Intergovernmental Oceanographic Commission
Reports of Meetings of Experts and Equivalent Bodies

IOC/UNEP Group of Experts on Methods, Standards and Intercalibration

Sixth Session

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In this Series

Reports of Meetings of Experts and Equivalent Bodies, which was initiated in 1984, the reports of the following meetings have already been issued:

- Third Meeting of the Central Editorial Board for the Geological/ Geophysical Atlases of the Atlantic and Pacific Oceans
- Fourth Meeting of the Central Editorial Board for the Geological/ Geophysical Atlases of the Atlantic and Pacific Oceans
- Fourth Session of the Joint IOC-WMO-CPPS Working Group on the Investigations of «El Niño»
- First Session of the IOC-FAO Guiding Group of Experts on the Programme of Ocean Science in relation to Living Resources
- First Session of the Editorial Board for the International Bathymetric Chart of the Mediterranean and Overlay Sheets
- First Session of the Joint CCOP(SOPAC)-IOC Working Group on South Pacific Tectonics and Resources
- First Session of the IODE Group of Experts on Marine Information Management
- Tenth Session of the Joint CCOP-IOC Working Group on Post-IDOE Studies in East Asian Tectonics and Resources
- First Session of the IOC-UN(OETB) Guiding Group of Experts on the Programme of Ocean Science in relation to Non-Living Resources

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1. OPENING

The Chairman of GEMSI, Dr. J. C. Duinker, opened the meeting at 0940 hrs on 26 November 1984 by welcoming the members to the Sixth Session of the Group. (A list of participants is given in Annex III.) He then invited Dr. Farrington (Woods Hole Oceanographic Institution) to make some welcoming remarks on behalf of the Director of WHOI.

The IOC Technical Secretary for the Session, Dr. R. Dawson, welcomed the participants on behalf of the Secretary of the IOC, Dr. M. Ruivo, and thanked Dr. J. Farrington for the invitation to hold the Sixth Session of of GEMSI in Woods Hole. He reminded the Group that this was the first session of GEMSI which was formally co-sponsored by UNEP following the agreements reached earlier in the year and the decisions taken by the Working Committee for GIPME at its Fifth Session, Bangkok, Thailand, 30 July-3 August 1984.

Following these remarks, the UNEP Technical Secretary, Dr. D. Elder, was invited to discuss the role which GEMSI may play in future activities of UNEP. He referred to the UNEP's co-sponsorship of the Group's activities particularly in relation to the Regional Seas Programme and the role he hoped GEMSI members would play in these activities.

The Chairman then spoke about the Group's new Terms of Reference which had been approved at the Fifth Session of GIPME in Bangkok and their relevance to the Group's contribution to work within the Comprehensive Plan. He reminded the Group, particularly the new members, that the plan envisaged distinct stages of data collection in its sequential programme (i.e., baseline studies/mass balances contamination assessment and pollution assessments). Whereas GEMSI would be involved in the first 3 stages, the last stage would be the responsibility of the Group of Experts on the Effects of Pollution (GEEP) which was to hold its first meeting in Plymouth in December 1984. He referred to the progress made by GEMSI to date and the role played by the various ad hoc groups and workshops in this matter.

The Chairman concluded his opening remarks by expressing the hope that individual members would contribute their valuable time and effort in the same unselfish manner as they had shown at previous meetings and during their intersessional activities, and strive to maintain the highest possible and applicable scientific standards.

2.1. ADOPTION OF THE AGENDA

The Group adopted the Agenda in Annex I with the modifications that Agenda Items 4.1 and 4.2 may be considered under one heading and that the ad hoc Group titles were in need of small corrections. It was noted that the Agenda Items 7.2 and 7.3 should be taken under one item 7.1.

2.2. DESIGNATION OF RAPPORTEUR

Dr. G. Topping was asked by the Chairman to act as Rapporteur for the Session. This suggestion was unanimously approved by the Group with the understanding that Dr. Topping would receive the usual support from individual members in the preparation of those items selected for annexing to the summary text.

2.3. CONDUCT OF THE SESSION

The IOC Technical Secretary discussed the documentation which IOC and UNEP had prepared for the Session in relation to the Agenda. It was pointed out that the Group should normally work in plenary but that provisions had been made for ad hoc Sessional Groups to meet as required.

3. INTERSESSIONAL ACTIVITIES

3.1. AD HOC GROUP ON THE ANALYSIS OF INDIVIDUAL ORGANIC CONTAMINANTS

The Chairman of this ad hoc Group, Dr. K. Burns, gave a report of intersessional work on the analysis of individual organic contaminants.

This ad hoc Group was formed in response to Recommendation 1 of GEMSI V in which it was recognized that the analysis of the mixture of predominantly hydrocarbon materials which had been termed "petroleum" is just as difficult as the analysis of chlorinated hydrocarbons. MARPOLMON-P, which uses relatively non-specific methods, was seen to be producing data useful for a general assessment of global oil pollution but the data cannot address questions related to contaminant sources and geochemical cycling.

IOC Manuals and Guides No. 7 had been revised and reprinted as Manuals and Guides No. 13. Concurrently, the ad hoc Group commenced efforts to expand the possibilities for monitoring important individual organic contaminants.

Since the halogenated hydrocarbons (HHC's) and other hydrocarbons (HC's) display basic similarities in their chemistry, it was desirable to combine consideration of these compounds into one ad hoc Group. The topics chosen to address were:

i. An assessment of chemical markers of HC contamination including a reference list for polyaromatic hydrocarbons (PAH's).
ii. An assessment of the feasibility of combined analytical procedures for HC's and HHC's.
iii. Review of methods manuals relating to organic contaminants measured in UN monitoring programmes.
iv. An evaluation of the state-of-the-art for the analysis of metabolites and other reaction products of organics in marine systems including a reference list.

These assessments were based on current literature and information papers contributed by sub-group members which were based on laboratory and field work conducted intersessionally. The main body of the report provides the background from which the Group's recommendations were drawn. The report identified markers for HC contamination and provided examples indicating the need to verify results obtained by non-specific techniques such as UV-F with individual component analysis. Markers used to yield useful information on residue sources and biogeochemical cycling processes were described. The need to tailor the methodology employed in individual monitoring programmes to the needs of in dividual projects was stressed.

The assessment of the feasibility of combined procedures for HHC's and HC's was made with special attention to the analysis problems for the analysis of trace organics in seawater and in high fat biological materials. The sub-group also formulated the details of an intercomparison exercise for the analysis of organic contaminants in seawater to be conducted in Bermuda in December 1984.

Appended to the main body of the report are the contributions made by group members to address specific aspects. These are:

Annex 1. A versatile apparatus for extracting solid materials used for concentrating lipophilic organic trace constituents from seawater.
Annex 2. Procedure suggested for quantitative determination of selected lipophilic organic compounds accommodated in seawater.
Annex 3. Plan for the Bermuda Intercalibration Exercise.
Annex 4. Toward common preparative procedures for petroleum and chlorinated hydrocarbon contaminants in marine monitoring programmes.
Annex 5. Candidate compounds for future marine surveillance/monitoring activities.

The complete ad hoc Group Report (IOC/INF-624) will be available from the Secretariat. The recommendations developed by the Group appear in Annex II.

3.2. THE USE OF MARINE SEDIMENTS IN MARPOLMON

The ad hoc Group on the Use of Marine Sediments in MARPOLMON met in Mazatlan, Mexico on 6-10 April 1984, under the Chairmanship of Dr. D. Schink.

After the opening preliminaries, the Chairman of the ad hoc Group and the IOC Technical Secretary reviewed previous activities of the ad hoc Group, and GEMSI's response to the first ad hoc Group report and intersessional activities. Among the tasks remaining for the ad hoc Group, first priority was given to revising prepared materials to give greater attention to organic contaminants. The results appeared as annexes IV, V, and VI to the ad hoc Group report. These annexes developed: (1) the rationale for use of sediments in a marine pollution monitoring programme; (2) a draft strategy manual for designing a pollution monitoring programme using sediments; (3) comments on sampling and analysis of sediments in a pollution monitoring programme.

The ad hoc Group also devoted a significant fraction of its time to planning for a CARIPOL training workshop on the analysis of petroleum hydrocarbons in sediments.

Among the tasks the Group was unable to accomplish was the review of questionnaires which had been collected by the ad hoc Group on the Use of Marine Organisms in MARPOLMON. These questionnaires are now in the hands of the ad hoc Group Chairman, Dr. Schink, and should be reviewed during future group activities. The ad hoc Group felt that the adoption of standardized data reporting formats should only be done after consultation with a broad range of users. Therefore candidate "standard forms" were only briefly considered, were included in an Annex to the meeting report, and the IOC Technical Secretary was asked to distribute these broadly for comment by potential users. This task is to be continued at future meetings of the ad hoc Group.

The ad hoc Group also noted the importance of making standards and reference materials available to the entire community served by IOC. Therefore ICES efforts should be supported by IOC with the purpose of expanding their scope. The ad hoc Group assigned a high priority to such efforts.

Finally, the ad hoc Group noted that its efforts at Mazatlan did not produce a final version of the Strategy Manual for designing a sediment monitoring programme; nor did the "Comments on the collection and Analysis of Sediments" represent a final document suitable for broad distribution. Both of these

Annexes, however, offer a start toward suitable documents. Efforts to complete the 'Strategy Manual' and 'Collection and Analysis of Sediments' should continue intersessionally with the goal of producing suitable final versions at the next meeting of the ad hoc Group on the Use of Sediments.

Discussions centered on the need for reference materials. Surprisingly large amounts of this material will be needed once availability is recognized by laboratories around the world. The Group suggested that there is a need for a manual on how to prepare secondary standards; one should be prepared. The need to broaden some ICES activities, particularly intercalibration, to include the greater scope of IOC responsibilities was recognized, and encouraged insofar as practical. The full ad hoc Group report will be available upon request to the IOC Secretariat.

3.3. THE USE OF MARINE ORGANISMS IN MARPOLMON

The Chairman of the ad hoc Group, Dr. G. Topping, gave an account of the progress made by this Group since the Fifth GEMSI Session. During August/September 1983, three members of the ad hoc Group (Drs. Topping, Uthe and Phillips), supported by Dr. Dawson (IOC) and Mr. A. Bremner (Marine Science Laboratory, Queenscliff, Australia), had organized and conducted an analytical workshop for trace metals in marine organisms for a number of scientists from WESTPAC countries. He briefly described the organizational aspects of the workshop (emphasizing the important role played by Messrs. Bremner, Dawson and Phillips) and the content and conduct of the actual workshop and the recommendations which arose from the workshop. A detailed report on the workshop had been prepared and was tabled for discussion. It was clear from the favourable comments received from the participants that the workshop had been successful in terms of its objectives. In the light of this success, and the need to maintain the impetus of this training programme, it was considered important that IOC give priority to the organisation of a second workshop for organochlorine (O/C) analysis in marine organisms in the near future. He concluded by saying that a timetable of the anticipated and likely progress for the analysis of contaminants in marine organisms had been prepared by the coordinators of the workshop following the experience gained at the workshop and in depth discussions with the participants (Annex IV).

