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# THIRD REPORT OF THE WORKING GROUP ON POLLUTION BASELINE AND MONITORING STUDIES IN THE OSLO COMMISSION AND ICNAF AREAS

Charlottenlund, 25-27 May 1977



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# Third Report of the Working Group on Pollution Baseline and Monitoring Studies in the Oslo Commission and ICNAF Areas, Charlottenlund, 25 - 27 May 1977.

## 1. Chairman's Opening Remarks

The Chairman of the Working Group, Mr A. Preston, opened the meeting at 9.30 h. on 25 May and formally welcomed the members. He noted that the meeting had been called sooner than had been anticipated at the meeting last year for three primary reasons : (1) the report of the Input Study, a major activity of the Group, had not been completed for the last meeting but a draft was now available, (2) a sub-group on sediments had met and produced a report, and (3) several requests for information and advice had been received from the Oslo and Interim Paris Commissions.

## 2. Composition of Membership

As there were a number of new members in attendance, each participant introduced him/herself, indicating affiliation and field of primary interest. The list of participants is given as Annex II.

## 3. Adoption of Agenda

Mr G. Berge proposed to add to the draft agenda a presentation on and discussion of the marine pollution research activities conducted in response to the recent blowout in the Ekofisk field. This suggestion was accepted as an addition to Agenda Item 7.4 and the draft agenda (Annex III) was then adopted.

## 4. Appointment of Rapporteur

The Council's Environment Officer was appointed Rapporteur and Dr J E Portmann agreed to provide scientific support where necessary. He subsequently acted as Chairman when, at a late stage in the meeting, Mr Preston had to withdraw due to illness.

## 5. Report of the 64th Statutory Meeting and Actions taken by ACMP at their two Meetings

The General Secretary reported on the items and decisions of interest to the Working Group which had occurred at the 1976 Statutory Meeting. He also informed the Group that the "Bureau Working Group" will be meeting at the end of June to discuss the structure and organisation of the Council with a view to a possible reorganisation and asked the Group for any advice that it may have in this regard. The General Secretary indicated that the "Bureau Working Group" will consider the question of whether to split the Fisheries Improvement Committee into two Committees : one dealing with mariculture and the other with marine pollution.

5.2 Although the Group had no specific advice to give the Bureau on reorganisation, there was general expression of concern that the marine chemists should be suitably organised so that they could be called upon to provide advice to the Working Group when necessary.

## 6. International activities of relevance to the Group

### 6.1 OSCOM, IPARCOM and JMG

6.1.1 The Chairman gave a brief review of the history of the Oslo Commission (OSCOM) and Interim Paris Commission (IPARCOM), leading

up to the formation of the Joint Monitoring Group (JMG). The JMG was formed as a result of the many common areas of interest between the two Commissions, including geographical region of competence and numerous technical issues, such as intercalibration. The Chairman read the terms of reference of the JMG as follows :

- To coordinate the monitoring activities of the two Conventions, taking into account the separate and joint needs of the two Conventions, national and international programmes.
- To develop and provide the required scientific basis for the effective conduct of monitoring activities including provisions of advice on how, when, where and what to sample and measure.
- To provide a forum in which all matters related to the intercalibration of sampling, analytical and related methods can be conducted.
- In these considerations, priority should be given to mercury, cadmium, zinc, PCB's, DDT and its residues. The Group should also develop and improve methods for tha analysis of lead.

6.1.2 In reporting on the first meeting of the JMG, held in Brussels in January 1977, Dr J.E. Portmann stated that it had been recognised that the ICES work for OSCOM is of direct interest to IPARCOM, but that this latter Commission also needs work related to the coastal margins. The JMG was also interested in the work ICES was doing with regard to review of the coordinated monitoring programme and the criteria for monitoring dumping sites; ICES was invited to submit the reports on these matters to the next meeting of the Group.

6.1.3 The Working Group felt that it was an important step forward that the stature of ICES has been recognised, even though there has been no formal recognition of ICES work by IPARCOM. The status of ICES as a member of the JMG will give it an opportunity to contribute to and formally respond to the JMG's work.

6.1.4 The Chairman informed the Group on the meeting of the scientific committee (SACSA) of OSCOM, held in Nantes last year, at which the Baseline Study of the levels of contaminants in the living resources of the OSCOM area had been presented. He said that the report had been well-received and had been found to give a good picture of the level of contaminants for most of the area concerned. However, he felt that, in addition to filling the remaining gaps in the Baseline Study, ICES should now turn to more sharply-defined activities (e.g., dumping ground selection criteria and monitoring) to satisfy the more specific needs of OSCOM.

6.2 GIPME, IGOSS

6.2.1 Dr Portmann first reported on the meeting of the GIPME (Global Investigation of Pollution in the Marine Environment) Working Committee, held in Hamburg in 1976. The Working Committee had, among other activities, carried out a review of regional programmes from which it had become clear that ICES work was a long way ahead of any other regional studies.

6.2.2 The GIPME Task Team on Monitoring had met in Lowestoft earlier in the year and agreed that it should recommend the establishment of a Group of Experts on Methods, Standards,and Intercalibration, the terms of reference for which Dr Portmann read (contained in C.M.1977/E:8, Annex 5). The Task Team had also determined that input information is very important to its studies and had asked the IOC to distribute the ICES questionnaire to member states in order to identify what type of information is required.

6.2.3 The Chairman observed that GIPME is an important beneficiary of ICES work in marine pollution. GIPME has recognised the importance of regional initiatives and, thus, the ICES work in this area can serve as a precedent and model for other regions.

6.2.4 Dr Portmann then reported on the status of the IGOSS (Integrated Global Ocean Station System) Pilot Project on Marine Pollution (Petroleum) Monitoring, which has now been extended to cover all world oceans and will run for a further two years. Certain amendments to the operational plan had been made and a revised version has been distributed to all participants. In particular, intercalibration is now catered for and certain biases in reporting data have been removed.

