OSPAR COMMISSION

Protecting and conserving the North-East Atlantic and its resources

CEMP[1] guidelines for coordinated monitoring for hazardous substances

(OSPAR Agreement 2016-04)

Contents

[1] CEMP Guidelines were previously referred to as JAMP Guidelines. Many of the existing JAMP Guidelines are due for review; until this review is complete they continue to be referred to as JAMP Guidelines.

1 Introduction

In 2014 the OSPAR Commission adopted a renewed OSPAR Joint Assessment and Monitoring Programme (JAMP) 2014–2021 (OSPAR Agreement 2014-02, updated 2016 http://www.ospar.org/work-areas/cross-cutting-issues/jamp) for the period 2014 to 2021 focusing on the development of new general assessments of the quality status of the marine environment for 2018. OSPAR coordinates repeated measurement and assessment of the marine environment over a 10–20 year timeframe.

The OSPAR Commission's strategic objective with regard to hazardous substances is to prevent pollution of the OSPAR maritime area by continuously reducing discharges, emissions and losses of hazardous substances, with the ultimate aim to achieve concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances.

The Hazardous Substances Strategy will be implemented progressively by making every endeavour, through appropriate actions and measures:

a. to achieve concentrations of contaminants at levels not giving rise to pollution effects, and contaminants in fish and other seafood for human consumption not exceeding levels established by EU legislation or other relevant standards, and finally;

b. to move towards the targets of the cessation of discharges, emissions and losses of hazardous substances by the year 2020[2].

To achieve these goals, programmes for monitoring the state of and pressures caused by hazardous substances to the marine environment have been implemented, comprising monitoring different compartments of the sea and inputs from rivers and atmosphere.

This document provides links to the monitoring guidelines, data sources, processing procedures and assessment products.

2 Monitoring for hazardous substances

Regular activities under the Strategy for the JAMP for status and pressure monitoring of hazardous substances and biological effects are set out in the Coordinated Environmental Monitoring Programme (CEMP) (OSPAR Agreement 2016-01, currently under review).

2.1 Purpose

The aim of the monitoring programmes for hazardous substances is to deliver comparable data from across the OSPAR maritime area, which can be used in assessments to address the specific questions raised in the JAMP:

- Assessment of the status of the marine environment
- Assessment of the pressures on the marine environment
- Assessment of the effectiveness of measures

[2] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) L164/19

3 Monitoring of Hazardous substances in the marine environment

www.ospar.org/documents/dbase/decrecs/agreements/16-01e_The_CEMP.doc

The Coordinated Environmental Monitoring Programme CEMP[3]

The general outline of monitoring requirements within the CEMP is defined at

http://www.ospar.org/content/content.asp?menu=00900301400000_000000_000000

3.1. Monitoring Indicators

These Guidelines are focused on monitoring of the concentrations and effects of selected contaminants in the marine environment as follows:

- metals (cadmium, mercury and lead) in sediment and biota
- PAHs in biota and sediment
- PCBs in biota and sediment
- brominated flame retardants in biota and sediment
- the effects of tributyltin in gastropods and concentrations in sediment and/or biota

The CEMP also includes a pre-CEMP covering components which the Contracting Parties are preparing to monitor in a co-ordinated manner through the development of monitoring guidance, quality assurance procedures and/or assessment tools. Currently the pre-CEMP includes the following components:

- planar PCBs in biota
- alkylated PAHs in biota and sediment
- PFOS in sediment, biota and water
- dioxins and furans in biota and sediment
- PAH- and metal-specific biological effects
- general biological effects

The components listed as OSPAR Common Indicators for regional compliance monitoring under MSFD Descriptor 8 are also part of CEMP.

Information on the actual status of the substances and compartments monitored, the links to the related assessment guidance documents as well as Contracting Parties monitoring is compiled in the related (expanded) CEMP appendices. The links to the assessment guidance documents are also listed under chapter 3.8.1.

3.2 Qualitative objectives

Qualitative objectives of the monitoring programme for hazardous substances are to determine the concentrations of hazardous substances in the marine environment

To detect:

- whether those hazardous substances monitored are at, or approaching, background levels for naturally occurring substances and close to zero for man-made substances,

- how are the concentrations changing over time
- whether the concentrations of either individual substances or mixture of substances are such that they are giving or not giving rise to pollution effects

To assess:

- the effectiveness of measures taken for the reduction of marine contamination by performing trend monitoring
- the status of the environment regarding hazardous substances against set criteria and/or standards as environmental assessment criteria and/or thresholds defining a good environmental standard

Monitoring of bioeffects supply qualitative or quantitative information on activities, concentrations, frequency or abundance of effects or their measurable reactions which can be used comparably to concentrations, and additionally can detect problems to marine organisms caused by multiple impacts, often on levels below possibilities of chemical analytical measurements or not discoverable by these methods.

3.3 Quantitative objectives

Quantitative objectives can be formulated in order:

- to assure the sample quality in environmental monitoring.

For temporal trend assessments a minimum trend of e.g. 5 or 10% a year should be possible to detect during a sampling period of ten years with a statistical power of 80% and significant level of 5%. This does not require that there is a trend present today but that the monitoring programme should be able to detect the suggested minimum trend, should it occur in future. To fulfil this objective the between-year unexplained variation must not be too large and the sample size not too small. Normally the contribution to the total variation is much larger from sample variation (biological, small scale spatial and temporal variation etc) than from the analytical error achieved at the chemical analysis. As the concentrations of some anthropogenic contaminants have decreased considerably and become close to detection limit the analytical error increases in relation to the sample variation. At some point temporal trend assessments become pointless. This point may well be defined. However, it is not necessary abandon the Quantitative objective approach, because it may be still be relevant in other areas or matrices or if the contaminant situation changes or the analytical technique improves.

