REPORT OF THE ADVISORY COMMITTEE ON MARINE POLLUTION

1974

Members of the Advisory Committee 1973/74

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1. INTRODUCTION

- 1.1 The Advisory Committee on Marine Pollution held its second meeting at Charlottenlund, 10-11 January 1974, with Mr A J Lee in the chair. All members, except the Chairman of the Anadromous and Catadromous Fish Committee, were present. The General Secretary acted as Rapporteur.
- 1.2 The Committee's terms of reference are as follows (Rule 26^A of the Council's Rules of Procedure):-

"The Advisory Committee on Marine Pollution shall be responsible for providing scientific information and advice on marine pollution and its effects on living resources and their exploitation to Member Governments and any intergovernmental body for the control of pollution which may request such advice. The Committee shall consist of the Chairman of the Consultative Committee, who shall be Chairman, and the Chairmen of such other Committees of the Council as the Council may nominate, together with such other members as may be coopted for the purpose".

- 1.3 The Committee first considered its working procedures and decided to produce annually a report, summarizing the advice which had become available through the Council's activities in a form suitable for submission to member countries and to cooperating international organisations. This is the first of such reports.
- 2. <u>STUDY OF POLLUTION OF THE NORTH SEA AND ITS EFFECTS ON LIVING RESOURCES</u> AND THEIR EXPLOITATION
- 2.1 A Working Group to carry out this study was established by the Council in 1971. Its first Report is published as ICES Cooperative Research Report, No.39, to which reference should be made for full details of the findings so far.
- 2.2 The Group has endeavoured to assess the input of various pollutants to the North Sea through domestic sewage disposal and industrial discharges, both directly and by rivers, estuaries and fjords, by dumping and by atmospheric deposition. Data on these inputs have been derived by means of a Questionnaire sent to member countries of the Council, and a summary of the totals are obtained from the replies given in Table 1^{*}. Detailed breakdowns of these inputs by stretches of coastline are given in Cooperative Research Report, No.39.

^{*)} This Table is identical with Table 5, Section 2 of Cooperative Research Report, No.39.

- 2.3 While information on the total inputs of sewage is far more complete than any information previously available, the data on its pollution content are still too few. It has been necessary to assume that the loads of certain pollutants in sewage discharged to the sea around the North Sea as a whole is the same as that found in the few samples analysed from particular areas. Similarly, the data on industrial waste discharges are incomplete, and in some countries are difficult to obtain on the grounds that to publish them would be to breach confidentiality. The data on dumping from ships in the North Sea are probably accurate as far as activities in 1971/72 are concerned, but it is considered that the magnitude of past activities is not properly known.
- 2.4 Table 1 (p.3) shows that atmospheric deposition may be an important source of pollutants, but it must be borne in mind that the data are of a preliminary nature and based on a few observation points and need to be verified, particularly over the entire North Sea area. Comparison of the magnitude of this input with those from other sources should therefore be made with caution, particularly in view of the inaccuracies in the latter. It should also be noted that atmospheric pollution is in certain cases largely of industrial origin and hence that industry is contributing through an indirect route to the input of various substances to the North Sea.
- 2.5 The study has included a Base-Line Study of Fish and Shellfish. This was carried out largely in 1972 and was concerned with organochlorine pesticide residues, PCBs, and certain metals. Cod, plaice, herring, shrimp and mussels of specified age or size, were sampled over the whole North Sea and analysed.^{*} The results of the analyses in different laboratories were made comparable by means of an intercalibration exercise and they show that the level of metals, such as mercury, copper, zinc, cadmium and lead, as well as those of organochlorine pesticide residues and PCBs, in the species and areas investigated were below the lowest levels established by certain countries as standards for human consumption. Levels were generally higher in the coastal areas than in the open sea.
- 2.6 Surveys of "dissolved" trace metals in sea water have been carried out. There are still difficulties with regard to the analytical techniques employed, but the results show clearly that levels of "dissolved" copper, nickel, zinc, manganese and cadmium are on the whole much higher in the coastal zones, particularly in the region of river estuaries, than in the open sea. North of the Dogger Bank the values in the central areas away from the coasts are similar to those found in the North Atlantic Ocean, and even in the Southern Bight levels in the central area are close to those found in the open ocean.