The IOC Technical Secretary informed the Group that the Working Committee for GIPME had approved the proposals for such an organochlorines workshop and assigned priority to its conduct.

Following discussion of the Workshop report the Chairman requested that Drs. Topping and Uthe, together with several members of GEMSI, meet sessionally to develop recommendations for the conduct of the O/C workshop and the planning and conduct of the second trace metal intercalibration exercise for trace metals in organisms.

The UNEP Technical Secretary indicated the interest in these activities and the possibility for co-operation by combining resources, since UNEP was planning a similar workshop at the University of Papua New Guinea in the summer of 1985.

Since the ad hoc Group's activities are closely related to Mussolwatch Concepts the Chairman also requested the sessional Group to consider the requests of GIPME V as presented under Agenda Item 4.

3.3.1. Proposal for the Conduct of an Organochlorine Workshop in WESTPAC

Dr. Topping summarised the conclusions of the Sessional Group in the light of:

i. the agreements between IOC and UNEP to co-operate within the respective regional programmes;
ii. the advanced state of planning and preparations for the workshop to be held in Port Moresby, Papua New Guinea in June 1985; and,
iii. the high probability that a number of selected participants would be common to both UNEP Regional Seas and WESTPAC programmes.

The Group felt stongly that the objectives of both programmes could be best served by a co-sponsored workshop catering for a maximum of fifteen participants from member states of COBSEA, SPREP and WESTPAC programmes and that the resources and persons previously envisaged for the IOC/WESTPAC organochlorines workshop as recommended by the Fifth Session of the Working Committee for GIPME be attributed to this effort. It was recommended that the workshop, comprising of lectures, demonstrations, sample preparation, and hands-on analytical experience, should have a duration of 2-3 weeks and that an inter-secretariat meeting early in 1985 should seek to identify participants, instructors, resources and preparatory steps.

The Group further recommended that the participants selected satisfy the requirements of both programmes and that thought be given to holding a follow-up workshop on the sampling strategies and sampling network design in the context of 'Musselwatch' for organochlorines (and to some extent trace metals) and that discussions proceed between IOC and UNEP with the appropriate Australian authorities to investigate the extent to which such future activities can be supported or associated with current Musselwatch programmes.

3.3.2. Second Round Trace Metal Intercalibration Exercise in WESTPAC

The Group reviewed the proposed timetable in Annex IV and, based on the indication that ILMR/IAEA was intending to prepare reference materials for a trace metal intercomparison exercise in marine organisms, recommended that IOC, UNEP and IAEA explore the co-ordination of a joint exercise. It was suggested that IOC could identify a mechanism for co-ordination in the WESTPAC Region perhaps in association with WESTPAC Task Team activities and that GEMSI could arrange for the evaluation of the returns. In this context, the Group was reminded that the first round intercalibration exercise had produced an excellent response among laboratories in WESTPAC and that increased participation may be expected in a joint IOC/UNEP effort involving WESTPAC/COBSEA and SPREP. It was agreed that the proposals should be submitted to the next COBSEA session and to the SPREP Secretariat through UNEP with a view to establishing a mechanism for distribution of materials, collection of data, and analysis of results.

Since the proposals are based on the preparation of suitable reference materials to be undertaken by ILMR, a tentative date in mid-1985 to commence the distribution was suggested following inter-secretariat discussions on logistics.

3.3.3. Review of 'Musselwatch' Activities

Following the request of the Working Committee for GIPME at its Fifth Session and the agreements between IOC and UNEP, GEMSI will undertake a critical review of regional 'Musselwatch' activities. The ad hoc Group on the Use of Marine Organisms in MARPOLMON will assist in this review which will also constitute to an appraisal of the effectiveness of the approach within the objectives and components of MARPOLMON.
The Group recommended that the review should primarily consist of three tasks:

i. the preparation of an inventory of national and international 'Musselwatch' programmes;
ii. the assessment of the quality of data from these programmes with

particular reference to the degree to which the quality of reported data may meet the objectives of each of the programmes; and,

iii. the assessment of the feasibility of and preparation of guidelines for, a global 'Musselwatch' programme.

In order to address these tasks, it is recommended that a five member Group be established to review the progress made towards these aims and to formulate guidelines for the approach as necessary. The Group should comprise the following members:

John Farrington, Woods Hole Oceanographic Institution, Woods Hole, USA
Kathryn Burns, IAEA International Laboratory of Marine Radioactivity, Musee Oceanographique, Monaco MC98000
Graham Topping, DAFS Marine Laboratory, P. O. Box 101, Victoria Road, Aberdeen AB9 8DB, UK
John Uthe, Department of Fisheries and Oceans, P. O. Box 550, Halifax, Nova Scotia B3J 2S7, Canada
Allan Bremner, Marine Science Laboratories, P. O. Box 114, Queenscliff, Victoria 3225, Australia

The Group also recommended that nominations of representatives from the regional programmes of IOC and UNEP be solicited to supply advice and information from regional and national programmes and that these nominations be made through IOC and UNEP contact networks.

It was further recommended that Dr. D. Phillips, Hong Kong, be invited to prepare and finalize the reviews as principal co-ordinator.

3.4. RIVER INPUTS OF POLLUTANTS TO THE COASTAL ENVIRONMENT

The Chairman of the ad hoc Group, Dr. H. Windom, began by giving an account of the Group's activities to date and the work leading up to the establishment of his Group. He reminded GEMSI that the Group at its Fifth Session had made recommendations for the organisation of a workshop, to evaluate and compare methods of river sampling and analysis. Following the establishment of this ad hoc Group, GESAMP had also established a complimentary working group to assess the state of knowledge on Land/Sea Boundary Flux of Pollutants and that a meeting in Mazatlan, Mexico in April 1984 of this latter Group had discussed possible activities and prepared plans (see Report GESAMP/WG-22/1).

The Working Committee for GIPME at its Fifth Session had endorsed these recommendations and ascribed a high priority to the activity.

Subsequent to GIPME V, the GEMSI ad hoc Group on River Inputs met in Bangkok and finalised proposals for this workshop which was to be based on one of the four major rivers in Thailand. Details of these proposals and the associated recommendations prepared by an ad hoc Sessional Group are given in Annex V.

3.5. INTERCOMPARISON EXERCISE FOR PAH'S IN MUSSEL HOMOGENATE

The Chairman asked Dr. A. Knap, one of the coordinators of this exercise to give an account of this exercise which had been jointly funded by UNEP and NOAA under the auspices of IOC and ICES.

A draft report describing this exercise and the entire set of data is nearing completion and will be distributed in December or early January, 1985 to all

participants, members of the ICES Marine Chemistry Working Group, GEMSI members, and the IOC, ICES and UNEP Secretariats. A period of two months will be allowed for comment and for participating laboratories to recheck the transcription of their data by the coordinating laboratory.

The final report will be submitted in April or May, 1985 unless there are requirements for extensive revision in which case the final report will be delayed accordingly. The ICES, IOC and UNEP Secretariats will consult in regard to the final publication of the report.

The preparations for this exercise began in 1982 at the request of the ICES Marine Chemistry Working Group with funding from the US NOAA to Dr. Farrington at Woods Hole Oceanographic Institution. The exercise was subsequently expanded to include IOC and UNEP identified laboratories with funding from UNEP via IOC to Dr. Anthony Knap of Bermuda Biological Station for Research Inc. to coordinate involvement of IOC identified laboratories. The last data were received in late September, 1984. A preliminary set of tabulated results have been made available for informal comment at the GEMSI meeting because of the timing of this meeting, in relation to the draft report preparation and to take advantage of the assembled expertise of GEMSI members in interpretation of this type of data.

Fifty laboratories from 24 countries participated in the exercise and this demonstrates the widespread international interest in improving the comparability of data for hydrocarbons in marine tissue samples. The need for further intercomparison exercises has been clearly demonstrated by the large coefficients of variation in the initial interpretation of this data; as much as 120% for some U.V.-fluorescence and gas- chromatography data and as much as 100% for GC/MS determination of specific aromatic hydrocarbons.

The results demonstrate that several different parameters of "petroleum" or several different petroleum compounds are being measured by a wide range of laboratories. This appears to be a function of different objectives and missions of programmes of participating laboratories and varying stages in the development of analytical capabilities.

Future exercises should focus on measurement of specific parameters or compounds by defined protocols of analysis. If it is necessary to offer options in the protocols, these should be clearly defined. Despite requests for details of methods of analyses, only a limited number of laboratories reported sufficient details to be of use in assessing sources of the wide range of coefficient of variation. Previous experience with other intercomparison exercises supports the strategy of specifying protocols if sources of discrepancies are to be identified.

It must be explicitly recognized that it may be some time before many laboratories would be able to re-equip with appropriate glassware, chemicals, and equipment for specified methods of measurements. Furthermore, training workshops will be needed to improve analytical capabilities and introduce improved methods of analysis.
At this time the most important task is to identify those specific parameters and compounds to be measured in assessing petroleum and pyrogenic compounds contamination in marine organisms. These needs have been addressed by the ad hoc Group on the Analysis of Individual Organic Contaminants.

The Group offered the following as advice for any future activities:

i. Further intercomparison exercises are needed to improve the quality of intra- and inter-laboratory data comparisons for purposes of regional and global assessments of organic compound

contamination in marine organisms.

ii. Future exercises should only proceed after reassessment of the parameters and specific compounds to be measured and the reasons for measuring these compounds and parameters.

iii. Future exercises should involve specific recommended protocols for measurement of specific parameters in recognition of the fact that there is not a single method that measures "petroleum".

iv. Future exercises should make use of research materials that have been spiked with known quantities of known compounds in addition to the natural materials. This should include cold extracted natural lipids (e.g. fish oils) spiked with known compounds as has been successfully utilised in organochlorine intercomparison exercises.

v. Future joint exercises of ICES/IOC may be useful. However, a consideration of the different objectives and missions of many ICES and IOC laboratories, indicate that separate exercises focussing on different protocols, parameters and specific compounds will be more productive for the next round of exercises.

