUP 22)

1. At the first meeting of Working Group 22 in Mazatlan, Mexico (3-7 April 1984) major attention was given to one of the terms of reference which specifies that the Working Group should "review the scientific literature and assess the sources, pathways and fate of selected substances across the land/sea boundary to allow for a quantitative description of the flux of material to and through the marine environment". Since rivers are a major pathway for the transport of material to the ocean, the Working Group agreed that emphasis should be placed on evaluating existing information on pollutant fluxes from rivers rather than from other land-based sources (e.g. outfalls, dumping). It was felt that pollutant inputs from these other sources were already being considered by other organizations, whereas no organization was evaluating river inputs in a comprehensive way.
2. The Working Group also agreed that a widely distributed questionnaire would be an appropriate initial method for retrieving information on river fluxes other than that in the published literature. It was also felt that such a questionnaire could provide information, such as the extent of ongoing studies and difficulties encountered, that might be useful in developing recommendations for "limited case studies to demonstrate the applicability and accuracy of the models generated" by the Working Group, thus addressing another term of reference. The participants of the first session therefore developed the questionnaire that was attached as Annex IV of the Report of the First Session (GESAMP/WG-22-1). The objective of this questionnaire was to obtain information to address the following questions:
  - (a) Which organizations throughout the world are conducting studies of material (i.e. pollutant) transport by rivers?
  - (b) Which river systems are being studied?
  - (c) Which classes of pollutants are being studied, what are the nature of the studies and what are the approaches being used?
  - (d) What are the major difficulties encountered?
  - (e) How adequate are hydrologic data for the purpose of estimating fluxes?
  - (f) What information exists on river transport studies other than that available from the published literature?
3. Additional information was requested in the questionnaire for the purpose of comparing discharge per drainage basin area, and discharge efficiency of world river systems.
4. The questionnaire was subsequently circulated through United Nations channels during the intersessional period starting approximately on 1 May

1984. As of 1 March 1985 one hundred and eleven responses had been received from organizations/individuals conducting studies on river systems. Responses represented a relatively good geographic coverage.

5. The results of the questionnaire returned thus far can be summarized by the following statements:

- (a) A considerable number of organizations/individuals are conducting river transport studies throughout the world.
- (b) River systems of all sizes are being studied.
- (c) Most studies are concerned with nutrients and trace metals. Considerably fewer address organo-pollutants and radionuclides.
- (d) No consistent approach to the study of river transport of materials is used.
- (e) The most common difficulties encountered in the study of river systems appears to be related to sampling and river variability.
- (f) Lack of adequate hydrologic information on river systems is considered to be a major problem in calculating material fluxes.

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ANNEX VIII

SUMMARY OF THE REPORT OF THE WORKING GROUP ON THE METHODOLOGY AND GUIDELINES  
FOR THE ASSESSMENT OF THE IMPACT OF POLLUTANTS ON THE MARINE ENVIRONMENT  
(WORKING GROUP 23)

1. The Working Group met in Rome (26-30 September 1983) and in Bangkok (29 October to 9 November 1984) under the chairmanship of Mr. V. Pravdic. Mr. H. Naeve acted as Technical Secretary. Rapporteurs were Messrs. E.D. Gomez (1st session) and J.E. Portman (2nd session). The Working Group analysed and defined factors relevant to the determination of the impact of waste on the marine environment, taking into account effects on marine organisms and ecosystems, human health and amenities. It developed and elaborated concepts on which the assessment of impact should be based, including that of the finite capacity of the environment to receive and to deal with pollutants.
2. The Working Group concluded that environmental capacity, the potential of the environment to receive and accommodate contaminants, is a property which can be determined, utilized and apportioned. Application of this concept requires considerable data and understanding of the ecosystem to which protection and utilization is applied. It will necessarily involve formulation of environmental quality objectives and criteria. The primary advantage of the environmental capacity concept is that, if properly applied, it would become a basic tool for environmentally-compatible development planning.
3. The Working Group has also reviewed existing strategies for environmental management, such as black/list-grey/list categories, maximum allowable concentration, uniform emission standards, environmental and water quality objectivess, water quality criteria and standards. It also recognized the merits, advantages and disadvantages of various strategies specifically in relation to suitability for legal enforcement. The Working Group concluded that most of these strategies could be considered as steps toward comprehensive policies based on the assessment of environmental capacity.
4. Each and every development project imposes an environmental load and exacts a price in the loss of amenities or restriction of some other activities. Scientific research, analysis and monitoring methodologies are capable of providing objective assessments of hazards associated with such development projects, and provide alternative technological solutions for risk avoidance or reduction.
5. The critical pathway analysis and similar techniques in environmental toxicology can be used to determine the impact of a contaminant release on a target in need of protection. They can be applied to both conservative and non-conservative contaminants as well as for any well-defined target, besides, and in addition to, human health and well-being.