6.3 UNEP (Open Ocean)

6.3.1 Dr Portmann presented an up-date on the IOC/WMO/UNEP Pilot Project for Monitoring Background Levels of Selected Pollutants in Open Ocean Waters, which concerns analysis of contaminants in sea water. The Working Group generally felt that ICES could make an important contribution to this programme if it goes forward, although it doubted that the ambitious time frame could be met.

6.3.2 In connection with this and the other programmes discussed, several members of the Working Group expressed their concern about the proliferation of programmes in the area of marine pollution, especially given the limited number of people to work on them. They felt that, because the work of ICES is widely esteemed, it should be channeled into the most productive areas.

7. Sub-Group Activities

7.1 Effects Sub-Group

7.1.1 In reviewing the status of the Report of the Sub-Group on the Feasibility of Effects Monitoring, Dr A.D. McIntyre stated that the changes and additions recommended during review of this document have now been incorporated and the document will be submitted to ICES for publication as a Cooperative Research Report by mid-June.

7.1.2 A prospectus for a Workshop on this topic is being prepared for the 1977 Statuory Meeting. It is planned that about 50 experts, not necessarily from ICES countries, will be invited to this Workshop Financial support is being sought from such organisations as UNEP and FAO.

7.1.3 On the subject of effects monitoring, the Working Group was also informed that the British Royal Society is planning a 2-day Symposium on the assessment of sub-lethal effects on organisms and on extrapolation from laboratory effects to the sea. This will be held in May 1978 and can provide a useful background to the ICES Workshop on effects monitoring.

7.1.4 Additionally, Mr G. Berge reported that GESAMP has recently established a Working Group on Biological Effects Monitoring with terms of reference, inter alia, to formulate a rationale for and assess the feasibility of biological effects monitoring. This Group will be drawing upon the work of Dr McIntyre's Sub-Group.

7.1.5 An example of research efforts in this area was given by Dr P. Hagel, who presented the results of a 15-year study of vertebral deformities in herring and their possible usefulness in biological effects monitoring. These results will appear in C.M. Doc. 1977/E:5 for the next Statutory Meeting. This study was not able to determine whether such abnormalities were due to pollution or to other factors.

7.1.6 Other participants also briefly mentioned on-going research on identifying effects of various pollutants on certain marine organisms.

7.2 Intercalibration Reports and Future Programmes

7.2.1 Dr G. Topping summarised the experience gained from the three intercalibration exercises he has coordinated using prepared fish flour. He noted that the quality of the results obtained had improved with each exercise, with the results of the third intercalibration being very good for several metals. Laboratories which had participated in all three exercises were now producing comparable data for copper, zinc, and mercury. Results for cadmium and lead, however, were still not accurate enough and a further intercalibration exercise is needed, which should take place in 1977.

7.2.2 Dr Topping additionally presented the results of the two intercalibration exercises on organochlorines which had been coordinated by Dr A.V. Holden. The results of the first exercise, using high spiked levels of organochlorines, had been good. Good results were also found for the second exercise even though the levels of organochlorine residues were much lower and were close to levels of naturally-occurring contamination. For the more common residues, a coefficient of variation of $\pm$ 10% was found; this coefficient increased to $\pm$ 20% for less common residues. Although good results can now be obtained for analysis of organochlorines in fish and shellfish, future efforts will need to be directed toward measuring the lower levels in seawater and sediments.

7.2.3 Dr Topping stated that in the light of the Group's comments, he would proceed to finalise the report on ICES experience in intercalibration using biological materials and draw conclusions on this basis. The Group recommended that this paper be published when final in the Cooperative Research Report series (see Recommendation 8).

7.2.4 The Group agreed that it would also be necessary to ensure that the analysts maintain a high standard of work. Accordingly, it was recommended that another intercalibration exercise, which should include a wider circle of laboratories, should be carried out in 1978. The Working Group in this connection passed Recommendation 1 (Annex V; see also Recommendation 3). This intercalibration will use a new fish flour preparation with lower mercury levels, closer to natural levels than in previous preparations. As in past exercises, a standard solution will also be distributed.

7.2.5 In discussing the topic of intercalibration, the desirability of including the Baltic laboratories in the 1978 Intercalibration Exercises was pointed out and it was suggested that direct contact be established between Dr Topping as Coordinator and the Baltic laboratories which may participate to facilitate communication (see Recommendation 1).

7.2.6 Dr P.G.W. Jones next reported on intercalibration exercises on heavy metals in sea water. The initial exercise, started in 1971, involved intercalibration among laboratories in Belgium, the Netherlands, and the United Kingdom. After the establishment of the present Working Group and Dr D. Schmidt's Sub-Group on Contaminant Levels in Sea Water, Dr Jones had coordinated the first ICES-wide intercalibration of standard solutions of heavy metals. The original results, reported in C.M.Doc. 1976/E:15, had been reviewed at the second meeting of this Sub-Group.

7.2.7 At the present time, Dr Jones is coordinating an intercalibration exercise, the third intercalibration on natural sea water samples, distributed mainly in a frozen state to 65 participating laboratories. Insufficient results have been received so far to draw any conclusions. The system employed for distributing the samples in a deep-frozen state by air freight proved basically satisfactory, but it was felt that more time should have been devoted to publicising the exercise.

7.2.8 The Sub-Group, Dr Jones reported, had made two recommendations in this regard : (a) that a fourth intercalibration exercise, which would utilise both natural and spiked replicate sea water samples in a programme to determine precision and systematic errors in analysis, be conducted in the near future, and (b) that a fifth intercalibration be conducted thereafter to compare different sampling, handling and storage techniques using different types of equipment on a single vessel. Additionally, the Sub-Group had recommended that, in the future, intercalibration exercises should be announced in the open literature to gain maximum participation among ICES member countries. The Working Group accepted these recommendations of the Sub-Group (see Recommendation 2). The Working Group also agreed with the decision of the Sub-Group to postpone a multi-ship exercise, discussed at earlier meetings, until the results of these next two exercises are available.

