Clean Seas Environment Monitoring Programme

Green Book

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Amendments Record

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THE GREEN BOOK

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1. Background

The Clean Seas Environmental Monitoring Programme (CSEMP) is a continuation of a UK-wide marine monitoring activity that has origins in the late 1980's. At that time was called the National Monitoring Programme and more recently the National Maine Monitoring Programme. It is one element of a series of activities coordinated by the Clean, Safe Seas Evidence Group (CSSEG). CSSEG brings together Agencies responsible for monitoring chemical contaminants, radioactivity, eutrophication, microbiological contaminants, algal toxins, litter and noise. The focus of the CSEMP is on chemical contaminants and eutrophication.

The drivers of the programme are:

i. 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 (replaced by the Eutrophication Monitoring Programme in 2005). Many aspects of the CSEMP are designed to contribute to the UK monitoring requirements under OSPAR (such as temporal trend monitoring for contaminants in sediments and biota).

ii. For compliance with EC Directives:

The EC Dangerous Substances Directive (76/464/EEC) requires monitoring for List I/II consented substances at sites adjacent to discharges and at reference sites. Data collected from marine reference sites (National Network Points) are submitted to the CSEMP. The Dangerous Substances Directive also requires analysis of sediments or biota to determine any increasing trends in the substances discharged. Shellfish are also analysed for metals and organic compounds to meet some of the requirements of, the Shellfish Waters Directive (79/923/EEC), the Shellfish Hygiene Directive (91/492/EEC) and as amended by 97/61/EC, and the Fisheries Products Directive (91/493/EEC).
Ecosystem monitoring to determine the impact of anthropogenic inputs of nutrients is required for the Urban Waste Water Treatment Directive (91/271/EEC), Nitrates Directive, (91/676/EEC), Habitats Directive (92/43/EEC) and Water Framework Directive (2000/60/EEC). A range of parameters must be monitored to determine whether there is an undesirable disturbance to the ecosystem arising from anthropogenic nutrients.

iii. 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 are included in CSEMP. These requirements are revised annually.

iv. For local monitoring

There are occasions when local marine environmental monitoring undertaken by one or more CSEMP 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 CSEMP, they may be included on the CSEMP database.

2. Aims of the Clean Seas Environment Monitoring Programme:

The general aims of the programme are:

i. To initiate monitoring programmes to detect, with appropriate accuracy, long-term trends in physical, biological and chemical variables at selected estuarine and coastal sites.

ii. To support and ensure consistent standards in national and international monitoring programmes for marine environmental quality

iii. To make recommendations to MARG as to how new analyses and techniques are best implemented in the United Kingdom.

iv. To co-ordinate, make optimum use of, and gain maximum information from marine monitoring in the United Kingdom.

v. To provide and maintain a high quality dataset for key chemical and biological variables in the marine environment of the United Kingdom.

vi. 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, now CSEMP) started on the detection of long term temporal trends. The second phase of the programme (1999-2002) was reported in 2004. The programme continuously evolves to incorporate new legislative requirements and improve the power of the programme to detect trends through improved sampling. As trends are established and we are confident that sea areas are not at risk, effort is focused on higher risk areas.

The programme is reviewed annually and changes recorded in this document. To assist in this, this document and its dependants will be operated as a controlled document operated by CSSEG and through the CSSEG AQC groups. The current version is available on the web at: http://www.cefas.co.uk/publications/scientific-series/green-book.aspx

3. Strategy

The CSEMP 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. CSEMP seeks to ensure consistent standards, comparability of measurements and data exchange.

The monitoring programme is outlined in Tables 1-6 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.

Sites are listed, with the organisations responsible for monitoring, in STATN.csv. This spreadsheet forms the MERMAN site reference table and is controlled by BODC.

Sampling locations were originally based on a fixed-station design, but this is currently superceded by a mix of fixed-stations for evaluation of long-term trend, combined with stratified-random designs to provide data representative of wider sea areas, and special survey work for new and emerging contaminants of concern.

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.

4. Methodology and Quality Control

All methodologies are outlined in the appendices and references. All laboratories contributing data to the CSEMP must participate in the relevant AQC schemes outlined below. The NMCAQC scheme requires laboratories to employ analytical methods which will achieve agreed targets. A similar process operates for the biological data.

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

i. The UK National Marine Chemistry Advisory Group (UK NMCAG) (formerly NMCAQC)

The National Marine Chemical Analytical Quality Control scheme (NMCAQC) was established in 1992 and the name and Terms of Reference were updated in 2007. The aim of the UK NMCAG group is to co-ordinate and advise on both current and future requirements marine analytical chemistry monitoring (methodology, techniques, quality assurance and associated research) in the UK marine environment and to quality mark UK marine chemistry analytical data submitted as part of the UK Clean Seas Environmental Monitoring Programme (CSEMP)

It oversees all aspects of quality control of marine chemistry monitoring for CSEMP. 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 CSEMP interests are covered by the scheme. The suitability of contaminant data submitted to CSEMP is judged by means of a data filter (Dobson et al. Ref. 5). The data filter requires laboratories to demonstrate the use of appropriate internal and external Quality Control procedures to show that their data is fit for purpose. Data is excluded where QC performance does not meet the required standard. Quality Control information required for the data filter is detailed in Table 6.

ii. The National Marine Biological Analytical Control Scheme (NMBAQC)

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 CSEMP 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 MERMAN 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.

UK Group for the Biological Effects of Contaminants in the Marine Environment (formerly NMEAQC)

iii. The National Marine Ecotoxicological Analytical Quality Control Group (NMEAQC)

The National Marine Ecotoxicological Analytical Quality Control Group was established in 1998 to provide methods and quality control procedures for biological effects measurements recommended for CSEMP. The Terms of Reference of the group were revised in 2007 to have a wider remit covering all aspects of the monitoring of biological effects of contaminants in the UK marine environment. This may be carried out to meet the needs of "drivers" such as OSPAR, WFD, etc and covers for example survey design, sampling protocols, sample analysis including AQC, data assessment and reporting. The 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.

5. Accuracy Targets and the Power to Detect Trends

The variables and sites to be measured are outlined in Tables 1-6 and in the MERMAN reference tables param_uomval and STATN. The anticipated power of each aspect of the programme is given within each table where temporal trends are being monitored. 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.

6. Data Submission

CSEMP, MAIN TEXT, VERSION 12 September 2007

Contaminants and benthic community data collected for CSEMP are submitted to the MERMAN database which is managed by BODC and hosted by Defra. Data is passed through the appropriate AQC filters.

Participants are required to submit contaminant data annually by 1st June of the year following sampling.

7. Reporting

The 2nd NMMP report (Ref 6) summarised the first 3 years (1999-2001) of data and NMMP2 data was used in the Defra report on the state of the seas (Ref 7). In future annual summary reports will be produced by the MERMAN database.

8. References

1 DOE (1991), The Principles and Practice of Monitoring in UK Coastal Waters. A Report from the Marine Pollution Monitoring Management Group.

2 DOE (1991), The Principles and Practice of Monitoring in UK Coastal Waters. The Government Response to a Report from the Marine Pollution Monitoring Management Group.

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.

6. Marine Environment Management Group (2004). UK National Marine Monitoring Programme – Second Report (1999 – 2001). ISBN 0 907545 20 3

7. Defra (2005) Charting Progress – an Integrated Assessment of the State of UK Seas