*) Only the muscle of the fish was sampled.

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Pollutant	Source			Atmosphere	
(Tonnes/year)	Domestic	Industry	Dumping	(prel. data)	
BOD	546 $\times 10^3$	459 x 10^3	?	?	
COD	882 x 10 ³	?	?	?	
Nitrogen	199×10^3	219*	?	?	
PO ₄ Phosphorus	36×10^3	73*	?	?	
Organochlorine Pesticides	0.66	?	?	?	
PCBs	6.56	?	?	?	
Zinc	25.4×10^3	15.4×10^{3} *	?	$100 \times 10^{3**}$	
Copper	3.9×10^3	$1.84 \times 10^{3*}$?	13 x 10 ³	
Manganese	61.4×10^3	?	?	6×10^3	
Lead	?	$3.16 \times 10^{3*}$?	15 x 10 ³	
Mercury	22	119*	?	?	
Cadmium	?	112*	?	2.3×10^2	
Iron	?	176 x 10 ^{3*}	$75 \ge 10^{3}$ +	150 x 10 ³	
Acids	-	493 x 10 ^{3*}	225 x 10 ³	?	
Volume of discharge/rainfall (m ³ /year)	2 680 x 10 ⁶	1 795 x 10 ^{6*}	?	46 000 x 10 ⁷	

Table 1. Summary of the input data from the North Sea Pollution Study Report (Coop.Res.Rep., No.39).

* Data very incomplete.

+ Titanium dioxide waste only and assumes 10% acid and 10% FeSO₄.

** There is considerable doubt about the validity of this figure.

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- 2.7 To date the Study has concentrated on obtaining a snapshot of present conditions in the water and in fish and has been concerned with the immediate problem of the hazard to human health from fish and shellfish consumption. Other pollution problems have not yet been tackled and there is now a need for the Working Group concerned to turn its attention to the promotion of studies designed to establish the extent to which the inputs of organochlorine pesticide residues, PCBs and trace metals and their existing levels in the marine environment are a hazard to the well-being of the fish stocks of the North Sea, to plankton production and to the marine ecosystem in general.
 - 2.8 There is a need to improve even further the information on the input of pollutants from all sources and it is hoped that bodies like the Oslo Commission can assist in this direction. Further work on the atmospheric pathway is urgently required. Analytical techniques have to be improved as quickly as possible, and base-line surveys for other chemical compounds, which may pose a hazard, need to be initiated; these compounds include organochlorine solvents, polynuclear aromatic hydrocarbons, polychlorinated terphenyls, and wastes from the petrochemical and petroleum cracking industries.
 - 2.9 The results of current national programmes of work on the distribution of metals etc. in the sea-bed sediments need to be coordinated and evaluated, and studies are required which aim at giving a better knowledge of current systems, the water budget and flushing time of the North Sea, and the processes which take place at the mouth of estuaries and fjords and hence determine the rates at which pollutants from freshwater sources are introduced to the North Sea proper.
- 2.10 Finally, the development of the North Sea oil production industry over the last few years has increased the risk of serious oil pollution, and the possible effects of this on living resources need to be investigated. Initial studies have been started in Norway and the UK within the framework of the ICES Study of Pollution of the North Sea, but increased research facilities in other countries are required if this work is to proceed at a reasonable pace. The Committee was informed that GESAMP*is in the process of establishing a Working Group on the impact of oil on the marine environment, and it looks forward to a close cooperation with that Working Group.

^{*)} GESAMP = Group of Experts on Scientific Aspects of Marine Pollution.