7.2.9 In the absence of Dr J. Ólafsson, Coordinator of the mercury intercalibration exercise (the second intercalibration) Dr Jones presented the results of this intercalibration. These results, which appear in C.M. Doc.1976/E:49 , show that many of the participating laboratories needed to improve their analytical techniques, especially with regard to the low, naturally-occurring mercury levels in uncontaminated sea water.

7.2.10 The Group then deliberated on the best type of publication to report the results of these intercalibration exercises and determined that, because full publication of the data is important, it would be best to have the reports appear in the Cooperative Research Report series. However, to ensure a wider recognition of this report, its publication should be announced in journals of wide distribution. The Group accepted the Sub-Group's recommendation to publish Dr Jones' three reports together, but considered that Dr Ólafsson's report should be published in the same volume, rather than separately in a scientific journal as had been recommended by the Sub-Group. It was decided that Dr Schmidt, Chairman of the Sub-Group, should be asked to gain Dr Ólafsson's approval on this matter (see Recommendation 9).

7.3 Sub-Group on Contaminant Levels in Sea Water

7.3.1 Dr G. Weichart formally presented the report of the Sub-Group (C.M. Doc. 1977/E:8) on behalf of its Chairman, Dr D. Schmidt, who was unable to attend this meeting. In making his presentation, Dr Weichart drew attention particularly to those items of the Sub-Group report which had not already been discussed. Among the significant matters, the Sub-Group had decided that it was still too early to plan an internationally-coordinated metal baseline survey in sea water. However, as a background to a future such study, a status report should be prepared giving the results of existing national baseline programmes to show areas of coverage and progress to date. A small group, consisting of Dr Topping, Dr Jones, Dr Bewers and possibly Dr K. Kremling, had been constituted. The Chairman accordingly requested all members of the Working Group to obtain the relevant data and pre-reports from laboratories in their respective countries and to forward such information to Dr D. Schmidt by 31 December 1977. The Working Group welcomed the preparation of this background report.

7.3.2 The Chairman, in summarising the discussion which followed, stated that while the concern of the chemists in improving the quality of analytical techniques must be respected, he would like to see progress in the usage of these tools in practical situations, e.g., applying them to dumping grounds. It was felt that techniques could be advanced more quickly, at least for coastal waters where levels are somewhat higher, so that the Group would be able to aid IPARCOM and OSCOM. He asked the Sub-Group to discuss this issue at its next meeting.

7.3.3 There was agreement in the Group that the analytical techniques would probably be adequate for use in polluted coastal waters, although attention must still be given to the comparability of different sampling and storage techniques. With regard to this latter issue, the hope was expressed that a competent laboratory could be persuaded to conduct a study of the effects of different sampling and storage techniques, particularly if some outside funding could be obtained. The Chairman asked the United States representative, Dr J. Snider, to check on the possibilities of an United States laboratory participating in this project. Dr Snider, in agreeing to do so, indicated that the United States intends generally to become much more active in the work of this Group.

7.3.4 The discussion then turned to whether Dr M. Bewers of the Bedford Institute in Canada would be able to take on the coordination of the fourth intercalibration exercise. Dr A. Walton expressed the willingness of the Bedford Institute to assume this responsibility. In reviewing the scope of this phase of the intercalibration exercises, Dr Walton pointed out that the cost of sample bottles, chemicals and shipping costs alone would be around $8,000 if 90 laboratories participated. This estimate did not include ship or laboratory time to collect and prepare the samples.

7.3.5 The Group wished to express to the ACMP its concern regarding the costs and burden on one laboratory due to the intercalibration exercises, which are vital components of the programme of the Group, in the hope that the ACMP would be able to find ways to finance them (see Recommendation 3). It seemed that either the costs should be apportioned among participants in the exercise or that a "block grant" should be sought from outside sources to fund the next intercalibration exercises. The Group agreed that a participants' fee system would not be a good idea as it could create substantial problems for certain

laboratories wishing to participate in the exercise. Thus, it was decided that block funds should be sought from international sources and the General Secretary offered to approach UNEP on this matter.

7.3.6 The Chairman expressed the hope that there would be greater participation in the work on analysis of trace metals in sea water by all the countries represented in the Working Group.

7.3.7 To close the discussion on this point, the Working Group agreed that the Sub-Group Report should go as a separate document to the Statutory Meeting (C.M. Doc. 1977/E:8).

7.4 Petroleum Monitoring and Intercalibration

7.4.1 Dr K. Palmork presented a progress report on a bilateral intercalibration between his laboratory in Bergen and Texas A & M University in the analysis of petroleum hydrocarbons in minced fish tissue at both natural and spiked levels. This intercalibration had been carried out, but considerable difficulties were encountered and it was decided that it could not be extended to other countries. However, Bergen and the MAFF laboratory at Burnham-on-Crouch now have identical analytical systems and are cooperating in a bilateral programme for the measurement of petroleum hydrocarbons in fish, which it might subsequently be possible to extend to other laboratories.

7.4.2 The Group was very interested in this and other programmes on the analysis of petroleum hydrocarbons in living resources and sea water and asked to be kept informed of work in this area. However, it concluded that it was still too early to formulate a programme on this subject.

