

UK National Marine Monitoring Programme

Green Book

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Amendments Record

The Green Book	Version	Date
Section		
Main Text	7	10 November 2003
Tables 1 - 6	8	10 November 2003
Figures 1 - 5	1	23 April 2001
Appendices 1 - 11	8	10 November 2003

**MARINE POLLUTION MONITORING AND MANAGEMENT GROUP (MPMMG)
UK NATIONAL MARINE MONITORING PROGRAMME (NMMP2)**

THE GREEN BOOK

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Marine Pollution Monitoring and Management Group (MPMMG) UK National Marine Monitoring Programme (NMMP2)

1. Background

In 1987/88 the Marine Pollution Monitoring Management Group (MPMMG) reviewed the monitoring carried out in UK estuaries and coastal waters (Ref. 1) and concluded that there would be considerable merit in the regular sampling of a network of coastal monitoring stations. This network was to include offshore stations as reference stations, as recommended by the Oslo and Paris Commissions (now replaced by the OSPAR Commission) at the North Sea Task Force meeting in 1989.

In its formal response to the MPMMG review (Ref. 2), the Government accepted the need for a minimum core programme of marine monitoring to national standards for all UK waters. It was agreed that there should be a network of sampling sites around the UK coast comprising estuarine, intermediate and offshore localities. Monitoring would be the responsibility of the statutory marine monitoring authorities. The programme was not intended to be a substitute for more intensive local monitoring programmes. The initial phase of this National Monitoring Programme (NMP) was primarily aimed at producing a co-ordinated and reliable data set on nationally significant contaminants and biological effects in inshore and coastal waters.

In November 1998, the Minister for the Environment reaffirmed the need for marine environmental monitoring to protect our seas but also to ascertain whether regulatory measures to reduce inputs of dangerous substances to our seas are effective. The knowledge gained may be used in the future to ensure that we use marine resources in a sustainable manner.

The main drivers for the NMMP2 are:

- **to meet temporal trend monitoring requirements of the OSPAR international agreement:**

The OSPAR Convention aims to protect the marine environment of the North East Atlantic. Under the OSPAR Convention, contracting parties are required to take all possible action to prevent and eliminate pollution of the North East Atlantic. Parties also contract to monitor the marine environment under the OSPAR Joint Assessment and Monitoring Programme (JAMP) and the Nutrients Monitoring Programme. Many aspects of the NMMP2 are designed to contribute to the UK's monitoring requirements under OSPAR (such as temporal trend monitoring for contaminants in sediments and biota).

- **for compliance with EC Directives:**

Water quality monitoring for metals and organic compounds is done to meet some of the requirements of the EC Dangerous Substances Directive (76/464/EEC) in marine sites (National Network Points). In addition, shellfish are analysed for metals and organic compounds to meet some of the requirements of the Dangerous Substances Directive, the Shellfish Waters Directive (79/923/EEC), the Shellfish Hygiene Directive (91/492/EEC) and as amended by 97 (68), and the Fisheries Products Directive (91/493/EEC).

- **to meet research and development needs**

Research and development needs may be driven by OSPAR or nationally. New substances or biological effects measurements are not generally added to the temporal trend monitoring programme until a spatial survey which highlights further monitoring requirements has been

completed. A number of research and development spatial surveys for new determinands and biological effects is included in NMMP2. These requirements are revised annually.

- **for local monitoring**

There are occasions when local marine environmental monitoring undertaken by one or more NMMP2 organisations becomes of national interest, as in a major oil spill. In addition, where monitoring identifies a particular problem in one or more areas, more intense monitoring may be required. Where locally gathered data meet the quality control data requirements for NMMP2, they may be included on the NMMP2 database.

2. Aims of the National Marine Monitoring Programme:

The general aims of the programme are:

- To initiate monitoring programmes to detect, with appropriate accuracy, long-term trends in physical, biological and chemical variables at selected estuarine and coastal sites.
- To support and ensure consistent standards in national and international monitoring programmes for marine environmental quality (for example: EC Directives, OSPAR).
- To make recommendations to MPMMG as to how new analyses and techniques are best implemented in the United Kingdom.
- To co-ordinate, make optimum use of, and gain maximum information from marine monitoring in the United Kingdom.
- To provide and maintain a high quality dataset for key chemical and biological variables in the marine environment of the United Kingdom.
- To produce reports providing overviews of the spatial and temporal distributions of these variables and their inter-relationships.

The first phase of spatial surveys (NMP) revealed the pattern of marine quality around the UK. The second phase (NMMP2) starts on the detection of long term temporal trends. It is expected that the programme will be reviewed annually and that temporal trends will be reported formally every 3 years from 2002 onwards.