3. EXTENSION OF ICES NORTH SEA BASE-LINE STUDY TO COVER THE WHOLE OF THE NORTH-EAST ATLANTIC (THE OSLO CONVENTION AREA)

- 3.1 At its first meeting the Committee noted that the Monitoring Group of the Preparatory Committee for the Oslo Commission had suggested that a base-line study would be required for the whole of the Commission's area. The Advisory Committee considered that the North Sea Base-Line Study would probably answer these requirements for the North Sea section of the area, but that it would need to be extended to completely satisfy the Commission's requirements. The Council had accordingly charged an <u>ad hoc</u> Meeting of Analysts and Biologists with the task of drawing up proposals for an extension to the Base-Line Study.
- 3.2 The ad hoc Meeting noted, from summaries presented by the Chairman of the Monitoring Group of the Preparatory Committee of the Oslo Commission (Mr G Berge) and the General Secretary, the need for ICES to conduct a base-line study covering the NEAFC* area as a basis for monitoring. After an extensive discussion of the factors which would have to be taken into consideration in the planning of such a programme, agreement was reached on the following proposal: Cod (or hake when cod is not available, i.e. in the south) should be sampled from a number of positions in the NEAFC area, and the sampling should be divided between all countries present, in an attempt to get full coverage in all areas. Additional species (hake, sole, plaice, flounder, pilchard, and capelin) would be sampled in a few of these areas by some of the laboratories to provide overlap coverage, and to assess levels in both pelagic and demersal feeding fish. The Meeting then drew up details of the sampling areas, sizes of samples, year class requirements, etc. ** During the discussion of individual parameters, the Meeting was informed by one of the Swedish participants that the programme could benefit by the inclusion of polychlorinated terphenyls, and that standards synthesized by his laboratory for individual PCB component analysis were freely available for use by others in the Working Group. The Meeting accepted with appreciation this generous offer.

*) NEAFC = North-East Atlantic Fisheries Commission.

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^{**)} These details are given in Council Doc. C.M.1974/E:3, which will be presented to the relevant Committees of the Council at its Statutory Meeting in 1974.

- 3.3 The proposals made by the <u>ad hoc</u> Meeting^{*}were considered at the Advisory Committee's second meeting, and the Committee noted that the proposals satisfied the first requirement of the Monitoring Group of the Preparatory Committee for the Oslo Commission, namely human health aspects, and that they went some way towards answering the problem of risks to marine resources. The proposals had taken account of the findings of the North Sea Base-Line Study in relation to problems of interpretation of results of analyses of shellfish and herring, but since cod had been selected as the main species to be analysed, continuity to the whole programme had been maintained.
- 3.4 The Advisory Committee endorsed the intention to extend the list of pollutant materials to be analysed, and the number of species selected for analysis in addition to cod and hake: although amended in comparison to the North Sea Base-Line Study it still included demersal and pelagic fish. It was further noted that a draft agreement had been made in respect of national responsibilities to be taken for the collection analysis of fish samples from the different sea areas.
- 3.5 The Advisory Committee endorsed the draft proposals but considered that in view of the large scale of the proposed operation it was not empowered to authorise their implementation. It therefore recommended that they should be brought before the Council for decision at the next Statutory Meeting, with the recommendation that the Council should start the proposed extension of the Base-Line Study in 1975. The Committee noted that some countries which had not been involved in the planning of the Study had interests in the area in question and recommended that they be urged to take part in the survey and any necessary intercalibration exercise which might accompany it.

4. <u>PLANS FOR MONITORING THE LEVEL OF TOXIC SUBSTANCES IN FISH AND</u> SHELLFISH, SEA WATER AND SEDIMENTS IN THE NORTH SEA

4.1 At its 61st Statutory Meeting ICES decided to call an <u>ad hoc</u> Meeting of Analysts to coordinate and suggest possible extensions to national programmes of monitoring in the North Sea, using the Base-Line Study data as a basis for its recommendations and also taking into account any available information on variations in residue concentrations

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^{*)} This Report is available in full as Annex 6 to Council Doc. C.M.1974/E:3.

with age, season, etc. The meeting should report the results of its discussions to the Working Group on the Study of Pollution of the North Sea and to the Advisory Committee on Marine Pollution (Council Resolution C.Res.1973/2:15).

