

## **ANNEX 2**

### **Contractor's Tender**



**OPEN CALL FOR TENDERS  
MARE/2008/03**

**Preparatory Actions for  
European Marine  
Observation and Data  
Network**

**ANNEX 2  
TENDER FORMS**



UNESCO

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
COMMISSION OCÉANOGRAPHIQUE INTERGOUVERNEMENTALE  
COMISIÓN OCEANOGRÁFICA INTERGUBERNAMENTAL  
МЕЖПРАВИТЕЛЬСТВЕННАЯ ОКЕАНОГРАФИЧЕСКАЯ КОМИССИЯ  
政府间海洋学委员会

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2 October 2008

**Subject: IODE Letter of support to tender No MARE/2008/03 "Preparatory actions for European Marine Observation and Data Network" for the 'chemical lot' as published in the Official Journal of the European Union S/124 of 28.06.2008 (ref. 2008/S 124-165113).**

To whom it may concern

On behalf of the IOC Committee on International Oceanographic Data and Information Exchange (IODE) it is my pleasure to support this Tender (coordinated by Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS, established in Trieste, Borgo Grotta Gigante 42/c - 34010 Sgonico (TS) - Italy).

The EMODNET chemical lot is an important initiative that - if approved - will complement, reinforce and link to, the IODE OceanDataPortal global distributed data network as well as the IODE network of data centres in general. We therefore wish to extend our support to this proposal and look forward to collaboration between IODE and EMODNET chemical lot.

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ANNEX 2 TO THE CALL FOR TENDERS MARE/2008/03  
"PREPARATORY ACTIONS FOR EUROPEAN MARINE OBSERVATION AND DATA NETWORK"

LOT No: 3 – CHEMICAL DATA

**TECHNICAL TENDER FORM**

Company name Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS	Telephone +39 040 2140391
Address Borgo Grotta Gigante 42/C, 34010 Sgonico-Trieste (ITALY)	e-mail agiorgetti@ogs.trieste.it

The technical offer must contain the following elements:

**1. Understanding of objectives.**

The European Commission, represented for the purposes of this call for tenders by the Directorate-General for Maritime Affairs and Fisheries (DG MARE), wishes to conclude service contracts for creating pilot components of the European Marine Observation and Data Network. The overall objective is to create a pilot to migrate fragmented and inaccessible chemical data into interoperable, continuous and publicly available data streams for complete maritime basins.

The results will help to define processes, best technology and approximate costs of a final operational European Marine Observation and Data Network. It will also provide the first components for a final system which will in themselves be useful to the marine science community.

The call for tenders comprises 4 lots. This bid concerns the lot 3: chemical data.

The specific objectives of the project are to:

- collate existing data from public and private organisations relating to the state of maritime basins; processing them into interoperable formats which includes agreed standards, common baselines or reference conditions;
- assessing their accuracy and precision and assembling them into common datasets;
- develop, test, operate and maintain a **portal** allowing public access and viewing of these data and a link to WISE-marine
- monitor and report on the effectiveness of the system in meeting the needs of users in terms of ease of use, quality of information and fitness for purpose of the products delivered;
- analyse what further steps need to be taken to improve the accuracy, precision, coverage and ease of use of the data, including a scheme for sustainable quality assurance and control of the data delivered to the system, both in this preparatory action and in the future larger system.

- analyse the necessary requirements to maintain the components built up in each lot as a sustainable infrastructure
- keep the portal operational afterwards and be prepared to transfer to the Commission.

The Call asks for the groups of chemicals required for monitoring the Marine Strategy Directive:

1. synthetic compounds (e.g. priority substances under Directive 2000/60/EC that are relevant for the marine environment), i.e.
  - a) pesticides,
  - b) antifoulants,
  - c) pharmaceuticals,
2. heavy metals,
3. radionuclides;
4. fertilisers and other nitrogen- and phosphorus-rich substances
5. organic matter (e.g. from sewers or mariculture)
6. hydrocarbons including oil pollution

At least one chemical should be defined for each of these 8 groups to make a minimum of 12 chemicals in all. The same chemicals should be used for all maritime basins. They should be chosen on a basis of their threat to the environment. It may be that the chemicals themselves are not monitored but rather indicators for these chemicals.

The data should include:

- all measurement points including inputs (from rivers, coastal activities, atmospheric deposition and ships) and concentrations (in sediments, water columns and biota - especially biota meant for human consumption where there is a risk to human or environmental health). For biota, the matrix (for example, type of mussel, fish or tissue) should be indicated.
- aggregations at an appropriate level that allows seasonal or annual trends to be observed.
- contiguous data. Those derived from sightings of short-lived events (e.g. oil spills) should be normalised to take account of the observation frequency (e.g. average number of events per month per square nautical mile).
- indications whether guidelines (e.g. by OSPAR) have been followed in making measurements. Both the original observations (or indicators for some of these chemicals) and harmonised maps should be accessible.

The chemical data should concern the following geographical regions:

- the Greater North Sea, including the Kattegat, and the English Channel. It includes stretches of water (Fair Isle, Cromarty, Forth, Forties, Dover, Wight, Portland) identified in a recent study<sup>15</sup> as being those European waters most affected by human activity.
- the Black Sea.

The portal must be developed with the main purpose to allow the download of data for further analysis by users and to make it available for combination with data from other portals including the other portals developed in this preparatory action. The portal will also allow the maritime community and potential users to understand how the data was collected as well as the overall aims of the EMODNET project. Thus the portal should allow:

- a. On-line instructions.
- b. Viewing a catalogue of the data available. The catalogue shall be structured in line with best practices relevant to the field of science covered by the data.