6. The determination of environmental capacity will always involve several sources of uncertainties and will often be confronted with voids in data needed and information required for reliable assessment. Crude approximations, such as single-box models, or averaging over a larger time scale, or assumptions of steady-states, can be used. Probabilistic analysis, a component of the methodology of Decision Analysis, could be applied in ensuing refinements.
7. A set of general guidelines for the scientific assessment of the impact of pollutants in the marine environment is presented. It involves pathway analysis, selection and application of standards of environmental quality, calculation of environmental capacity and determination of scientifically acceptable discharge rates. Monitoring and reassessment procedures are an essential part of the recommended methodologies.
8. The development projects in the Eastern Seaboard area of the Gulf of Thailand were visited, and served to clarify the conceptual approach developed by the Working Group. Recognising the complexity of problems involved in large and diverse developments the Working Group gained valuable experience on what type of case studies it should use in the verification process of its Guidelines and Methodology.

LIST OF PARTICIPANTS OF THE SECOND SESSION OF THE  
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2.	Review of Harmful Substances	1976	E
3.	Scientific Criteria for the Selection of Sites for Dumping Wastes into the Sea	1975	E, F, R, S
4.	Report of the Eighth Session	1976	E, F, R
5.	Principles for Developing Coastal Water Quality Criteria	1976	E
6.	Impact of Oil on the Marine Environment	1977	E
7.	Scientific Aspects of Pollution Arising from the Exploration and Exploitation of the Sea-bed	1977	E
8.	Report of the Ninth Session	1977	E, F, R
9.	Report of the Tenth Session	1978	E, F, R, S
10.	Report of the Eleventh Session	1980	E, F, S
11.	Marine Pollution Implications of Coastal Area Development	1980	E
12.	Monitoring Biological Variables related to Marine Pollution	1980	E, R
13.	Interchange of Pollutants between the Atmosphere and the Oceans	1980	E
14.	Report of the Twelfth Session	1981	E, F, R
15.	The Review of the Health of the Oceans	1982	E
16.	Scientific Criteria for the Selection of Waste Disposal Sites at Sea	1982	E
17.	The Evaluation of Hazards of Harmful Substances Carried by Ships	1982	E

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| 18. Report of the Thirteenth Session   | 1983 | E, F, S |
| 19. An Oceanographic Model for the Dispersion of Wastes Disposed of in the Deep Sea      | 1983 | E       |
| 20. Marine Pollution Implications of Ocean Energy Development                            | 1984 | E       |
| 21. Report of the Fourteenth Session   | 1984 | E, F, S |
| 22. Review of Potentially Harmful Substances - Cadmium, Lead and Tin                     | 1985 | E       |
| 23. Interchange of Pollutants Between the Atmosphere and the Oceans                      | 1985 | E       |
| 24. Thermal Discharges in the Marine Environment   | 1984 | E       |
| 25. Report of the Fifteenth Session  | 1985 | E       |
| 26. Atmospheric Transport of Contaminants into the Mediterranean Region (in preparation) |      |         |