- 4.2 The meeting was held at Charlottenlund, 10-12 December 1973, with Dr J E Portmann as Convenor. Representatives from each of the countries bordering the North Sea gave brief summaries of their national monitoring programmes for heavy metals, organochlorine pesticides, PCBs, oil and other pollutants. It became clear that the number of programmes was such that it would not be possible in the time available to the meeting to recommend effective coordination of them. It was also clear that the great majority of the programmes for 1974 were already in such advanced stages of preparation that the national authorities would not be prepared to undertake more than minor changes in them for that year.
- 4.3 The meeting therefore concentrated on collecting as detailed and complete information as possible on the past, present and planned environmental programmes and surveys. At the time of the second meeting of the Advisory Committee on Marine Pollution such information had been presented and tabulated from Belgium, Denmark, Federal Republic of Germany, Netherlands, Norway, Portugal (not in the North Sea), Sweden and the United Kingdom, in all about 90 projects. Some additional information (for instance from France) was expected.*
- 4.4 It appeared from the tabulations as available for the meeting that there is good coverage, as far as monitoring of the level of content of heavy metals in fish, shrimps and mussels are concerned, of the coastal waters of the North Sea as well as of the Norwegian and Swedish coasts of Skagerak and Kattegat. The content of organochlorine pesticides and PCBs in fish and shellfish is also extensively monitored in these waters, but a greater frequency of such observations in the German Bight may be desirable.
- 4.5 Petroleum hydrocarbons are monitored in sea water by Norway, Portugal (not in the North Sea), Sweden and the United Kingdom. Norway is surveying petroleum hydrocarbons in sediments, and the United Kingdom those in plankton, fish, benthos and sediments.
- 4.6 Metals and organochlorines in sea water are, or will be, surveyed in Belgian and Dutch coastal waters, in the German Bight and in the southern North Sea and British coastal waters, and also in Norwegian fjords, Skagerak and Kattegat, as well as in Portuguese waters.
- *) Information updated and tabulated as per 1 April 1974 is presented as Annex 5 to Council Doc. C.M.1974/E:3.

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- 4.7 Metals in sediments are investigated by Belgium (coastal waters), Norway (fjords) and Sweden (Skagerak and Kattegat); organochlorine residues in sediments by Belgium (coastal waters), Norway (fjords) and Portugal (coastal waters).
- 4.8 The Working Group on the Study of Pollution of the North Sea which met at Charlottenlund on 8-9 January 1974 took note of this information, and recognized that adjustments of the national programmes for 1974 would not be possible. In order that ICES should be in the position to coordinate the work in future years, and also in order that it should receive the necessary information for rendering advice to the Oslo Commission, it was recommended that the results of all monitoring exercises and surveys carried out in the North Sea in 1974 should be reported to the Secretariat of ICES as soon as possible after the end of the reporting year. The members agreed that most of the data would be available by 1 July 1975, at which time the ICES Secretariat would presumably be in possession of the necessary professional staff to compile and preliminarily evaluate the data for consideration by the relevant Council Committees.
- 4.9 The Advisory Committee took note of this recommendation, and endorsed it. It agreed with the Working Group that continued monitoring of toxic substances in fish and shellfish, and in some parts of the marine ecosystem is required, and also that it is important to keep the efforts and resources deployed on this activity in balance with those required for programmes of fundamental research. It is therefore necessary that appropriate national programmes are coordinated as soon as possible and that attempts are made at rationalisation in order to close gaps which exist and avoid unnecessary overlapping.
- 4.10 In the discussions concerning this item, the Advisory Committee agreed that it is too early to assess the effects of the level of contaminants in the environment on the different organisms. However, if they have an effect, it is probably mainly through the level of these substances in the organism. It is therefore justified to give priority to this part of the monitoring programme. It was noted that this is in agreement with the monitoring requests of the Preparatory Committee for the Oslo Commission. It was also agreed that a base-line study is necessary to prerequisite for monitoring. While monitoring at the level of trace substances in fish and shellfish in the North Sea area, and mainly in its coastal areas, can be undertaken on the basis of the recently completed Base-Line Study, consideration of a monitoring scheme for the remainder of the Oslo Convention area should await the results of the extended Base-Line Study.