7.4.3 Mr Berge presented a preliminary report on the research programme to determine the ecological effects of the blow-out on the Bravo Platform in the Ekofisk oil field in the North Sea. A large number of scientists and research vessels from several countries had participated in the investigation of the effects of the oil. The results indicated, inter alia, that obvious effects on marine life were very small and were only observed on one occasion at one station, that the levels of aromatic hydrocarbons were low, that the temperature was still too low for mackerel spawning and primary production was just starting, and that the water was fully mixed with no stratification except in the nothernmost areas. Although the possibility of sub-lethal effects could not be ruled out, they were expected to be minimal, if at all. Mr Berge expressed the pleasure of his Government over the multi-national efforts in this matter.

7.5 Sediment Working Group

7.5.1 The Chairman opened discussion on the report of the Sub-Group of Specialists in the Field of Pollutants in Sediments by reminding the Working Group that this specialist group had been established to advise on the practicability of using sediments in pollution monitoring. Dr Duinker introduced the report of the Sub-Group which had concluded that, in spite of the considerable amount of work being done in this field, they could not recommend any overall

programme of monitoring using sediments. The main reasons for this were the complexity of the various processes taking place in the coastal zone, especially in relation to the fresh water/sea water interface where it is now recognised that much of the fresh water pollutant burden is shed at least temporarily, although it may subsequently be reworked and moved on by a process of reworking into the truly marine situation. The Sub-Group had, however, identified several open sea areas where the siltation regime was less complex and in which pilot scale studies could usefully be pursued with a view to improving knowledge on sedimentation rates, etc. This could then lead to a better understanding of processes in the dynamic coastal zone.

7.5.2 The Working Group felt that the conclusions of the Sediments Group could apply to shallow seas in general and thus extend possible areas for pilot studies. However, these conclusions did not apply to deep seas, as these areas are different and are complicated by the extremely high degree of dispersion and hence low level of pollutant input to such areas.

7.5.3 The Working Group's attention was drawn to the recommendations made by the Sub-Group for further work and the Working Group noted that, in an effort to broaden the knowledge base on the coastal zone processes, the Sub-Group had suggested that a Symposium be held. The Working Group endorsed this recommendation and further suggested (see Recommendation 4) that Dr Postma be invited to convene the proposed Symposium. The Chairman also undertook, at the suggestion of the Working Group, to write to Dr Postma requesting that before the 1977 Statutory Meeting he should write to the General Secretary outlining the coverage of the proposed Symposium in order to clarify the proposal for the Council. The Chairman undertook to remind Dr Postma, in drawing up his proposals, to emphasise that the Symposium would be concerned with work on sediments in all shallow seas and would not be restricted to the North Sea.

7.5.4 The Working Group also endorsed Recommendations 2 and 3 from the Sub-Group, which it felt could usefully be linked, but additionally recommended that the proposed offshore pilot study should include an investigation of "dissolved" pollutants as well as those associated with particulate materials (see Recommendation 5). In this connection the Working Group recognised there was a potential area of interest for the Hydrography Commitee and suggested that papers on this topic be solicited for the 1978 Council Meeting with a view to their being discussed at a joint session of the Hydrography Committee and the Fisheries Improvement Committee.

8. Input data

8.1 Input Study Sub-Group Report

8.1.1 In introducing this topic, the Chairman reminded the Group of the history of the input study, which had not been considered at last year's meeting because not all replies had been received. Spain and Portugal had indicated that they were not in a position to reply and data promised by France have still not been received. A draft containing all available data has been prepared by a group consisting of Mr O. Vagn Olsen, Dr J.E. Portmann and the Council's Environment Officer. There were still many gaps in the data and many estimates had been made, but the information available represented a substantial step forward from earlier studies.

8.1.2 The Environment Officer briefly presented the document and explained the bases on which estimates had been made. The document was then discussed and a number of suggestions were made on improvements.

8.1.3 Mr G. Berge, as Chairman of the ACMP, stated that this document represented a tremendous step forward and congratulated the three compilers of the data.

8.1.4 The Chairman also thanked the three persons, especially Mr Vagn Olsen and the Environment Officer, for their work in compiling the data. He indicated, however, that summary tables should be incorporated into the text. The Group accepted the document, with the suggested changes, and recommended that it be published as a Cooperative Research Report. In this connection it was concluded that, although it would be very desirable to include the French data in the report, publication of the document should not be delayed pending submission of data from France (see Recommendation 7).

8.1.5 In terms of the Northwest Atlantic, the Chairman reported that the United States was compiling input data with a view to presenting a report at the 1977 Statutory Meeting. Dr Snider stated that the United States would coordinate with Canada to produce a common report on the inputs of pollutants to this area. The Group welcomed the production of this report and agreed that when the United States and Canadian data become available, data for the west coast of Greenland should be added and a report be prepared for publication in the Cooperative Research Report series.

8.2 Atmospheric Input Monitoring

8.2.1 Reports of studies on the input of pollutants via atmospheric deposition were presented by several persons. Dr Topping began by summarising the results of studies of atmospheric input to the Firth of Forth, as reported in C.M. Doc. 1976/E:41. The Chairman then reported on studies of atmospheric deposition of metals and organochlorines in the North Sea using coastal stations along the east coast of Scotland and England, and also in Norway and the Netherlands. Reports of these studies are found in C.M. Docs.1976/E:17 and E:46. Studies of metal deposition have now stopped because adequate information has been obtained on the magnitude of this input.

8.2.2 Dr Snider presented the Group with a report on the atmospheric input of trace metals to the New York Bight.

8.2.3 The Group discussed whether it should set up a coordinated monitoring programme or other international programme on atmospheric deposition of pollutants and concluded that, while this work is important and further work should be maintained, it was not in a position to agree on any coordinated action at the present time.

9. Coordinated Monitoring

9.1 Consideration of the 1975 Monitoring Report

Dr Portmann introduced this report by reminding the Working Group that preparation of the report had been delayed by the late submission of national monitoring data from programmes conducted in 1975, the last of which had not been received until March 1977. The report included data from all countries bordering the North Sea except Denmark.