3.6. PROGRESS IN THE ANALYSIS OF PCB COMPONENTS IN SEAWATER

The Bermuda Biological Station for Research, Inc., the Institute for Marine Research (Bergen, Norway) and the Netherlands Institute for Sea Research (Texel) have volunteered in the past to carry out experimental work on the isolation and analysis of individual PCBs in seawater (see Sum. Rep. of GEMSI IV and V). The results were expected to supply useful information to be used in the two-year programme to determine the levels and fates of organochlorines in the open ocean (IOC/GGE(MSI)-IV/3, Annex Vc). This programme has not been carried out yet due to lack of funding.

In the meantime, the first two laboratories and the Institute for Marine Research (Kiel, Federal Republic of Germany) have worked intersessionally on improvements of methodology, including comparison of liquid-liquid and resin extraction techniques. No report has been supplied to this meeting as the data are presently being evaluated. There still remains an urgent need for standards of individual PCB components to allow more accurate qualitative and quantitative analyses and any financial assistance from IOC and UNEP in this context would represent a significant input. It was noted, however, that the National Research Council of Canada is preparing to release standard solutions of 52 certified chlorinated biphenyl compounds in solvent.

4. REPORT OF THE FIFTH SESSION OF THE WORKING COMMITTEE FOR GIPME

The Chairman of the WC/GIPME, Dr. N. Andersen, introduced this item by highlighting the decisions taken at the Fifth Session in Bangkok, 30 July - 3 August 1984. He reported thet the Working Committee had adopted, without reservation IOC Technical Series 25 (A Framework for the Implementation of the Comprehensive Plan for GIPME) which had received considerable inputs from GEMSI members. The adoption of Technical Series No.25 indicates a consensus on the approach and stages defined in the plan: many of the actions in the stages require action from GEMSI,since the earlier stages in the plan fall under the terms of reference of the Group. Dr. Andersen reported that GEMSI's recommendations had been adopted by the Working Committee and that the Group

had received praise for the scientific merits of its work and recognition of past efforts. He stated that WC/GIPME had drawn up a list of priorities (see IOC/WC-GIPME-V/3, page 17) in relation to the Comprehensive Plan and that GEMSI had been requested to examine them in relation to their Terms of Reference.

With regard to the question of the identification of vulnerable areas, he felt that this was the responsibility primarily of GEEP but that GEMSI may well be asked to comment indirectly through GEEP since the WC/GIPME had strongly recommended that the two Expert Groups work closely together. This joint activity was also to be encouraged, in collaboration with the GIPME ad hoc Group on Planning,Policy and Strategy (GOPPS) on the general question of the implementation of MARPOLMON. On the question of 'Musselwatch' he informed GEMSI that they should work in collaboration with UNEP with regard to a review of global activities as requested by the WC/GIPME. On the question of methodology to be used within MARPOLMON he asked that particular attention be paid to selection and use of methods which should have as wide an application as possible. These methods however must meet the criteria for quality assurance. On the question of river inputs and the proposed workshop he informed the group that this had been fully supported by WC/GIPME. He concluded by saying that the Terms of Reference of GEMSI had been revised by the Working Committee to better reflect UNEP's co-sponsorship.

Following Dr. Andersen's account the Chairman of GEMSI established a number of ad hoc Sessional Groups to deal with, and make recommendations on the various points arising from the WC/GIPME report and other earlier agenda items.

The Group reviewed the various activities given priority by the Working Committee in the context of the Comprehensive Plan. The overall priorities assigned by GEMSI for the activities of the coming intersessional period, in relation to the stage of implementation in the comprehensive plan and the priority assigned by GIPME are listed below.

GEMSI ACTIVITY	IMPLEMENTATION stage	priority	OVERALL PRIORITY
Individual organics	0	1	1
open-ocean baseline	1	2	5
river-inputs	0,1	1	2
marine organisms	0	1	3
marine sediments	0	2	4
UNEP method manuals	n/a	-	1a
reference materials	0	3	2a

The last two items of this list were included predominantly as new activities of most interest to UNEP/RSP, while recognizing their value in the context of GIPME. Therefore, sub-priorities have been assigned to these topics whilst providing a set of priority assignments for the main continuing field programmes.

5. REVIEW OF METHODS FOR MARPOLMON AND UNEP - RS/PAC

The IOC Technical Secretary opened this item by outlining the IOC documents available on methodology and stating that these manuals were the only source of information on methods, specifically prepared by IOC. He noted, however, that a number of recommended ICES procedures had been endorsed by GEMSI over the years and IOC commonly draws on this source of information and in many cases has distributed the information to laboratories upon request or in the course of preparing workshop materials. He gave examples of the use of some of these manuals, e.g., Manual and Guides No. 13 which was to be used in the coming Bermuda Workshop, and which had been adopted by the Bermuda Biological Station for their summer courses. Manuals and Guides No. 15 on Surface Microlayer Sampling was similarly being reviewed among these workshops. To date no manuals on trace metals had been produced by IOC but UNEP had published several for participants in their Regional Seas Programmes. He stated that it was the wish of UNEP as part of the joint activity with IOC that GEMSI would assist UNEP in reviewing and suggesting improvements for these manuals and those to be prepared in the future.

The UNEP Technical Secretary was then asked by the Chairman to speak on this matter from the UNEP viewpoint. Dr. Elder began by outlining the development of the Regional Seas Programme, its conventions and the Action Plans for each of the study areas (see details in IOC/GGE(MSI)-VI/21). He then went on to say that an important component of these Action Plans was the need for, and use of, reference methods and reference materials in connection with sampling and analysis. Although the co-ordination of the production of these methods and reference materials was to be the responsibility of scientists at Monaco, in particular Dr. S. Aston, he hoped that GEMSI would assist in these tasks. Dr. Aston then described the procedure for producing UNEP manuals and his proposals for GEMSI's involvement in this matter. After a short discussion on this matter the Chairman suggested that a small Sessional Group should be set up to explore the manner in which this help might be given. The results of the Group's deliberations and recommendations are summarised in Annex VI.

5.1. METHODS TO BE DEVELOPED DURING SESSIONAL AND INTERSESSIONAL PERIODS

Under this item the IOC Technical Secretary listed the areas of work which GEMSI might address sessionally and intersessionally. These were:

a. The analyses of individual hydrocarbons in seawater and biota.
b. The analysis of contaminants in suspended particulates.
c. The need for a basic manual on biology and sampling of selected marine organisms.
d. The need for manuals on the analysis of individual chlorinated hydrocarbons in biota.

The Chairman agreed that items (a), (b) and (c) could be dealt with by the relevant ad hoc Groups already established and that biological sampling strategy (c) may for the most part be referred to GEEP.

6. STANDARDS, CERTIFIED REFERENCE MATERIALS AND INTERCALIBRATION EXERCISES

6.1. AVAILABILITY OF STANDARDS AND REFERENCE MATERIALS

This item has arisen partly through a discussion paper prepared by Drs. Walton, Topping and Bewers which had been tabled by Dr. Andersen who had expressed particular concern on this subject. It was clear from the discussion which

followed the general opening comments made by Dr. Andersen that there were mixed opinions regarding the availability of funds for the provision of these materials and who might be responsible for their preparation and the co-ordination of their distribution. The Chairman asked Dr. Bewers to establish a sub-group sessionally to examine this matter and report its findings and recommendations to the Group.

Having considered the proposal contained in the paper of Drs. Walton, Bewers, and Topping for the improvement of international co-ordination in the development of "reference" materials, it was agreed that a working group should be formed under the auspices of IOC and UNEP for the purpose of reviewing current and future needs for "reference" materials taking into account programmes of IOC, UNEP and other relevant international and multilateral agencies. The terms of reference of the Group should read as follows:

i. To assess the need for "reference" materials (that is standards, certified reference materials, intercomparison samples and research materials) for quality assurance purposes in future marine chemical and contamination investigations and monitoring activities, particularly in respect to on-going and planned international programmes.

ii. To collate and assess the numbers and types of "reference" materials currently available and specify the extent to which they satisfy the needs identified in i above.

iii. To specify the type of "reference" materials that are both needed and currently unavailable for marine quality assurance activities, assign priorities for the urgency with which these materials need to be prepared and identify which agencies might be capable and willing to prepare them.

iv. To formulate a preliminary proposal and work plan that could be used for soliciting the preparation and distribution of reference materials needed by the various international programmes identified in i above.

v. To identify an international infrastructure whereby the distribution of the above materials could be co-ordinated.

The Group considered that the creation of an international co-ordination mechanism to deal with marine chemical standards and reference materials should be a high priority concern and that GEMSI could serve as the catalyst to initiate activities and could also serve as a review and advisory body. The Group further recommended that consideration be given to convening an international workshop to address aspects of the preparation, quality assurance control and certification of reference materials, to the prediction of what materials are required and may feasibly become available and an assessment of the results obtained in previous exercises using such reference materials.
The Sub-Group reviewed the present situation with regard to those contaminants of interest to GEMSI members, and to marine environmental materials for which "reference" materials are or will be required in the near future. Annex VII summarises the results of this review.

6.2. ON-GOING INTERCALIBRATION EXERCISES (WESTPAC, IOCARIBE, UNEP REGIONAL SEAS, ICES AND OTHERS

The IOC Technical Secretary introduced this item by informing the Group about the plans for an exercise on PAHs in organisms and sediments in IOCARIBE following a workshop on this topic. He also reminded the Group about the exercise on Petroleum Hydrocarbons in Seawater to be conducted in Bermuda and the joint IOC/UNEP/CSIC exercise for oil and petroleum hydrocarbons recently conducted in Barcelona for laboratories participating in MEDPOL.

The UNEP Technical Secretary gave an account of the various exercises underway in the Regional Seas Programmes (in particular in the East Asian Seas, MEDPOL, Kuwait Action Plan and West African Regions). He reminded the Group that each region's Action Plan had an intercomparison exercise component.

Dr. Bewers then gave an account of the work going on under ICES, especially the completion of the Nantes exercise for dissolved and suspended metals in seawater, the sediment intercalibration exercise for trace metals currently being conducted by Dr. Loring; the results of the first part of the 7th exercise of trace metals in tissue and plans for the second part; the proposals for an intercomparison of sampling and analytical procedures for trace metals in seawater based on the sampling at a select number of homogeneous water masses and finally he briefly described the SCOR/ICES exercise for trace metals in sediments which had been organised by Dr. L. Bruegmann (German Democratic Republic).

Following a request from Dr. Bewers, Dr. Uthe gave a few more details of the current state of progress with regard to the intercalibration exercise for the analysis of OC's in biological tissue.

Dr. Farrington then presented an account of the results of the intercalibration exercise for individual PAH's in mussel homogenate from the ICES viewpoint. This led to the Group discussing such matters as confidentiality of data and the approach to be adopted in the reporting of the results of IOC and ICES participants. It was agreed that Drs. Farrington and Knap would contact laboratories on this matter to establish which of the IOC laboratories participating wished to be identified with their data (the practice common in ICES exercises). Failing a consensus, the data from laboratories selected by IOC would be reported anonymously with identification codes.