- 4.11 It was agreed that it is important that the results of all current and planned monitoring in the North Sea are reported to the Council as soon as possible, as recommended by the Working Group on the Study of Pollution of the North Sea, but it was also considered necessary that preparations should be made without delay for designing a plan for joint international monitoring in the North Sea area. A sub-group undertook to prepare a draft of a plan that would meet the requirements of the Monitoring Group of the Preparatory Committee for the Oslo Commission and be based on the results of the Base-Line Study, but would keep in mind the national activities reported. The plan should be available for discussion by the Fisheries Improvement Committee and the Advisory Committee on Marine Pollution during the 62nd Statutory Meeting of ICES.
- 4.12 It was further agreed that the results of the studies and surveys of "dissolved" metals and pesticides in sea water are not yet sufficient for starting routine monitoring exercises. A bigger research effort is needed, both as to methodology and as to the factors influencing the variability in time and space of these contaminants in the North Sea, before the need for a monitoring programme can be assessed and a suitable scheme can be designed. It was therefore strongly recommended that the current investigations should be intensified and extended and that they should be effectively coordinated to ensure better comparability between results from different laboratories.
- 4.13 In this connection it was also agreed that experimental work on the uptake and effects of metals, organochlorines and PCBs in relation to primary production is urgently needed.
- 4.14 There was a discussion on the feasibility of designing a monitoring programme for primary production parameters, especially the relation of primary production to units of chlorophyll. Such parameters may serve as an indicator of environmental quality. The Committee agreed, however, that before it could take steps to design such a monitoring programme, it would need more information about the intended methods and about studies carried out to date. It was requested that the Plankton Committee should place this item on its Agenda for the next Statutory Meeting, and the Chairman of the Plankton Committee agreed to do so. The Advisory Committee will revert to this item when the Report of the Plankton Committee is available.
- 4.15 It was noted that investigations on the contents of heavy metals, pesticides and other contaminants in sediments are being undertaken. Few results are available so far and the Advisory Committee recommended that, as a first step, the Working Group on the Study of Pollution of the

North Sea should be asked to convene an <u>ad hoc</u> meeting of the scientists working in this field in order to have a discussion on methods, comparability of results and identification of gaps in the studies. In this connection attention was drawn to the need for a sedimentation chart of the North Sea.

5. PROGRESS IN THE STUDY OF POLLUTION OF THE BALTIC

- 5.1 The ICES/SCOR Working Group on the Study of Pollution of the Baltic was established jointly by ICES and SCOR^{*} in 1971/72, following the recommendation of an <u>ad hoc</u> ICES/SCOR meeting in Helsinki, 24-25 September 1971. The Working Group met in Lund 3-5 May 1972 (Report Doc. C.M.1972/E:10), and in Kiel, 28-30 June 1973 (Report Doc. C.M.1973/E:7). In addition, an <u>ad hoc</u> meeting was held in Copenhagen, 30 September 1972.
- 5.2 The Working Group has devoted itself to the following primary tasks: input study, inventory of sampling and analytical methods and capacities in the Baltic countries, base-line study, and formulation of a research programme, with the intent to cover gaps in the Baltic research as regards the pollution problem.
- 5.3 Input study: A Questionnaire has been circulated asking for information on inputs of domestic and industrial wastes, toxic substances, dumping activities, atmospheric fallout, and on inputs from other possible sources. In particular, information on discharged flow, amount of nutrients, and sewage treatment was asked for. Answers from five countries have so far been received "* Although the final report on the study has not yet been compiled, some comments can be made at this stage. The answers are lacking in completeness as far as nutrients and industrial inputs are concerned. The problem related to the input via rivers is evident: we do not know how much of the river material reaches the open Baltic, and by what As regards the atmospheric fallout there is also a severe gap in means. our information. It seems important to stress the necessity of further work, both surveying and basic research, as far as the input of possible pollutants is concerned.

SCOR = Scientific Committee on Oceanic Research (of the International Council of Scientific Unions)

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By 14 May 1974, answers from all countries bordering the Baltic were available.