Although a number of small changes appeared to have taken place, especially with regard to the pattern of concentrations of PCB in relation to DDT and the relative proportions of DDT and its metabolites, the general picture was similar to that found during the 1972 Baseline Study and during the 1974 Coordinated Monitoring Programme. Several suggestions were made for editorial changes and certain improvements to the tables. It was agreed that these should, if possible, be incorporated in time for submission of the report to the forthcoming ACMP meeting. Some data were also presented at the meeting by Denmark and it was agreed that, where they had been produced by an intercalibrated laboratory, they should also be included in the report. Subject to these amendments, the Working Group approved the report.

9.2 Consideration of 1976 Monitoring Report

9.2.1 In introducing this report, Dr Portmann indicated that, although ACMP had suggested that a more relaxed time table of report preparation might if necessary be followed, he had received most of the data which could be expected and had therefore prepared a report based on those data. Since completion of the report, he had either received or had been promised immediate dispatch of all outstanding data. Dr Portmann pointed out that, in accordance with the agreement made last year, the report included data on programmes conducted in both the Irish Sea and North Sea.

9.2.2 The Working Group accepted this and agreed that, subject to a few minor amendments, the report should be put to the forthcoming ACMP meeting, if possible with the inclusion of the additional data now available or about to be supplied. The Working Group noted that the Council had already agreed to publish the annual reports on coordinated monitoring in the Cooperative Research Report series.

9.3 Consideration of Additions to the Baseline Study

Dr Portmann reminded the Working Group that, in considering the results available from the 1975 Baseline Study in the North Atlantic, it had been recognised that for a variety of reasons coverage had not been as complete as intended. Certain gaps had been identified and the countries concerned had been requested to fill these as soon as possible. The Working Group was informed that the necessary data had been collected by Ireland in respect of metals and that Portugal and Canada expected to be able to supply the necessary data on both pesticides and PCBs and metals by late 1977. The Working Group also confirmed that a considerable amount of data on metal concentrations in fish had been received from the United States Because the data related to many species of fish, most of which had been caught in 1971 and 1972, the Working Group was in some difficulties as to which data were most relevant to its needs. After some discussion it became clear that these United States data were only part of a compilation, which was expected to be made available to the 1977 Statutory Meeting. It was, therefore, agreed that no action should be taken pending receipt of this later report, at which time a decision could be taken, on appropriate advice, on what elements of the data were most comparable with the remainder of the North Atlantic Baseline Study. Although the data for the Western Atlantic could perhaps be regarded as being discrete enough to stand in their own right, the Working Group did not consider it desirable to separate them in this way.

Accordingly, it was agreed that selected U.S. data should be compiled with those submitted by Canada, Ireland and Portugal in the form of a supplement to the North Atlantic Baseline Study. This report should be prepared in time for a draft to be considered by the Working Group at its next meeting.

9.4 Proposals for Improvements to the Coordinated Monitoring Programme

9.4.1 At the 1976 meeting of the Working Group, it had been recognised that the procedures adopted for collecting data from national monitoring programmes were resulting in a somewhat scattered supply of data with some duplication of effort and, due to lack of consistency, some difficulty in comparing the data from place to place and year to year. A Sub-Group had thus been charged with drawing up proposals for improvements to the protocol for the Coordinated Monitoring Programme. This Sub-Group had worked by correspondence under the guidance of Dr Portmann, who introduced the proposals which had been agreed upon.

9.4.2 In considering these proposals, the Working Group accepted the proposition that, now that the baseline study was more or less complete, there was a need to establish whether or not pollutant levels were changing with time. However, the Working Group also felt that there was a need to continue to collect and compile data which would be relevant to the assessment of risks to human health. After some discussion, it was agreed that these two needs were not necessarily compatible and that different sampling systems may be required. It was also noted that, especially in relation to the needs of the Interim Paris Commission, greater emphasis would need to be placed on species collected in estuaries and coastal waters. The Working Group discussed in some detail certain proposals for the use of different species and a selective sampling and analysis regime, but concluded that for a variety for reasons the adoption of such a protocol was premature. Before reaching this conclusion, the Working Group was reminded that the Joint Monitoring Group of OSCOM and IPARCOM had specifically requested advice from ICES on which species and substrates should be used for monitoring particular pollutants and what sampling regime should be adopted. The Working Group concluded that this was a matter which would have to be considered by the ACMP, but that it could see no way of making the required proposals on a scientific basis. However, it was agreed that, should the ACMP wish to pursue this matter, several members of the Working Group would be prepared to assist in the work by elaborating on the reasons for the impracticability of such a protocol.

9.4.3 A basic difficulty in this respect is the lack of understanding of what factors are really important in affecting the variation and distribution of most pollutants in marine organisms. In this connection, the Working Group took note of a proposal by Dr Uthe (see Annex IV) which, if adopted, would reveal much of the required knowledge. This proposal would involve considerable extra effort in terms of sampling and analysis and also in collection of other data, e.g., on age, sex, etc. Accordingly, it was agreed that members would consider the proposal and, if possible, adopt it on a limited scale for a species and an area of interest to them with a view to exchanging the information gained at the next meeting of the Working Group.

9.4.4 The Working Group did, however, agree that certain changes to the methods of sampling and data submission were desirable and certain changes were adopted. (see Annex IV). These are designed to allow a continuity of sampling which will provide information relevant to the assessment of risks to human health and by ensuring more careful attention to repeat sampling provide a better possibility of detection of trends. Additionally countries are urged to pay more attention to sampling in inshore and coastal waters with a view to providing data of relevance to IPARCOM.