6.3. FUTURE INTERCALIBRATION EXERCISES

As reported under previous Agenda Items, the organisation of two intercalibration exercises is foreseen for 1985, notably:

- the second round trace metal intercomparison exercise on biological tissue for WESTPAC in co-operation with COBSEA/SPREP and IAEA. (3.3.2).

- an envisaged intercalibration exercise for PAH's in sediments and organisms in the Caribbean Region.

The IOC Technical Secretary explained that the latter exercise in support of CARIPOL was very much on the drawing board and awaits the outcome of the decisions with regard to funding, from the Fourth Meeting of the Monitoring Committee of the Action Plan for the Caribbean Environment Programme to be held in Cancun, 22-26 April 1985.

The intercalibration exercise is conceived to follow a training workshop on the analysis of petroleum hydrocarbons in marine sediments and organisms (in the context of Musselwatch) to be held in Cancun, Mexico.

It was clear that early attention should be paid for the availability of suitable reference materials to use in this exercise and he enquired whether stocks of those reference materials used in the joint ICES/NOAA/IOC exercise had been exhausted.

The Group's discussions returned to the topic of availability and suitability of reference materials as covered under Agenda Item 6.1 since it was the Group's impression that intercalibration exercises cannot be planned on an ad hoc basis without careful attention to this overriding problem. It was further advised that the recommendations arising from the aforementioned PAH intercalibration exercise, particularly with regard to the use of specified methodology and methods reporting, be adopted in the future. It should also be made clear that the specific objectives of an intercalibration should be well defined in advance of the exercise.

7. GEMSI ASSISTANCE TO REGIONAL WORKSHOPS AND TRAINING COURSES

7.1. REVIEW OF ON-GOING AND PLANNED IOC WORKSHOPS

A number of reports on workshops which had taken place during the past intersessional period was provided. The IOC Technical Secretary gave brief accounts of two workshops in the Kuwait Action Plan Region namely: a Training Workshop in Oceanographic Sampling, Analysis, Data Handling and Care of Equipment was carried out at the University of Qatar, 22 October - 4 November, 1983 and a Symposium/Workshop on Fate and Fluxes of Material in the KAP Region had been conducted in collaboration with ROPME and UNEP at the University of Basrah, Iraq (8-12 January 1984).

An intercalibration worhshop, IOC/UNEP/CSIC on Oil and Petroleum Hydrocarbons had been completed the previous week in Barcelona, 12-18 December 1984, involving participants of the MEDPOL programme; the results of which, he suggested, would in combination with the planned activities in Bermuda provide GEMSI with a solid basis for a complete appraisal of Manuals and Guides No. 13 since both workshops dealt with similar subject matters.

Dr. Burns summarised the objectives of the forthcoming Bermuda Intercalibration Workshop (3-14 December 1984) which was jointly sponsored by IOC and UNEP largely involving participants from the CARIPOL programme and from the WESTPAC Region with the Core Group of GEMSI and nationally sponsored participants. The Workshop description appears as an Annex to the Report of the ad hoc Group on the Analysis of Individual Contaminants.

Accounts were previously provided of the organochlorines workshop proposed under Agenda Item 3.3.2 and of the proposed workshop on River Inputs under Agenda Item 3.4.

As mentioned in the planned intercalibration exercises (Agenda Item 6.2), a workshop an the analysis of petroleum hydrocarbons (with some components of organochlorine analysis) in organisms and sediments is being planned, to take place in Cancun, Mexico in late 1985. Dr. Uthe provided some details of this planned exercise based on a meeting of the ad hoc Group on Sediments and CARIPOL Steering Committee which had taken place in Mazatlan (9-13 April, 1984).

Also in the Caribbean, and in co-operation with UNEP, a Symposium on Petroleum Research and Monitoring to include an evaluation of data collected under CARIPOL, will be held in Puerto Rico, May-June 1985.

The UNEP Technical Secretary informed the Group that in the South East Pacific (west coast of South America) the Permanent Commission for the South Pacific is responsible on behalf of UNEP for co-ordination of the Regional Seas Action Plan. Under this project a workshop on "Standardization of Methods for Pollution Monitoring in the South East Pacific: Petroleum and Pesticides" was held in Callao, Peru, in July of 1983. The pollution monitoring programme at present concentrates on monitoring Hg and Cu around coastal mining activities, petroleum pollution and chlorinated insecticides in areas of agricultural run-off. During 1985/1986 it is planned that workshops related to Hg and Cu in marine samples will be conducted.

Under a joint FAO/IOC/IAEA/WHO/UNEP project (WACAF 2) for West and Central Africa several marine pollution monitoring activities have been intiated. IOC has been responsible for the petroleum hydrocarbon monitoring while FAO is concerned with monitoring for metals and organochlorines. During 1984 training was initiated by FAO for analysis of metals and organochlorines and during 1985/1986 it is planned that training in this activity should be extended to petroleum hydrocarbons, other contaminants in the form of workshops of methods and intercalibration. Plans for this are being formulated at present.

The UNEP Technical Secretary also reported that in the Kuwait Action Plan Region (KAP) the Regional Organization for the Protection of the Marine Environment (ROPME) will convene with UNEP's assistance a Regional Symposium on Marine Pollution Problems of the KAP Region towards the end of 1985. One of the major aims of the symposium will be to report and analyze the result of the pilot phase of the Regional Marine Pollution Monitoring Programme which has been underway since 1982. On the basis of this review, recommendations for the establishment of a long-term monitoring programme will be formulated.

Finally, Dr. Knap reminded the Group about the annual Bermuda Biological Station's training course on the analysis of Marine Pollution which had been supported by the IOC for a number of years. He agreed to send details of the course to Dr. Elder indicating the availability of funding from private foundations for potential participants from the Regional Seas Programmes.

8. OPEN-OCEAN ACTIVITIES

8.1. OPEN-OCEAN ACTIVITIES FOR ORGANOCHLORINES

In discussions under this Agenda Item, the Group concluded that baseline determinations of organochlorines in open-ocean waters would have to wait until the appropriate methodology has been developed, tested and intercompared. Work towards this goal is presently carried out in a number of laboratories on a voluntary basis. These laboratories will try to accomplish this task jointly assuming that the project will be funded. The progress in methodology may then justify organochlorines to be included in the open-ocean baseline programme proposed to take place in 1987.

8.2. TRACE METALS AND PETROLEUM HYDROCARBONS

It was agreed that previous conclusions of GEMSI on the subject of an open-ocean baseline activity for trace metals required review and amendments, where necessary, in the light of research results during the intervening period. It was, however, agreed that the philosophy and approach previously adopted by GEMSI in respect to baseline measurements for trace metals were still valid and could probably be used also for both petroleum hydrocarbon components and chlorinated organic compounds. An ad hoc Group was established to review the relevant parts of the Summary Reports of the GEMSI IV and V and to amend them as necessary.

The ad hoc Group on individual organic contaminants would undertake to consider the methods for, and the strategy for conclusion of, open-ocean baseline measurements for hydrocarbons.

It was decided, as a result of discussions, that plans for open-ocean baseline activities should be further developed so that such baseline activities can be carried out in the years 1987-1988. Various potential national contributions to this programme were then discussed, particularly from the FRG, USA and Canada.

8.3. OPEN-OCEAN BASELINE SURVEY

A sessional group was established to deal with planning for the open-ocean baseline survey that was given high priority by the Working Committee for GIPME. This group met briefly to review GEMSI documents on this topic and to devise a procedure for preparing detailed plans and soliciting national contributions to such a baseline programme. It was concluded that a reasonable target for the conduct of an open-ocean baseline survey was 1987-1988. This would, however, require rapid development of a strategy for the baseline survey and the solicitation of national shiptime contributions to the programme.

The Group reviewed GEMSI's designs for an open-ocean baseline survey for trace metals contained in the Summary Report (Annex IV to Annex Vc) of the GEMSI V meeting. It concluded that the approach, which is based upon the measurement of metal concentrations in the major deep water masses and source waters of the North Atlantic, was basically sound, but that some additional criteria for sampling stations such as major oceanic fronts might also be considered.

In other respects the document annexed to the report of the GEMSI V Report is outdated. The availability of Atlantic Ocean trace metal data and the number and distribution of laboratories capable of conducting reliable baseline measurements has improved substantially since that document was prepared. All these aspects

of the proposal need revision so that potential contributions to the baseline survey can determine the scale and nature of the programme.

It was therefore proposed that the strategic and logistical plan for the conduct of the baseline survey be revised inter-sessionally by scientists from the Bedford Institute of Oceanography led by Dr. P. A. Yeats and the Skidaway Institute of Oceanography led by Dr. J. Blanton. In order to facilitate this revision it is requested by GEMSI that a small provision be made by IOC to support travel associated with the work during 1985.

9. MARINE POLLUTION DATA MANAGEMENT

9.1. REVIEW OF DATA REPORTING FORMATS

The ICES representative presented the Interim Reporting Formats for Contaminants in Fish and Shellfish and Contaminants in Seawater. It was stressed that these are interim formats that will be used for the accumulation of data from the 1985/86 ICES Baseline Survey. The formats will be further reviewed and revised after testing and application in the ICES community.

A number of questions were raised during the discussion of these documents. These are:

i. General

- Why prepare two unique formats and code lists and will there be a third format for sediment/suspended matter? Since there are common elements in all three this could be addressed by a single multi-functional format.

- A data base consisting of a mixture of reporting units may cause problems.

ii. Specific to ICES Interim Reporting Format for Contaminants in Fish and Shellfish

- All samples should be located by geographical co-ordinates (latitude-longitude) and the option to locate samples on a grid system seems undesirable when considering global scales.

- The specimen data record appears to refer largely to finfish and appears weak for molluscs and crustaceans. Marine mammals do not appear to be well covered. Should they be?

- Contaminant loading in plants, especially those used as a human food source may need to be included in future formats.

iii. Specific to ICES Interim Reporting Format for Contaminants in Sea Water

- The format structure should be altered to accomodate any contaminant/parameter in the first data record instead of the present format which requires specific parameters.

- Is there a need to report temperature, salinity and suspended solids if these infrequently reported parameters clutter the format?

- A methods list is absent.

Drs. Uthe and Bewers responded to these questions by outlining the background and purpose behind ICES reporting formats. The questions refer more to any generic reporting format that might be used for data relating to a variety of oceanographic phases. Both the ICES formats reflect the nature of sample procedures involved, which in the two cases are inherently different. Ultimately, it might be possible to develop suitable generic formats using the ICES experience as a guide.