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5.4

Sampling and analytical capacities of laboratories in the Baltic countries have also been surveyed by a Questionnaire. The compilation of answers from 27 laboratories is encouraging in that the laboratories together can cover the need for analyses of the different compounds which can be considered important for the immediate future work. The great variety of methods used necessitate, however, a closer examination of standards and techniques in order to prepare for a successful baseline study. This is being achieved by

- i) sending two chemists, one for heavy metals and one for organic substances, on a round-trip to laboratories with the aim of obtaining direct information about the procedures used;
- ii) holding a meeting of Analysts at Charlottenlund, 26-28
 February 1974. This meeting will lead to the formulation of a proposal regarding the analytical methods for potential pollutants to be used during the base-line study;
- iii) arranging an International Workshop on Methods for Analyses of Potential Pollutants in Sea Water, Marine Organisms, and Sediments.
- 5.5 <u>Base-line study:</u> The Working Group decided that this should be organised along the same lines as the study carried out by the North Sea Working Group. A number of heavy metals and organic compounds should be analysed in cod, herring, flounder and mussels. In view of the preparations needed for the analysis of the samples the intention is to carry out the sampling in the last quarter of 1974.
- 5.6 The formulation of a research programme was carried out by an <u>ad hoc</u> Group. The report of that Group was discussed very comprehensively at the Kiel meeting and was considerably amended. The Council has decided that the amended version should be published as No.42 in its Cooperative Research Reports series. A number of specific research tasks are proposed in the report, and it is the intention now to proceed with detailed planning of some of these tasks, namely:

^{*)} The Workshop was planned to be held in Kiel in September 1974, but it has been necessary to postpone it to a later year.

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- i) an open sea experiment aimed at an understanding of physical processes, in particular the vertical transport processes;
- ii) a study of the Baltic circulation, comprising both modelling and observational efforts. In connection with this problem a Special Meeting on the Modelling of Water Circulation in the Baltic will be held on 26-27 September, 1974 at Charlottenlund.
- iii) the establishment of open sea multidisciplinary continuous stations aimed at improving our understanding of the chemical and biological processes occurring in the Baltic.

It is felt that these tasks are of such a character that they can only be implemented through international cooperative efforts. The aim is to carry out the observational studies jointly as an International Baltic Pollution Study.

6. VARIOUS MATTERS CONSIDERED BY THE ADVISORY COMMITTEE

- 6.1 The Advisory Committee recognized that one of its future tasks should be to produce periodical reports on "The Health of the Ocean" in its area of interest. It was not yet in a position to start preparations for a full report, which in due time should preferably be compiled in a similar way as the "Survey of Fish Resources in the North-East Atlantic" (Coop.Res.Rep., No.37), but it noted with appreciation that a draft chapter on "dissolved" metals in sea water may become available in the near future, and that this might include information from U.S.A. and Canadian waters.
- 6.2 The Committee was informed about problems that had arisen in one member country from the disposal of waste from asbestos manufacture near mussel banks. Fibres remain in the mussel tissues even after they have been kept in cleaning tanks and render the mussels unsaleable. The Committee agreed that it needs more information about this problem before it can give any advice, and the Chairman of the Fisheries Improvement Committee agreed to place this item on his agenda for the next Statutory Meeting.
- 6.3 The Committee recalled Council Resolution C.Res.1973/4:6 which reads as follows:

"It was decided, that:

- a) all member countries be asked to provide scientific information on the disposal of "Red Mud" from bauxite production and the disposal of wastes from titanium dioxide production, and on the problems arising in connection with such disposal to the next Statutory Meeting, and
- b) after that Statutory Meeting all available information be collected and summarised by appointed Rapporteurs, for the consideration of the Advisory Committee on Marine Pollution."

It was noted that the Chairman of the Fisheries Improvement Committee will ask a Rapporteur (or Rapporteurs) to review the relevant literature before the next Statutory Meeting and present a statement to that meeting. After the meeting the documentation, resulting from the Council Resolution and the discussions in the Committee will be summarised for further consideration by the Advisory Committee on Marine Pollution.

- 6.4 The Committee noted two papers by Dr J E Portmann on the selection of dumping sites. These had been presented to the last Statutory Meeting. The Committee was informed that they will also be considered by the GESAMP Group on Criteria for Selection of Dumping Sites, and it expressed the hope that it would receive the report of that Group in due course, so that it would be in a position to take into consideration the views of GESAMP.
- 6.5 It was further agreed that at the future mid-year meetings of the Advisory Committee on Marine Pollution the Chairman of each Subject-Committee represented will draw the attention of the Committee to those papers which have been presented to their various Committees and which they consider to be of importance for the Advisory Committee's work.

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