10. Dumping Ground Considerations

10.1 Selection Criteria

10.1.1 Although intended for the ACMP, the paper on the review of the GESAMP Report on the scientific criteria for the selection of dumping sites was introduced by the Council's Environment Officer with a view to obtaining constructive suggestions. The background of the paper was that at the meeting of the JMG, ICES had indicated that it was examining the GESAMP document and other relevant documents on the selection and monitoring of dumping sites and would make this information available to the JMG. This offer was accepted. In response to a portion of this request, the Environment Officer had prepared a summary of the major points in the GESAMP report along with an example of certain areas of biological sensitivity. Additionally, Dr Portmann had prepared a draft document on monitoring needs for dumping grounds, and the Chairman had responded to another JMG request in drawing conclusions on areas likely to be unsuitable for dumping based on 1972-1975 survey data.

10.1.2 The Group discussed the GESAMP review paper and made comments. Although several members of the Group welcomed the information on biologically sensitive areas, such as spawning grounds, given in part III of this paper, the Group as a whole felt that it should be deleted because it could be subject to misinterpretation and it was therefore agreed that instead reference should be made to the source and availability of this and similar information.

10.2 Monitoring Needs

Dr Portmann presented his draft on the monitoring needs for dumping grounds and some constructive comments were made by members of the Group.

10.3 Areas likely to be unsuitable based on 1972-1975 survey data

10.3.1 Dr Portmann also introduced a short draft paper on conclusions based on 1972-1975 survey data, which had been prepared by the Chairman, and suggestions were made and amendments proposed in relation to it.

10.3.2 The three above papers, along with suggestions and amendments, were accepted for passage to the ACMP.

11. Future Work Schedule and Deadlines

11.1 The Working Group was asked to study Dr Uthe's suggestion (Annex IV) regarding a sampling programme to investigate the statistical correlation between contamination level and age in a population for consideration at the next meeting.

11.2 The Chairman reminded the Working Group of the various activities which will be conducted by its sub-groups or former sub-groups, namely the possible future Symposium on Pollutants in Sediments which it was proposed that Dr Postma be asked to convene, the background report on existing baseline work in the measurement of trace metals in sea water, and the Symposium on the Feasibility of Effects Monitoring that Dr McIntyre has been asked to convene. In connection with the report on baseline work on trace metals, the Chairman reminded the Working Group that submissions of relevant information should be made to the Sub-Group Chairman, Dr D. Schmidt, by 31 December 1977.

11.3 The Working Group accepted Dr Topping's draft report on ICES experience in intercalibration using fish flour and oil and approved it for submission to the ACMP, on the understanding that various suggestions for additions and amendments would be incorporated. The Group accepted that it will not be able to see this report again before it is published.

11.4 With regard to the baseline survey, the Group agreed that a combination of appropriate selections of new baseline data from Portugal, the United States and possibly other sources should be utilised to prepare an extended baseline report. It was requested that data be available by the end of 1977. The Council's Environment Officer agreed to provide some assistance in the compilation of this report.

11.5 It was noted that the fish monitoring sub-group's proposals for improving the coordinated monitoring programme will need further work during the intersessional period and this was agreed to by the members of this sub-group.

11.6 In connection with the coordinated monitoring programme, the Group was reminded that the deadline for reporting data for the annual report had been brought forward by one month to 31 March of each year. In supplying such data, attention should be given to the inclusion of all relevant information concerning the specimens analysed.

11.7 The Working Group agreed that the draft report of this meeting should be forwarded to members of the ACMP before the final comments are received. Comments on the draft should be sent directly to the Council's Environment Officer, with a copy to the Chairman, no later than one month from the date of distribution.

11.8 In terms of the next meeting, it was decided that a meeting will probably need to be held in 1978 to consider, among other things, the 1977 coordinated monitoring report and any work resulting from D. Schmidt's Sub-Group. The Group felt that this should be held in Charlottenlund in mid-May.

12. Any other Business

Many members of the Working Group felt that it would be advantageous to change the name of the Working Group by removing the reference to geographical areas. This would, among other advantages, allow the participation of Baltic countries and encourage participation by countries from the ICNAF area and perhaps eventually facilitate the intercalibration programme. The Working Group thus recommended to the Council that its name be changed to "Working Group on Marine Pollution Baseline and Monitoring Studies" (see Recommendation 6).

13. Recommendations

The Working Group made a number of Recommendations which appear in Annex V.

14. Closure of Meeting

There being no further business, the Chairman closed the meeting at 12 o'clock, 27 May 1977 and thanked the members for their participation and assistance in the meeting. The Chairman also expressed his gratitude to the General Secretary and his staff for their assistance both prior to and during the meeting.

Action required by Members

1. All members to consider a proposal from Dr Uthe (Annex IV) for a sampling programme required to investigate the statistical correlation between contamination and age within a fish population (paragraphs 9.4.3 and 11.1).

2. Dr Portmann to amend the 1975 and 1976 coordinated monitoring reports for presentation to the ACMP (paragraphs 9.1 and 9.2.2).

3. The Environment Officer and Dr Portmann to complete tables of the Input Study, particularly summary tables and those relating to atmospheric input and dumping. The report to be revised in time for the ACMP meeting and final editing to be completed shortly thereafter. The report to be published as soon as possible after the 1976 Statutory Meeting in order that it may be presented to SACSA (paragraph 8.1.4).

4. The Chairman to inform Dr Postma of the recommendation to the Council that a Sediment Workshop be convened and to request Dr Postma to make proposals on its organisation and the invitation of participants (paragraph 7.5.3).

5. Members of the Sub-Group on Contaminant Levels in Sea Water to conduct their work as proposed at their meeting (paragraphs 7.2.8 and 7.3.1).

6. All members to provide reports on results of existing programmes to study the levels of trace metals in sea water to Dr D Schmidt no later than 31 December 1977 (paragraph 7.3.1).