9.2. QUALITY ASSURANCE OF REPORTED DATA

The Chairman initiated the discussion of this item by asking Dr. Topping to speak to the paper for WC/GIPME on Quality Assurance of Measurements in the Coastal Zone (IOC/WC GIPME-V/II). As expected this item produced considerable discussion about the state-of-the-art with regard to measurements of contaminants in marine samples. The Chairman considered that a paper outlining the experiences of GEMSI in the organization and planning of intercalibration exercises should be prepared as an information and reference document for participants on the various national and international marine monitoring programmes. Dr. Topping informed the Group that it was his intention to prepare such a paper for a forthcoming dedication issue for Science of the Total Environment.

10. FUTURE ROLE OF GEMSI

10.1. NEW TERMS OF REFERENCE FOR GEMSI

The Chairman referred to the new terms of reference for GEMSI which had been prepared by WC/GIPME and invited discussion by the Group. The Group agreed that the Revised Terms of Reference were appropriate in relation to their future activities.

10.2. MODALITIES OF GEMSI/UNEP CO-OPERATION

The IOC Technical Secretary opened the discussion by referring to the recent correspondence between IOC and UNEP in which UNEP had presented some guidelines for their association with GEMSI, including the sort of advice they required in relation to preparation of method sheets, reference materials, "musselwatch activities" and workshops in the framework of their Action Plans. The UNEP Technical Secretary informed the Group of the financial and "in kind" support UNEP would be prepared to contribute towards the future intersessional activities, specifically: (i) review of "musselwatch" activities, (ii) the intercalibration exercise for trace metals in tissues (through its project with the ILMR), (iii) review of reference methods, in particular those of the various regional seas programmes, (iv) review of needs for reference standards and materials for intercalibration exercise and (v) workshops planned for both regional seas programmes and IOC regional bodies such as WESTPAC, IOCARIBE, etc. He emphasized that the support would have to be based on mandates derived from governments participating in various Regional Seas Action Plans and UNEP's Governing Council and indicated that at present these mandates made NEP/GEMSI

co-operation possible in the areas indicated. He also said that UNEP would assist with the administrative aspects of future GEMSI meetings and indicated that the Monaco Laboratory had offered its facilities for the next GEMSI meeting. He concluded by saying that he saw no foreseeable problem in providing the necessary support to GEMSI for activities in which IOC and UNEP had joint interests. He emphasized the need for close co-operation administratively, and through GEMSI, on matters such as the organisation of workshops in regional areas so that the respective IOC and UNEP scientific and administration groups in this area are in early, and close, contact with each other.

11. FUTURE INTERSESSIONAL ACTIVITIES OF GEMSI

The Group agreed that the following ad hoc working groups should continue their intersessional activities.

1. Individual Organic Contaminants

Membership: K. Burns (Chairman)
K. Palmork
M. Ehrhardt
A. Knap
J. C. Duinker
J. W. Farrington

Intersessional activities of this group are to be as follows:

i. Continued methods development to separate fats from the hydrocarbon contaminants and reaction products of high fat samples using HPLC, or other appropriate procedures (Intersessional Report, Annex 4).
ii. Relative retention indexing system for common ECD contaminants (Report, p. 4-18).
iii. Testing the efficiency of various adsorbants for common contaminants in seawater and further investigations on the distribution of organic contaminants in marine water columns (Report, p. 18-24).
iv. Continue identification of marker compounds for future incorporation of candidate molecules into monitoring programmes (Report, Annex 5).
v. Investigation of availability of standards of important marker compounds (Report, p. 4-18).
vi Evaluation of methodologies to determine the concentrations and deposition rates of organic contaminants in the atmosphere, in order to determine flux (Report, p. 4-18).
vii. Continued investigations on the rates of photo-oxidation of organic contaminants and the products formed at the sea surface (Report, p. 25).
viii. Development of the strategy for including organic measurements in the open-ocean monitoring programme (Report, Annex 4).
ix. Review of the report resulting from the Bermuda Intercomparison Exercise (Report, Annex 3).

2. Use of Marine Organisms in MARPOLMON and Regional Seas Programmes

Membership: G. Topping (Chairman)
J. W. Farrington
D. Phillips
J. H. Uthe

The intersessional activities of this group are to be a follows:

i. The organisation and conduct of an organochlorines workshop for tissue jointly sponsored by IOC/UNEP (see Recommendation 3.3.1).
ii. The organisation and conduct of a second trace metal intercalibration exercise for tissue in collaboration with Dr. Aston, Monaco, jointly sponsored by IOC and UNEP (see Recommendation 3.3.2).
iii. The review of musselwatch activities as outlined in 3.3.3 and Recommendation 28.

3. Use of Marine Sediments in MARPOLMON and Regional Seas Programmes

Membership: D. Schink (Chairman)
J. Duinker
A. Knap
D. Loring
R. Wollast

The intersessional activities of this group are to be as follows:

i. Complete preparation of the Strategy Manual for Use of Marine Sediments in Monitoring Pollution.
ii. Continue work (including the collection of comments on the efforts so far) on a manual detailing the methods of sampling and analysis to be used in such a programme.
iii. Collect suggestion and comments on standardized data reporting formats for use in such a programme and develop improved formats.
iv. Review questionnaires collected by the ad hoc Group on Use of Marine Organisms in MARPOLMON and to determine how to use this information and what further steps to take.

4. River Inputs

Membership: H. Windom (Chairman)
J. M. Bewers
J. C. Duinker
A. Knap
M. Hungspreugs
J. -M. Martin
H. Dou

The intersessional activities of this group are to be as follows:

i. Send out questionnaires to prospective participants for the River Input Workshop in Bangkok.
ii. A steering group meeting to plan detailed schedule for workshop and make on-site arrangements.

5. Methods and Manuals

Membership: S. Aston (Chairman)
J. M. Bewers
J. C. Duinker
M. Ehrhardt

The intersessional activities of this group are to be as follows:

i. To review and provide comments on the scientific content of Guidelines and Reference Methods for marine pollution studies prepared for use in UNEP's Regional Seas Programme.
ii. To periodically review and provide comments on revisions of the Guidelines and Reference Methods referred to in (a) above.

6. Reference Materials

Membership: (To be named)

The intersessional activities of this group are to be as follows:
(To be named.)

7. Open-Ocean Baseline

Membership: J. M. Bewers (Chairman)
(To be named.)

The intersessional activities of this group are to be as follows:
(To be named.)

12. ELECTION OF OFFICERS

The Chair asceded to Dr. Dawson for this agenda item. The rules of IOC stipulate that the Chairman and Vice Chairman of the Group of Experts should be elected each year. Dr. Topping nominated J. C. Duinker, which was seconded by Dr. Bewers. There being no other nominations, Dr. Duinker was re-elected for the next intersessional period and the next meeting. Dr. Palmork nominated Dr. Knap for Vice Chairman but this was declined. Dr. Bewers then nominated Dr. Palmork, and this was seconded by Dr. Windom. There being no other nominations, Dr. Palmork was duly re-elected Vice Chairman for the next intersessional period and the next meeting.

13. OTHER MATTERS

13.1. AREAS OF GEMSI EXPERTISE/COMPETENCE

Following a discussion of the relationships between GOPPS, GEMSI, and GEEP and potential topics to be referred to GEEP by GEMSI, a discussion arose as to the need for an assessment of the priorities assigned to different classes of chemical contaminants. It was considered that GEEP might, in its assessment of the effects of different classes of chemical contaminants, conclude that an additional group of contaminants than those now being addressed by GEMSI was in need of attention by GEMSI. It was agreed that should this occur, GEMSI should be prepared, with WC/GIPME's approval, to extend or revise its areas of competence/expertise to cover such additional classes of chemical contaminants. It was, however, stressed that the contaminant classes currently being addressed by GEMSI, namely trace metals, 'petroleum' hydrocarbons and organochlorine compounds, were those stressed as the most important in previous resolutions of the WC/GIPME. Indeed, no additional classes of chemical contaminant had been referred for urgent GEMSI attention.

The discussion then broadened to consider the UNEP/RSP representative's question regarding the areas in which GEMSI felt competent to review methods manuals. A particular question raised concerned the extent to which GEMSI might be prepared to arrange for the review of manuals describing techniques for the determination of microbiological pathogens. Following discussion, it was concluded that GEMSI should continue to maintain the expertise to deal with the prosecution of the GIPME programme as it pertained to marine chemical contamination. This might require broadening to cover additional chemical contaminants identified as of importance by GEEP or other WC/GIPME bodies. However, it would be unreasonable to extend the expertise on GEMSI to other classes of contaminants, specifically physical and/or biological contaminants, to fully cover UNEP/RSP concerns since this would result in GEMSI becoming too diversified to be effective.

In the event that non-chemical contaminants are identified as requiring attention within either WC/GIPME or UNEP/RSP programmes, other groups should be identified or created to address these topics.

13.2. IOC TECHNICAL PUBLICATIONS

Dr. Bewers wished to draw the attention of the Group to some concerns he had regarding recent publications by UNESCO that resulted from GEMSI activities. He felt it important that individuals who had made important contributions to the preparation of IOC Technical Series Reports all be acknowledged in the Preface to such reports. He cited the case of IOC Technical Series No. 25, where acknowledgement was made only to the chairman of the GEMSI ad hoc group responsible for the formulation of this document. Others, specifically Drs. A. Cornford, J. C. Duinker, J. E. Portmann and G. Topping had made invaluable contributions to the content of this document and should also have been acknowledged. A policy should be adopted by the IOC that ensured that appropriate acknowledgements are made in the future IOC publications.

Dr. Bewers was also concerned about editorial errors in IOC Technical Series Reports and wished to request more thorough proof correction prior to final publication.

Finally, Dr. Ehrhardt indicated his concern with regard to IOC Technical Series No. 12 which had failed to reference some source material and particularly the transcriptions from "Methods of Seawater Analysis" (Editors: K. Grasshoff, M. Ehrhardt, K. Kremling. Verlag Chemie) and felt that the IOC's attention should be drawn to these.

GEMSI considered and endorsed these various comments and agreed to their inclusion in the record of the meeting.

13.3. EVALUATION OF MEDITERRANEAN CONTAMINANT SURVEY RESULTS

The Group considered the decision of GOPPS that GEMSI should evaluate pollution monitoring and research data from the Mediterranean region. It concluded that such an evaluation would be valuable, and that in conjunction with an evaluation of results published in the open literature, an approach should be made to MEDPOL expressing interest in its very considerable efforts in the compilation and review of results from the Regional Seas Programme and expressing a willingness to co-operate in an assessment of contamination and pollution in the Mediterranean. It was understood by the Group that an assessment of data resulting from the Regional Seas Programme is an on-going exercise within

MEDPOL and that this would be taken into account in order to avoid a duplication in efforts to evaluate data.