- for compliance monitoring

For example the programme should be able to show compliance with a target value (e.g. EQS) at a distance of xx% from the target with the achieved sample variance. If the target is 0 or at background concentration a constant has to be added to the target to maintain the Quantitative objective approach.

3.4 Monitoring Strategy

See monitoring manual:

http://www.ospar.org/content/content.asp?menu=00900301400135_000000_000000

3.5 Sampling Strategy

[3]Reference number: 2016-1

See monitoring manual:

http://www.ospar.org/content/content.asp?menu=00900301400135_000000_000000

3.6 Quality management

Three requirements are essential for the inclusion of a substance or an element or groups of it into the CEMP. These are:

- guidelines;
- quality assurance tools;
- assessment tools.

For analytical quality assurance and control, contracting parties should follow EN ISO/IEC 17025:2005 (General requirements for the competence of testing and calibration laboratories).

Consequently all CEMP components should have external QA/QC in place, e.g. via one of the following laboratory proficiency testing schemes:

QUASIMEME: http://www.quasimeme.org/

BEQUALM: http://www.bequalm.org/

3.7 Data reporting, handling and management

ICES data centre serves for data handling, management and storage in DOME (http://dome.ices.dk/browse/index.aspx) and for making available environmental monitoring data via the Internet to other authorities (e.g. the EEA) and to the public.

http://ices.dk/marine-data/Pages/default.aspx

3.7.1 Data acquisition

The data are extracted from the ICES database, with technical and scientific support by the ICES data centre.

3.7.2 Preparation of data

The measurements each year are summarised by an annual contaminant index. To account for differences in analytical quality, an analytical weight is assigned to each index based on the available analytical quality information. The analytical weights are then converted into statistical weights that account for the relative magnitudes of the analytical and environmental variability in the data.

For assessment, concentrations in biota are expressed on wet weight basis, apart from organics in shrimp and herring which are expressed on a lipid weight basis.

Concentrations in sediment are commonly first normalised to account for differences in sediment composition. Concentrations in sediment are expressed on a dry weight basis.

Details on the methods used for concentrations of hazardous substances and most biological effects can be found at: http://dome.ices.dk/osparmime/help_methods_biota_metals.html and

http://dome.ices.dk/osparmime/help_methods_sediment_metals.html.

Details for imposex can be found at: http://dome.ices.dk/osparmime/help_methods_biota_imposex.html

3.8 Assessment

The assessment methodology is fully described in the online help files.

3.8.1 Assessment criteria

Concentrations are compared to both Background Assessment Concentrations (BACs) and Environmental Assessment Criteria (EACs) or their equivalent. Details can be found at:

http://dome.ices.dk/osparmime/help_ac_biota_metals.html

http://dome.ices.dk/osparmime/help_ac_biota_chlorobiphenyls.html

http://dome.ices.dk/osparmime/help_ac_biota_pah_(parent).html

http://dome.ices.dk/osparmime/help_ac_biota_organo-metals.html

http://dome.ices.dk/osparmime/help_ac_biota_pesticides.html

http://dome.ices.dk/osparmime/help_ac_biota_biological_effects.html

http://dome.ices.dk/osparmime/help_ac_biota_imposex.html

http://dome.ices.dk/osparmime/help_ac_sediment_metals.html

http://dome.ices.dk/osparmime/help_ac_sediment_chlorobiphenyls.html

http://dome.ices.dk/osparmime/help_ac_sediment_pah_(parent).html

3.8.2 Spatial Analysis and / or trend analysis

Information on spatial differences in the status are illustrated by the maps of the annual assessments (link see above at the beginning of §3).

Time series are assessed by fitting a weighted regression model to the annual contaminant indices. The type of model depends on the number of years of data:

- 1-2 years: no model
- 3-4 years: mean
- 5-6 years: linear trend
- 7+ years: smoother (with amount of smoothing estimated from the data)

The fitted models are used to assess environmental status against available assessment criteria and evidence of temporal change in contaminant levels in the last twenty years.

Details for concentrations and most biological effects can be found at:

http://dome.ices.dk/osparmime/help_methods_biota_metals.html

http://dome.ices.dk/osparmime/help_methods_sediment_metals.html

Details for imposex can be found at: http://dome.ices.dk/osparmime/help_methods_biota_imposex.html

3.8.3 Presentation of assessment results

The assessment results are published by OSPAR as CEMP Assessment Reports “Levels and trends in marine contaminants and their biological effects”, available online at the OSPAR website. The maps and graphs of the annual assessment as well as additional information in help files are available at: http://dome.ices.dk/osparmime/main.html.

3.9 Change Management

Actions required to update the CEMP are described in section 4 of the CEMP.

The OSPAR subsidiary body responsible for monitoring hazardous substances in the marine environment is OSPAR's Working Group on Monitoring and on Trends and Effects of Substances in the Marine Environment (MIME), which should periodically consider the implementation of the CEMP, for those aspects of the JAMP where monitoring guidelines, quality control procedures and assessment tools are in place. This consideration should track the progress of these programmes, e.g. collating data, producing assessment reports and initiating new programmes as and when opportunities arise.