7. Dr Topping, Dr Jones, Dr Bewers and possibly Dr Kremling to compile data on the levels of trace metals in sea water into a report to be presented at the next meeting (paragraph 7.3.1).

8. Dr Topping and Mr Holden to work on the 1978 intercalibration exercises, with funding being sought by the General Secretary from UNEP or other sources (paragraphs 7.2.4 and 7.2.5).

9. Dr Topping and Mr Holden to complete their report on prior intercalibration exercises with a view to publication by ICES this year (paragraphs 7.2.3 and 11.3).

10. Dr Jones and Dr Ólafsson to complete their reports on trace metal intercalibrations in sea water with a view to publication by ICES in due course (paragraph 7.2.10).

11. The Fish Monitoring Sub-Group to complete their proposals (paragraphs 9.4.2 and 11.5).

12. Dr Portmann to complete report of extended baseline study when data are available (paragraph 9.3).

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Annex II

## LIST OF PARTICIPANTS

| | |
|---|---|
| Ms M.C. Barros | Laboratorio de Fitofarmacologia, Quinta do Marquês, Oeiras, Portugal |
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Other Participants

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# A G E N D A

1. Chairman's Opening Remarks.
2. Composition of Membership.
3. Adoption of the Agenda
4. Appointment of Rapporteur.
5. Report of the 64th Statutory Meeting and Actions taken by ACMP at their two Meetings.
6. International Activities of Relevance to the Group - Brief Reports.
   1) OSCOM, IPARCOM and JMG.
   2) GIPME, IGOSS.
   3) UNEP (Open Ocean).
7. Sub-Group Activities
   1) Effects Sub-Group (C.M. Doc. 1976/E:44).
   2) Intercalibration Reports and Future Programmes.
   3) Sub-Group on Contaminant Levels in Sea Water.
   4) Petroleum Monitoring and Intercalibration.
   5) Sediment Working Group.
8. Input Data.
   1) Input Study Sub-Group Report.
   2) Atmospheric Input Monitoring.
9. Coordinated Monitoring.
   1) Consideration of 1975 Monitoring Report.
   2) Consideration of 1976 Monitoring Report.
   3) Consideration of Additions to the Baseline Study.
   4) Consideration of Fish Sub-Group Proposals for Improved Monitoring.
10. Dumping Ground Considerations.
    1) Selection Criteria.
    2) Monitoring Needs.
    3) Areas likely to be unsuitable based on 1972-75 Survey Data.
11. Future Work Schedule and Deadlines.
12. Any Other Business.
13. Recommendations
14. Closure of Meeting.

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Annex IV

## Canadian Proposal for a statistical monitoring study

RE: ICES Data and Future Analyses

I have summarized the analyses which I did on the ICES data as follows:

Computations for sample size, given that one uses only 6 year old fish:

1) For metallic contaminants:

(a) Worst standard deviation = 0.39025 ($As_m$ from Sydney)

(b) Sample size for 0.1 log change (=25.9% in original terms)=

$$(.39025)^2/(.1)^2 \times F_{1,N} = N$$

$$N \cong 65 \text{ for } P = .05$$

(c) Sample size for 0.05 log change (=12.2% in original terms)=

$$(.32025)^2/(.05)^2 \times F_{1,N} = N$$

$$N \cong 250 \text{ for } P = .05$$

2) For PCB contamination:

(a) Worst standard deviation = 0.18418 (PCB from PEI)

(b) Sample size for 0.1 log change (=25.9% in original terms)=

$$(.18418)^2/(.1)^2 \times F_{1,N} = N$$

$$N \cong 16 \text{ for } P = .05$$

(c) Sample size for 0.05 log change (=12.2% in original terms)=

$$(.18418)^2/(.05)^2 \times F_{1,N} = N$$

$$N \cong 55 \text{ for } p = .05$$

These sample sizes are estimates based on the standard deviations derived from the sample data provided. They were derived from $\log_{10}$ transformed data; the transformation is necessary to decorrelate means and variances in the various sample values.

However, this is not the most efficient way of sampling or analyzing the results to show levels of contamination in the various areas. The following approach is strongly recommended:

1) Sample size: N = 60 for all areas.

2) Sampling method: Selected samples, to take advantage of the Berkson case, in regression theory, i.e.,

   a. Divide maximum size range of individuals in catch by 12.
   b. Select at random from catch the first 5 individuals which fall in each of the 12 size ranges. This will probably result in considerable searching for the individuals at the tails of the size distribution, but is well worth the effort.
   c. Have all 60 individuals aged.
   d. Have contaminants measured in all 60 individuals.

e. Using standard multiple regression techniques, regress the log-transformed contamination values on log length, log weight and age.
f. Test for significance of the regression coefficients, remembering that a ZERO coefficient means that the animal has absorbed the contaminant at a rate which has approximated its growth or age.

g. There may not be any particular point in comparing areas; if there is, then analysis of multiple covariance can be done on the data. Between-sample-year comparisons would also be carried out using analysis of multiple covariance.

The rationale behind this approach is as follows:

1) If there is a significant relationship between contamination and age, then it is important to know what the relationship is; one cannot assume that any one age-class can be representative (i.e. 6-year-olds, as you used in the present data). On the other hand, if there is no relationship with age, i.e., the slope is not significantly different from zero, then there is absolutely no sense in bothering with aging the fish at all. This should save a considerable amount of work.

2) This also applies to the potential relationships of contamination with size, and condition. In fact, if it can be shown that there are no significant slopes of contamination on size, condition or age, then any 60 fish will do to get estimates for inter-area and inter-year comparisons. From the first year, revisions in sample size can be made using the technique above. However, if there is any significant change in contamination taking place, there should be a relationship showing up in age and size relationships within area and year-samples.