The Group also considered the request of GOPPS that the results of the Hydrocarbon Intercalibration Workshop to be held in Bermuda in December 1984, be reviewed by GEMSI and reported to IOC in time to be presented at the IOC Assembly in 1985. However, the results of intercalibration workshops take considerable time and effort to be accumulated and evaluated. Furthermore, GEMSI review and approval of the report should be finalized during a full GEMSI meeting. It would, therefore, seem more appropriate for a provisional or interim report of the activities and on-site analytical aspects of the Bermuda Hydrocarbon Workshop only to be submitted to IOC in time for the 1985 IOC Assembly. The full report of the Workshop should be prepared and submitted to IOC in time for review by GEMSI as a whole prior to and during the next full GEMSI meeting.

Finally, the Chairman expressed concern about the fate of ad hoc Group intersessional reports. It was agreed that these should be easily retrievable and that IOC and UNEP should explore the possibility of publishing the reports either in the IOC Technical Series or UNEP Regional Seas Reports. The IOC Technical Secretary informed the Group that the IOC Information Series, although not as elegant as the Technical Series of Manuals and Guides Reports did offer the possibility of speedy production in sufficient numbers.

14. ADOPTION OF THE SUMMARY REPORT

The Group adopted the Summary Report and gave the Secretariats the usual editorial licence to prepare the final document.

15. CLOSURE

The Chairman closed the Session at 1500 hrs, 30 November 1984, and thanked Dr. Farrington for his hospitality and arrangements throughout. He congratulated the secretaries for their considerable efforts and expressed his satisfaction for the time and energy devoted by the members, observers and joint secretariats.

ANNEX I

AGENDA

1. OPENING

2. ADMINISTRATIVE ARRANGEMENTS

   2.1 ADOPTION OF AGENDA
   2.2 DESIGNATION OF RAPPORTEUR
   2.3 CONDUCT OF THE SESSION

3. INTERSESSIONAL ACTIVITIES

   3.1 THE ANALYSIS OF INDIVIDUAL ORGANIC CONTAMINANTS
   3.2 THE USE OF MARINE SEDIMENTS IN MARPOLMON
   3.3 THE USE OF MARINE ORGANISMS IN MARPOLMON
   3.4 RIVER INPUTS OF POLLUTANTS TO THE COASTAL ENVIRONMENT
   3.5 PETROLEUM HYDROCARBONS INTERCALIBRATION EXERCISE
   3.6 PROGRESS IN THE ANALYSIS OF PCB COMPONENTS IN SEAWATER

4. REPORT ON THE FIFTH SESSION OF THE WORKING COMMITTEE FOR GIPME

5. REVIEW OF METHODS FOR MARPOLMON AND UNEP-RS/PAC

   5.1 EXISTING METHODS FOR MARINE POLLUTION RESEARCH AND MONITORING
   5.2 METHODS TO BE DEVELOPED DURING INTERSESSIONAL PERIOD

6. STANDARDS,CERTIFIED REFERENCE MATERIALS AND INTERCALIBRATION EXERCISES

   6.1 AVAILABILITY OF STANDARDS AND REFERENCE MATERIALS
   6.2 ON-GOING INTERCALIBRATION EXERCISES (WESTPAC,IOCARIBE, UNEP REGIONAL SEAS, ICES AND OTHERS)
   6.3 FUTURE INTERCALIBRATION EXERCISES

7. GEMSI ASSISTANCE TO REGIONAL WORKSHOPS AND TRAINING COURSES

   7.1 REVIEW OF ON-GOING AND PLANNED IOC-UNEP WORKSHOPS

8. OPEN-OCEAN ACTIVITIES

   8.1 ORGANOCHLORINES
   8.2 TRACE METALS AND PETROLEUM HYDROCARBONS
   8.3 CONDUCT OF OPEN-OCEAN BASELINE SURVEY

9. MARINE POLLUTION DATA MANAGEMENT

   9.1 REVIEW OF DATA REPORTING FORMATS
   9.2 QUALITY ASSURANCE OF REPORTED DATA

10. FUTURE ROLE OF GEMSI

   10.1 NEW TERMS OF REFERENCE FOR GEMSI
   10.2 MODALITIES OF GEMSI/UNEP CO-OPERATION

11. FUTURE INTERSESSIONAL ACTIVITIES

12. ELECTION OF OFFICERS

13. OTHER MATTERS

14. ADOPTION OF THE SUMMARY REPORT

15. CLOSURE

ANNEX II

RECOMMENDATIONS

RECOMMENDATION GEMSI VI-1

It is recommended that a distinction be made between the methodology required to assess ambient water quality on a local scale and to assess the long term distribution and accumulation patterns of organic contaminants on a global scale.(Agenda Item 3.1)

RECOMMENDATION GEMSI VI-2

The non-specific methods chosen for implementing regional or global monitoring programmes must be expanded to include the quantification of markers chosen to address the central questions of: 1) the distinction between biogenic and recently biosynthesized hydrocarbons from contaminant hydrocarbons; 2) the distinction between petroleum products and combustion residues; and, 3) the recognition of changes in residue patterns in environmental samples resulting from a variety of biogeochemical processes.(Agenda Item 3.1)

RECOMMENDATION GEMSI VI-3

In assessing the cost of regional or global monitoring efforts it is recommended that planning bodies consider that the cost of instrumentation represent only a fraction of the total when expenditures for planning, sampling, ship time, sample storage, work-up, data interpretation and presentation of results are taken into account. Thus for maximizing the return of analytical information needed to accomplish defined objectives it would be cost effective to use adequately sophisticated instruments and techniques.(Agenda Item 3.1,general)

RECOMMENDATION GEMSI VI-4

It is recommended that chemical clean-up procedures for the analysis of biota and sediments be more clearly defined than is currently done in manuals available in the UN system for hydrocarbon analysis including UV-F procedures.(Agenda Item 3.1)

RECOMMENDATION GEMSI VI-5

The UV-F methods description must be expanded to cover emission scanning and synchronous excitation/emission scanning to permit the assessment of oil type in samples and the suitability of various quantification standards.(Agenda Item 3.1)

RECOMMENDATION GEMSI VI-6

To address questions related to source identification, biological effects and geochemical cycling markers such as the PAH products of combustion and markers in the saturated hydrocarbon fraction should be analyzed as requested in the 1984 IOC/ICES/UNEP intercomparison exercise for hydrocarbons in mussel tissue.(Agenda Item 3.1,3.5)

RECOMMENDATION GEMSI VI-7

Analytical Methods should strive for detection limits based on concentrations of toxicants that may provide an early warning of the degradation of the environment, not just on consideration of immediate toxicological effects.(General)

RECOMMENDATION GEMSI VI-8

More accurate methods for sampling and analysis of organic contaminants in the marine atmosphere should be developed and evaluated.(Agenda Item 3.1)

RECOMMENDATION GEMSI VI-9

Further research needs to be conducted on the relative bioavailability of contaminants such as the PAH's, hetero-substituted PAH's, etc.(Agenda Item 3.1)

RECOMMENDATION GEMSI VI-10

Methods manuals should in general contain clear statements of the uses and limitations of the methods described. UNEP manuals for the analysis of chlorinated hydrocarbons as written employing packed column gas chromatographic analysis have severe limitations in data accuracy and interpretations. These methods can only be used to determine their general presence for ill-defined electron capturing materials. All methods manuals for the analysis of halogenated hydrocarbons must be updated to high resolution gas chromatographic and other advanced methods. With this modification the 1984 draft of manual no. 14 would be acceptable for use in UN monitoring programmes. Manual No. 15 describing beach tar sampling was considered generally acceptable but similar to description of the method in IOC Manuals and Guides No. 13.(Agenda Items 3.1,5)

RECOMMENDATION GEMSI VI-11

Manuals should be prepared describing:

1) reference methods for the analysis of contaminants in marine sediments; and,
2) strategy for the design of programme using sediments to monitor pollution.

Such manuals should be designed to serve a broad audience, but should not duplicate large sections of existing published work. Annexes to the report of the ad hoc Group on the Use of Sediments in MARPOLMON represent a start toward this goal, but further work is needed and should be accomplished before the next meeting of the GEMSI.(Agenda Item 3.2)

RECOMMENDATION GEMSI VI-12

The Group recognized the need for an intercomparison exercise for organic contaminants in marine sediments. It noted that ICES is currently considering the second round of a petroleum hydrocarbon intercomparison exercise in sediments. This exercise should involve a comparison of simple class determination methods as well as analyses for individual components. It is recommended that GEMSI takes part in this exercise.(Agenda Item 3.2)

RECOMMENDATION GEMSI VI-13

The Group recommends that IOC organize an intercalibration exercise for trace metals in sediments and invite interested laboratories to participate. In this context the IOC might initially investigate the possibility of extending or incorporating its activities into the intercalibration for trace metals in sediments, planned to be conducted under the auspices of the ICES Working Group on Sediments in relation to pollution.(Agenda Item 3.2)

RECOMMENDATION GEMSI VI-14

Recognizing that the regular use of sediment reference material is essential for the establishment of the (relative) accuracy of heavy metals, and other contaminant determinations, it is recommended that IOC, in consultation with appropriate agencies, make available appropriate reference materials to those laboratories that wish to assess the precision and accuracy of their analytical techniques.(Agenda Items 3.2,6)

RECOMMENDATION GEMSI VI-15

Recognizing that most sediment reference materials now available have been prepared from shelf sediments of northern latitudes, it is recommended that action should be taken to prepare additional sediment reference materials obtained from shelf sediments that are representative of tropical and semi-tropical, estuarine and coastal areas, and to approach appropriate agencies in this respect.(Agenda Items 3.2,6.1)

RECOMMENDATION GEMSI VI-16

An Intercalibration Exercise on River Input of Pollutants should be held in Bangkok, Thailand during January-February 1986 with the Chao Phraya River being the study site. The duration of the exercise should be approximately 14 days with a preliminary budget allocation as detailed in Annex V.(Agenda Item 3.4)

RECOMMENDATION GEMSI VI-17

The following are recommended as Core Laboratories for the River Input Exercise:

Skidaway Institute of Oceanography (H. Windom)
Bermuda Biological Laboratory (A. Knap)
Bedford Institute of Oceanography (M. Bewers)
Institut fur Meereskunde, Kiel (J. Duinker, M. Ehrhardt)
Laboratoire de Geologie, Ecole Normale Superior, Paris
(J.-M. Martin)
Laboratoire de Chimie Organique, CNRS, Marseille (H. Dou)
(see Agenda Item 3.4)