3. NMP Phase 1: the Spatial Survey

Phase 1 of the NMP was largely executed over the period 1993-95 through the spatial survey. This was detailed in 'The Plan' (Ref. 3) In addition, further information gaps were dealt with in 1996-1998. The objectives for the spatial survey were:

- a) To permit a statistical comparison of the concentration of contaminants between sites (spatial distribution), highlighting areas with high concentrations of contaminants that are of concern and merit a trend survey;
- b) To estimate the variability, arising from natural variations of the determinands and from the methods of sampling and analysis, inherent in the recorded data in those areas whose concentrations of contaminants cause concern;
- c) To enable comparison of biological effects between the different areas.

To assist in meeting these objectives a central computerised database for contaminants in all media and for biological effects in the UK marine environment was established in 1996. It is now located at the National Centre for Environmental Data and Surveillance of the Environment Agency, in Bath.

The phase 1 objectives were largely achieved and were reported in the 'Survey of the Quality of UK Coastal Waters' (Ref. 4).

4. National Marine Monitoring Programme Phase 2 (NMMP2)

The data from the spatial survey have been analysed. 1999 marks the introduction of the second phase of the programme, concentrating on temporal trend monitoring in line with the initial objectives and the introduction of new biological effects studies. From the results of the spatial survey, specific areas have been identified for long-term monitoring and new objectives for the second phase have been established. Phase 2 is to be known as the National Marine Monitoring Programme 2 (NMMP2).

Phase 2 of the programme is integrated where possible with other monitoring programmes such as EC directives. These programmes have been included where it is prudent to integrate with NMMP2 but do not represent all EC Directive compliance monitoring in the marine environment.

As many of the objectives of NMMP2 will be achieved over a long time-scale, the programme will be reviewed annually. To assist in this, this document and its dependants will be operated as a controlled document operated by Fisheries Research Services, Marine Laboratory Aberdeen (SERAD).

5. Strategy

The NMMP2 seeks to integrate national and international monitoring programmes across UK agencies. It does not represent all the marine monitoring programmes being implemented by these agencies but it complements existing programmes. The NMMP2 seeks to ensure consistent standards, comparability of measurements and data exchange. Phase 1 of the programme focussed on known impacted estuaries, with some offshore monitoring. During phase 2, some monitoring effort will be directed at less impacted estuaries in considering temporal trends and spatial variability. Additional coastal and offshore areas will be monitored as required.

The monitoring programme is outlined in Tables 1-5 for each determinand and matrix combination. Sampling frequencies are designed to detect temporal trends with appropriate statistical accuracy. Sites have been selected to ensure that the maximum amount of information may be gained at each site. Sediment samples, for example, are to be collected at locations suitable for biological measurements. This will ensure maximum co-ordination of information.

Figures 1 - 3 shows the approximate locations of all present sites in the UK National Marine Monitoring Programme. These sites are listed, with the organisations responsible for monitoring, in Table 6.

The following criteria guided choice of the network of monitoring sites:

- fixed estuarine sites were selected where possible in the high salinity band (20-30) to minimise variability with salinity.
- sampling sites were chosen to be representative of stable depositional substrates suitable for benthic community analysis.
- Parties also contract to monitor the marine environment under the OSPAR Joint Assessment and Monitoring Programme (JAMP) and the Nutrients Monitoring Programme.
- further estuarine and coastal sites suspected to be non-impacted were selected where a good long-term dataset already existed which would be ideal for monitoring temporal trends or where maximum use could be made of such data (for example - Special Areas of Conservation).

- with the exception of the specific TBT/imposex investigations, all sites were located outside the influence of shipping channels, dredging operations or the mixing zone of known inputs.

Figure 4 illustrates the general principal of the proposed sampling strategy illustrating a more integrated approach to individual site monitoring. Figure 5 is a Gant Chart showing the monitoring requirements in the different sampling groups.

For each element of the sampling programme there is a corresponding appendix which sets out detailed procedural guidance for sampling and analysis of samples. The procedures are intended as standard guidance and take into account published guidance from JAMP, and reflect a UK interpretation of this guidance as well as practical experience of what is realistically achievable with the resources available to Agencies responsible for undertaking the programme.

6. Methodology and Quality Control

All methodologies are outlined in the appendices and references. Field and laboratory sheets are also included to ensure minimum OSPAR data requirements and supporting information are recorded. All laboratories contributing data to the NMMP2 must participate in the relevant AQC schemes outlined below. The NMCAQC scheme requires laboratories to employ analytical methods which will achieve the targets set out in Tables 1-5. A similar process operates for the biological data.