All-in-all, the use of selected samples with multiple regression analyses is the most efficient way of keeping sample sizes down, and showing up changes in contamination levels. The reference to Berkson is not important to anyone except another biometrician; it is a theoretical development allowing regression analysis to be used in cases where there is apparent error in all variables.

# RECOMMENDATIONS

Recommendation 1

The Working Group on Pollution Baseline and Monitoring Studies in the Oslo Commission and ICNAF Areas proposes to carry out a new intercalibration exercise for metals, organochlorine pesticides and PCBs in biological material during 1978 and, recognising the desirability of comparability of data produced by the ICES Working Groups of pollution studies in the Baltic and North Atlantic, recommends that the ACMP should encourage laboratories in countries bordering the Baltic to participate in the 1978 programme.

Recommendation 2

The Working Group notes the proposals of its Sub-Group on Contaminant Levels in Sea Water for the 4th and 5th stages of its metal intercalibration exercise and recommends that these proposals should be adopted and carried forward as soon as practicable. Participation by countries bordering the Baltic is encouraged.

Recommendation 3

Bearing in mind the substantial cost anticipated in the preparation and distribution of intercalibration samples for up to about 100 participants, the Working Group recommends that the ACMP should discuss the problem of financial recompense to those undertaking the task with a view to the possibility of some recovery of certain costs.

Recommendation 4

The Working Group, having thoroughly discussed the question of sediment and pollutant interchange in shallow seas and the difficulties of interpreting data from such studies, recommends that a Symposium be held with Dr Postma invited to act as Convenor. This Symposium should be restricted to invited participants who are directly involved with such studies, either at a practical level or in the planning and interpretation of the data.

Recommendation 5

The Working Group supports and further recommends the proposal of the ad hoc Group of Specialists in the Field of Pollution in Sediments that a pilot survey be inaugurated in selected offshore areas to study the process of pollutant accumulation in relation to sedimentation processes. Furthermore, a study should also be inaugurated in an offshore location to examine pollutant levels associated with suspended material and their relation to both bottom sediments and dissolved constituents of the overlying water column.

Recommendation 6

The Working Group recommends that its title be changed to "Working Group on Marine Pollution Baseline and Monitoring Studies".

Recommendation 7

The Working Group recommends that the results of the input study be published as a Cooperative Research Report as soon as possible after the next Statutory Meeting and, although it would prefer the inclusion of the data from France, the publication of the report should not be held up on this account.

Recommendation 8

The Working Group recommends that the report on the series of intercalibration exercises on the analyses of metals, organochlorine pesticides and PCBs in biological material be published as a Cooperative Research Report.

Recommendation 9

The Working Group recommends that the reports on the series of intercalibration exercises on the analyses of trace metals in sea water, including that for mercury, be published as a Cooperative Research Report.

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Annex VI

Procedures for Coordinated Monitoring as agreed at 1977 Meeting of the Working Group on Pollution Baseline and Monitoring Studies in the Oslo Commission and ICNAF Areas

1. Samples of interest, in a coordinated monitoring sense, are those taken from the different sectors of the Irish Sea, the German and Southern Bights of the North Sea, certain estuaries of these seas which are recognised as being subject to substantial pollutant loads, e.g., Thames, Forth, Rhine and Schelde; the Skagerrak and Oslofjord, and additionally from the Western Atlantic certain parts of the Gulf of St Lawrence and New York Bight.

2. Species of particular interest, since these will provide data relevant to assessment of risks to human health and continuity with the baseline surveys,are : cod or hake, herring or pilchard, plaice or sole and mussels, although it is not expected that all these species will be available in all areas.

3. Additionally, bearing in mind the need to establish trends and extended coverage of inshore regions, countries are urged to include flounder wherever practicable and any other species which is commercially exploited, provided it can be reliably sampled from year to year.

4. All samples should, whenever possible, be collected in a manner which is similar to that used in previous years for the particular species and sampling site. No set limits are established as these will obviously have to vary from site to site, but attention should in particular be paid to the physiological condition of the organism sampled.

5. Fish samples should be collected ungutted and be preserved (deep frozen) as soon as practicable after collection.

6. Mussel or other filter-feeding shellfish should be held in clean (filtered) sea water for 12-24 hours to allow discharge of adventitious silt material as pseudo-faeces.

7. Pollutants of interest include, but are not restricted to, mercury, lead, cadmium, copper, zinc, arsenic and selenium, HCB, PCBs and organochlorine pesticides including mirex.

8. All analyses to be reported on a wet weight basis as a minimum, but preferably also on a dry weight basis. HCB,pesticides and PCBs should also be reported on a fat weight basis or as a minimum be accompanied by a fat weight determination result.

9. Dry weight determination should be carried out by air-drying at 105°C or by freeze-drying of a sub-sample of the material analysed for the pollutants.

10. Fat weight should be determined on a sub-sample of the extract used for pesticide and PCB analyses.

11. Pollutant analyses should be carried out if at all practicable on individual fish,a sample of which should consist of at least 10 individuals.

12. A mussel sample should consist of at least 50*) individuals.

13. In all cases full results of all analyses performed should be provided, i.e. individual data and means and standard deviations should be provided together with full details of source, date and method of collection and preservation, date of analysis, etc. In the case of PCB data, the formulation used for quantification should be stated and typical chromatograms of standards and samples should be provided.

14. Laboratories submitting analytical data should have successfully taken part in a recent ICES intercalibration exercise and should provide details of which exercise at the time of submission of results.

15. All data to be reported to the coordinator not later than 31 March of the calendar year following that in which the samples were collected.

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*) NOTE: It was originally suggested that this should be the same number as in the Goldberg Mussel Watch. That number is believed to be under review and could not be confirmed. 50 is the number used in the 1969 North Sea Study and that adopted to date by most participants in the Coordinated Monitoring. This will be reviewed again at the 1978 meeting.