RECOMMENDATION GEMSI VI-18

A small Steering Committee composed of members of the GEMSI ad hoc Group on River Inputs should meet intersessionally before June 1985 to finalize detailed plans for the logistics and conduct of the exercise. This committee should prepare a pre-workshop document which provides background information in and the known chemistry of Thai rivers. This document should also include a detailed schedule of day to day activities during the exercise.(Agenda Item 3.4)

RECOMMENDATION GEMSI VI-19

A questionnaire should be sent to WESTPAC and ASEAN laboratories identified during the 1984 intersessional meeting, that describes the proposed River Input Workshop, and requests information on the prospective participants' interests and past experiences. The questionnaire should be sent out as soon as possible to be returned by February 1985. This would provide useful additional information, for the Steering Committee, in the workshop planning.(Agenda Item 3.4)

RECOMMENDATION GEMSI VI-20

The Group recommended that all the data from laboratories reporting in the ICES/IOC/UNEP intercomparison exercise are used in full to maintain the integrity of the data set. In this regard, IOC and co-operating organizations should establish a policy with respect to confidentiality with the data they report in such exercises.(Agenda Item 3.5)

RECOMMENDATION GEMSI VI-21

The Group recommends careful co-ordination of TEMA and other international and national programmes of training and education in contaminant monitoring would ensure cost effectiveness and the achievement of the common scientific objectives of all of the UN Agency programmes in marine pollution studies.(General,7.1)

RECOMMENDATION GEMSI VI-22

The Group considered the ways in which GEMSI could provide advice and comments on Reference Methods being developed for use in UNEP's Regional Seas Programmes. The Group agreed that it is willing to assist in this activity and recommended that the mechanism for the review process described in Annex VI be adopted.(Agenda Item 5)

RECOMMENDATION GEMSI VI-23

The Group recommended that the joint IOC/UNEP intercomparison exercise on trace metal determinations in marine organisms (see Annex VI) be carried out and that the offer of the Monaco Laboratory of the IAEA to provide intercomparison material be accepted. The Group agreed that the results compiled from the exercise should be collated by the Monaco Laboratory and evaluated by GEMSI.(Agenda Items 3.3,6.3)

RECOMMENDATION GEMSI VI-24

The Group noted: (1) the success of the IOC(WESTPAC) Training Workshop on the Use of Marine Organisms in Marine Pollution Monitoring held in Queenscliff, Australia in late summer 1983; and, (2) the UNEP organochlorine workshop currently planned for Papua, New Guinea in June 1985 and recommends that the IOC collaborate with UNEP with the aim of running a comprehensive training workshop in the use of bivalves in monitoring organochlorine residues as outlined in 3.3.2. (Agenda Items 3.3,7)

RECOMMENDATION GEMSI VI-25

The ad hoc Group on the Open-Ocean Baseline Survey recommends that the strategic and logistical plans for the GIPME/GEMSI Open-Ocean Baseline Survey be revised and finalized by consultants during the intersessional period.(Agenda Item 8.3)

RECOMMENDATION GEMSI VI-26

It is recommended that the UNEP/RSP and IOC Secretariats proceed with the establishment of an intersessional working group on reference materials having the terms of reference specified in 6.1 of this report.

RECOMMENDATION GEMSI VI-27

The Group recommended that an international workshop on Standard Reference Materials be arranged with participation of all concerned Agencies and that this workshop should be devoted to aspects of preparation, quality assurance control measures, certification and distribution, together with an assessment of the results obtained using such materials in previous intercalibration exercises.(Agenda Item 6.1)

RECOMMENDATION GEMSI VI-28

It is recommended that GEMSI undertakes the 'Musselwatch 'review as requested by the WC GIPME, as a joint IOC-UNEP activity and that the ad Hoc Group on the Use of Marine Organisms in MARPOLMON be called upon to organise this review as outlined under 3.3.3 of this report.

ANNEX III

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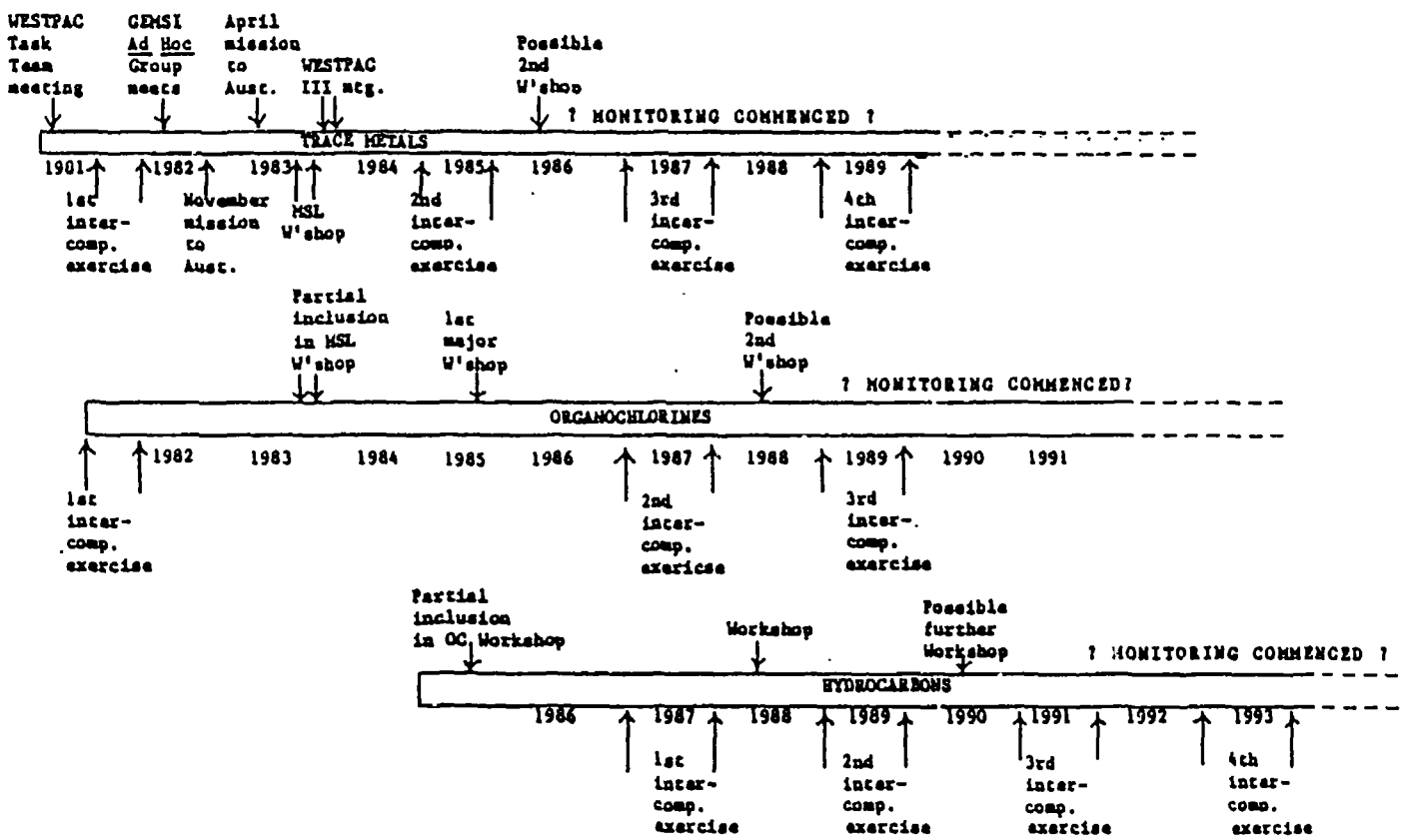
ANNEX IV

ENVISAGED OVERALL PROGRAMME FOR THE DEVELOPMENT OF TRAINING AND MONITORING OF COASTAL WATERS USING BIO-INDICATORS WITHIN THE WESTPAC REGION. EACH CLASS OF CONTAMINANT IS SHOWN SEPARATELY



ANNEX V

Report of the ad hoc Group on River Inputs of Pollutants

1. Intersessional Activities

Following the fifth session of the Working Committee for Global Investigations of Pollution in the Marine Environment (GIPME) in Bangkok, Thailand (30 July - 3 August 1984) the GEMSI Sub-Group on River Inputs of Pollutants convened (5-9 August 1984) to formulate initial plans for a river sampling/analysis intercalibration exercise. It had been proposed at the fifth session of GEMSI (Paris, 14-17 June 1983) that such an exercise might be held in Thailand in association with the WESTPAC Marine Pollution Research and Monitoring Programme. Therefore, in addition to Sub-Group members a number of scientists from the WESTPAC region also participated.

The objectives of this meeting were to prepare a preliminary design for a river sampling/analysis intercalibration exercise to be discussed at GEMSI VI and to establish a logical framework for carrying out the exercise.

The full report of this intersessional sub-group meeting is available from the IOC Secretariat but the major conclusions and recommendations coming from this meeting are given below.

The Sub-Group recommended that the overall objectives of the river intercalibration exercise shall be:

1) To assess techniques for the determination of the gross fluxes of chemical constituents, including contaminants, through river discharge;

2) To select a uniform or standardized set of techniques for determining the discharge constituents by world rivers;

3) To assess the ability of participants to obtain comparable results on contaminant concentrations in river water samples.

The overall exercise should include a training/workshop component which would provide a mechanism for participants from experienced core laboratories to share that experience with other participants. The workshop should also provide a forum for participants to discuss various apects of estimating river contaminant flux.

As a result of this exercise, and its associated workshop, a foundation would be established for follow-up activities by participants from the ASEAN/WESTPAC region. The objectives of these activities would be:

1) To obtain, using standardized techniques, time series data on the compositional characteristics and associated hydrologic information of rivers in the ASEAN/WESTPAC region to estimate and compare gross chemical discharges from different rivers in the region.
2) To analyze and interpret hydrologic and compositional data acquired during the time-series studies to gain a better understanding of the relationships between chemical discharges from rivers and drainage basin geology, climatology, demography and anthropogenic activities within drainage basins.

3) To determine suitable procedures for normalizing the fluxes of chemical substances, particularly contaminants, in rivers to other factors such as major ion concentration and drainage basin characteristics.

In the long term, the overall objective of these IOC-GEMSI activities is to collect, assemble and interpret data on the discharge of chemical constituents from major world rivers in order to provide estimates of aggregate world river discharge of chemicals into the ocean. This information will then be applied to the construction of mass balance assessments for ocean basins and marginal seas for GIPME and UNEP/RSP purposes.