Data entering the NMMP2 database must be of specified quality and for this reason inter-laboratory testing schemes have been initiated to support the analytical work associated with NMMP2.

NMCAQC

The National Marine Chemical Analytical Quality Control scheme (NMCAQC) was first established in 1992. It oversees all aspects of quality control of marine chemistry monitoring for the NMMP2. Independent proficiency testing materials are provided by QUASIMEME (Quality Assurance of Information for Marine Environmental Monitoring in Europe). The NMCAQC group works closely with QUASIMEME to ensure that UK NMMP2 interests are covered by the scheme. In addition, the NMCAQC group has provided five annual reports summarising the performance of all participating laboratories. The suitability of chemical data submitted to NMMP2 will be judged by means of a datafilter (Dobson *et al.* Ref. 5). The datafilter requires laboratories to have appropriate Quality Control and Quality Assurance procedures, to have demonstrated that they produce data that are fit for purpose. To facilitate operation of the datafilter and the production of reports, an NMCAQC database has been set up and is located alongside the NMMP2 database.

NMBAQC

The National Marine Biological Analytical Control Scheme was established in 1994 to monitor all aspects of marine biological quality control for benthic faunal community studies. Approximately half of the participants of the scheme are now laboratories without NMMP2 responsibilities. A variety of different approaches to measure quality in biological analyses has been examined by the group. Most of the exercises now take the format of ring test identifications and 'own-sample' exercises. The ring tests are aimed at improving laboratory expertise. The own-sample exercise assures the quality of marine biological data in the NMMP2 database. A data filter similar to the NMCAQC system, which uses information about both in-house and external quality control procedures is currently being developed. Again, only data which meet the specified quality standards enter the database.

NMEAQC

One of the recommendations of the 1997 NMP Workshop in Newcastle was that a national quality control group in the area of biological effects should be formed. This was established in 1998 and is known as the National Marine Ecotoxicological Analytical Quality Control Group. The remit of the group is to provide methods and quality control procedures for biological effects measurements recommended for NMMP2. The NMEAQC group will coordinate with the European project, BEQUALM (Biological Effects Quality Assurance in Monitoring) to ensure that there is minimum duplication of activities. Data quality filters will be developed in this area in line with the chemistry and biology AQC data filters.

Considerable progress has been made in co-ordinating the monitoring activities of the responsible organisations in the United Kingdom through the AQC groups. This ranges from improved dialogue between organisations to collaboration between the individual laboratories responsible for the practical implementation of the work. In parallel with the co-ordination effort, quality control procedures have been developed to ensure comparability of data between laboratories.

7. Accuracy Targets and the Power to Detect Temporal Trends

The variables to be measured are outlined in Tables 1 to 5. Details of sampling requirements at each station are given in Table 6. The anticipated power of each aspect of the programme is given within each table where temporal trends are being monitored. Accuracy targets are also given within each table for all determinand and matrix combinations. It should be noted that where a programme is being carried out to measure compliance with a Directive, the accuracy targets are generally set to a tenth of any environmental quality standard (EQS). The power of the benthic monitoring data is currently being evaluated by the NMBAQC group. There are no long-term biological effects monitoring programmes at this stage to evaluate the power of these programmes. However, as the data sets are gathered, assessments of their power will be made as appropriate.

8. Data Submission

All data collected for NMMP2 are to be returned to the NMMP2 database at the National Centre for Environmental Data and Surveillance of the Environment Agency, Bath. Data will be passed through the appropriate AQC filters.

All reporting formats for data submission are given in the UK National Monitoring Plan Database Front End (Appendix 10).

Participants are encouraged to submit their data annually by 1st May of the year following sampling.

9. Reporting

The first report will summarise the first 3 years (1999-2002) of data.

10. References

- 1 DOE (1991), The Principles and Practice of Monitoring in UK Coastal Waters. A Report from the Marine Pollution Monitoring Management Group.
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- 3 HMIP (1994), 'UK National Monitoring Plan' Marine Pollution Monitoring Management Group, Monitoring Co-ordination Sub-Group.
- 4 Marine Pollution Monitoring Management Group (1998), Survey of the Quality of UK Coastal Waters. ISBN 0 9532838 3 6
- 5 Dobson, J.E., M.J. Gardner, B.S. Miller, M.A. Jessep and R.H. Toft (1999), An Approach to the Assessment of the Quality of Environmental Quality Data. Journal of Environmental Monitoring. 1(1):91-95.