2. Sessional Activities

The ad hoc Group met sessionally during GEMSI VI to discuss further plans for the proposed workhop/intercalibration exercise on River Input of Pollutants. From these discussions the following recommendations were made:

1) The exercise should take place in Bangkok, Thailand during January-February 1986 with the Chao Phraya River being the study site. The duration of the exercise should be approximately 14 days.

2) The following are recommended as core laboratories for the conduct of the exercise:

   Skidaway Institute of Oceanography (H. Windom)
   Bermuda Biological Laboratory (A. Knap)
   Bedford Institute of Oceanography (M. Bewers)
   Institut fur Meereskunde, Kiel (J. Duinker, M. Ehrhardt)
   Laboratoire de Geologie, Ecole Normale Superior, Paris (J.-M. Martin)
   Laboratoire Chimie Organique, CNRS, Marseille (H. Dou)

3) A small steering committee should meet intersessionally with the host institution before June 1985 to finalize detailed plans for the logistics and conduct of the exercise. This committee should prepare a pre-workshop document which provides background information on the hydrology and chemistry of Thai rivers. This document should also include a detailed schedule of day to day activities during the exercise.

4) A questionnaire should be sent to WESTPAC and ASEAN laboratories, identified during the 1984 intersessional meeting, that describes the proposed workshop, and requests information on the prospective participants' interests and past experiences. The questionnaire should be sent out as soon as possible to be returned by February 1985. This would provide additional useful information, for the Steering Committee, in the workshop planning.

As a final task the ad hoc Group developed a preliminary budget for the proposed exercise. This is summarized below and is subject to a more detailed analysis of estimated costs:

15 Regional Participants		
Round Trip Travel (15 @ $500)	$	7,500
13 days per diem ($50/day/participant)		9,750
Local (Bangkok) Costs		
Ship time (8 days @ $1,150/day)		9,200
Lab assistants (60 man days @ $40 each)		2,400
Ground Transportation (car rentals)		1,000
Chemicals, supplies, etc.		2,000
Shipping		500
TOTAL	$	32,350

It is expected that the Core Laboratories can obtain support for their participation from respective national programmes. It is recommended that ChulalongKorn University act as the local coordinating agency for the workshop.

The ad hoc Group on River Input Measurements discussed two other issues. These were:

1) The global ocean flux programme being proposed in as soon to be published National Academy of Science report.

2) The draft terms of reference for a new SCOR Working Group on the Role of Phase Transfer Processes in the Cycling of Trace Metals in Estuaries.

On the first of these subjects, the ad hoc Group expressed great interest in reviewing the NAS Programme document in order to determine in what way regional river-input/discharge flux measurements might adjunct, or compliment, such a global programme. The ad hoc Group would intend to examine the NAS programme document from this perspective as soon as it is received by GESAMP members.

Regarding the terms of reference for a new SCOR Working Group, the ad hoc Group considered the subject area as an important one which compliments the GESAMP thrust to conduct measurements of gross contaminant fluxes in rivers. It was also noted that the subject of the phase transfer in estuaries is important to the estimation of net river fluxes to the oceans. Thus, the ad hoc Group would like to have seen greater stress upon the relevance of such processes to the general relationship between gross and net riverine inputs. It was also considered valuable, that the implications of the theoretical aspects of phase transfer to previous experimental studies on estuarine processes and estuarine mass balances, could be included in the draft terms of reference for the SCOR Working Group.

ANNEX VI

Sessional ad hoc Group on Methods Manuals

The sub-group first discussed the rationale and procedures for the preparation of UNEP Methods Manuals. The UNEP members described the way in which requests for the preparation of manuals were received and the way in which the manuals are prepared, the described methods tested, and the manuals reviewed and revised for final publication. Following this presentation the sub-group considered the following topics:

1) The extent to which all aspects of the strategy, sampling, analytical and interpretative aspects of methods for the determination of specific marine materials were covered;

2) The philosophy with regard to the selection of methods, particularly on the context of sophistication and range of application; and,

3) Procedures for GEMSI review of draft manuals.

With respect to the first item, it was agreed that an evaluation of the completeness of the manuals produced by UNEP for specific contaminant/matrix combination could be judged in the context of a hierarchical diagram outlining all aspects of a determination method. Such a sample diagram is attached. It would be possible then to identify for which combinations of contaminant/matrix method manuals had been prepared, what omissions from the entire determination procedure remained undescribed and which organizations had covered, or were intending to cover, other components or other contaminant/matrix combinations so as to reduce unnecessary duplication of effort.

Regarding the second topic of discussion, it was agreed that greater attention to specifying of the applicability of the documented methods and pointing out purposes and applications to which the described methods are inappropriate. The UNEP representative agreed to endeavor to do this in future manuals. Furthermore, it was in principle agreed that there was no objection to describing different procedures for specific contaminant/matrix combinations having differing levels of sophistication in equipment and sample handling so that laboratories wishing to improve their capability could refine their methodological procedures.

Finally, the sub-group devised procedures for facilitating the review by GEMSI of draft methods manuals. It was agreed that draft manuals should be submitted to the IOC (or UNEP) Secretariat(s) for transmission to designated members of GEMSI, depending on the particular subject of analyte, for these members to arrange reviews by appropriate scientists either within their own organisations or others, making where possible full use of other GEMSI members. The individual reviewers would then send reviews to the IOC Secretariat for onward transmission to ILMR with copies to the GEMSI member responsible for the particular subject analyte.

Proposed GEMSI members for coordinating the reviews of manuals are as follows:

Hydrocarbons	Dr. A. Knap
Organochlorines	Dr. J. C. Duinker
Trace Metals	Dr. J. M. Bewers

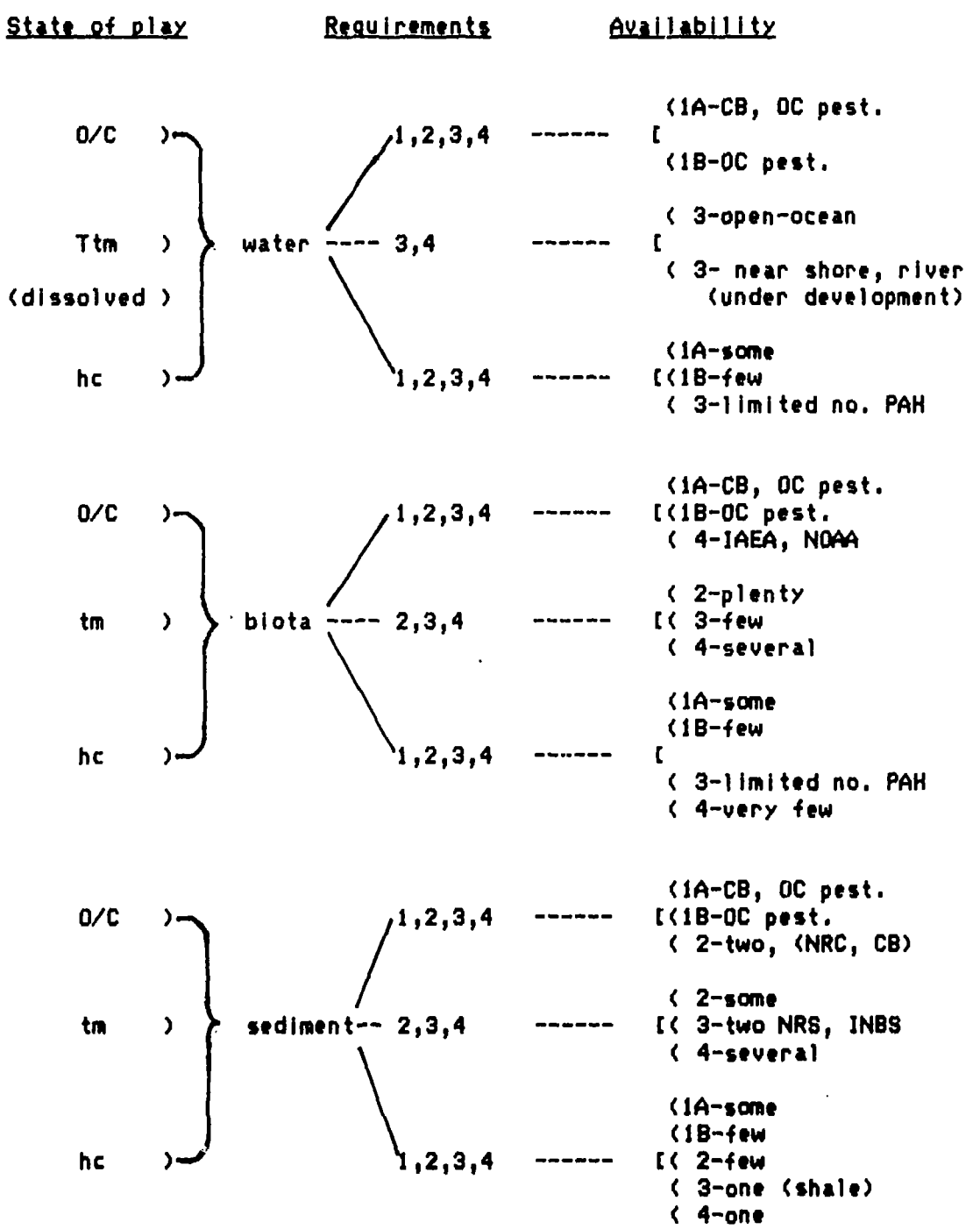
Manuals on Methodology

TRACE METALS IN WATER

Principles/Guidelines/	River	Fe, Mn, Cu, ZN, Ni, Cd, Hg, Pb, Se, As
Objectives	Estuary	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
(Ancillary Data Needs)	Shelf	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Open-Ocean	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
Sampling Strategy/	River	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
Procedures	Estuary	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
(inc. Statistical	Shelf	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
Factors)	Open-Ocean	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
Sample Pretreatment	River	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
e.g. (Preservation)	Estuary	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
(Filtration)	Shelf	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Open-Ocean	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
Analytical Method(s)	River	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Estuary	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Shelf	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Open-Ocean	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
Interpretation	River	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Estuary	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Shelf	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As
	Open-Ocean	Fe, Mn, Cu, Zn, Ni, Cd, Hg, Pb, Se, As

ANNEX VII

Requirements for, and current availability of "reference" materials.



* 1 Standards (A, qual.; B, quant.) 3 intercomparison samples
2 certified reference materials 4 research materials
O/C organochlorines tm trace metals
hc hydrocarbons CB chlorinated biphenyls
OC pest. PAH polyaromatic hydrocarbons
IAEA International Atomic Energy Agency
NOAA Nat.Oceanogr.Atmos.Admin.
NRC National Research Council NRS National Reference Stand.
INBS Int.Bureau of Standards