- c. Querying of data. The description of the data shall as much as possible employ the INSPIRE metadata implementing rule while downloading should be based on the INSPIRE download service implementing rule or should it not be available, on the OGC Web Feature and Coverage Services Specifications.
- d. On-line capability to view the position and magnitude of data as well as geographical information system layers delivered in accordance with the INSPIRE View Service Implementation Rule. This should include an online viewer allowing layer-selection, attribute queries, panning and zooming.
- e. Downloading of GIS layers, monitoring and contiguous data.
- f. Understanding of the precision of the data and how it has been processed.
- g. Users to receive feedback on queries sent by e-mail.
- h. Links to other relevant web-sites (on measurements, standards, similar projects etc).

## 2. Added value.

This EMODNET Chemical joint tender has been prepared and submitted by the **SeaDataNet** consortium, represented by a large subgroup of the partnership, selected on their geographical coverage and specific expertise, relevant for the pilot of the EMODNET chemical lot.

SeaDataNet is a leading infrastructure in Europe for marine & ocean data management. It is actively operating and further developing a Pan-European infrastructure for managing, indexing and providing access to ocean and marine data sets and data products, acquired via research cruises and other observational activities, in situ and remote sensing. The basis of SeaDataNet is interconnecting 40 National Oceanographic Data Centres and Marine Data Centers from 35 countries around European seas into a distributed network of data resources with common standards for metadata, vocabularies, data transport formats, quality control methods and flags, and access. Thus most of the NODC's operate and/or are developing national networks to other institutes in their countries to ensure national coverage and long-term stewardship of available data sets.

The majority of data managed by SeaDataNet partners concerns physical oceanography, marine chemistry, hydrography, and a substantial volume of geology, geophysics and marine biology. These are partly owned by the partner institutes themselves and for a major part also owned by other organizations from their countries.

SeaDataNet is implemented as an EU Research Infrastructures I3 project, which was awarded in the FP6 programme, began in early 2006 and has a duration of 5 years. Version 1 of its infrastructure upgrade was launched in April 2008 and is now rolled out to all 40 data centres. It comprises the network of 40 interconnected data centres (NODCs) and a central SeaDataNet portal. V1 provides users a unified and transparent overview of the metadata and controlled access to the large collections of data sets, that are managed at these data centres.

The SeaDataNet V1 infrastructure comprises the following middleware services:

- Discovery services = Metadata directories and User interfaces
- Vocabulary services = Common vocabularies and Governance
- Security services = Authentication, Authorization & Accounting
- Delivery services = Requesting and Downloading of data sets
- Viewing services = Mapping of metadata
- Monitoring services = Statistics on system usage and performance and Registration of data requests and transactions

- Maintenance services = Entry and updating of metadata by data centres

In the coming years the SeaDataNet infrastructure will be extended into Version 2 with a further development of:

- Viewing services = Quick views and Visualisation of data and data products
- Product services = Generic and standard products

As a basis for the V1 services, common standards have been defined for metadata and data formats, common vocabularies, quality flags, and quality control methods, based on international standards, such as ISO 19115, OGC, NetCDF (CF), ODV, best practices from IOC and ICES, and following INSPIRE developments.

Also an architecture has been designed to provide a coherent system of the various V1 services and a later extension with V2 services. For the implementation, a range of technical components have been defined and developed. These make use of recent web technologies, and also comprise Java components, to provide multi-platform support and syntactic interoperability. To facilitate sharing of resources and interoperability, SeaDataNet has adopted the technology of SOAP Web services for various communication tasks.

Considering this situation it is proposed to realize the EMODNET Chemical portal by using the SeaDataNet network of national data centres and its new V1 infrastructure, thereby demonstrating its abilities for handling and giving users access to the requested chemical data sets and products in combination with other multi-disciplinary data sets.

This approach and synergy will have mutual benefits for the EMODNET chemical pilot and for SeaDataNet:

- It guarantees an easy expansion of the geographical coverage of the EMODNET chemical data sets to other seas, because SeaDataNet Data Centres are located and established in all countries riparian to the European seas;
- It guarantees an easy expansion and merging with other types of marine data sets, because SeaDataNet already handles a large volume of multi-disciplinary data sets and other initiatives are planned and underway for enlarging the SeaDataNet coverage by connecting to other networks, such as the biological community via EurOBIS and MarBEF and the geological & geophysical community via upgrading and integrating of EU-SEASED and SEISCAN;
- It facilitates a long term sustainability of the infrastructure, because the infrastructure and network are based upon the NODC's, which are usually part of large marine research institutes and which receive long term funding from their institutes for managing and safeguarding marine data sets. The infrastructure and consortium are not just created for the EMODNET tender and might fall apart, once the EU funding halts. SeaDataNet is in a position to continue its services, especially when there is a perspective for a wider implementation of EMODNET;
- It challenges SeaDataNet to prove its concept, network and infrastructure, which implicates that the EMODNET pilot will be developed by a dedicated and motivated team;
- It guarantees that high quality and long expertise with handling marine data will be mobilised for handling and processing the EMODNET chemical data sets;
- It makes optimal use of existing infrastructure and ongoing SeaDataNet developments, - the time lines are in parallel, which provides excellent opportunities for synergy,



whereby the EMODNET tender will give an extra stimulus to the development of the V2 data products viewing and presentation services;

- It will provide excellent efficiency and cost effectiveness by combining efforts and developments, not only technically, but also organisation-wise. There is no need to create any specific new database for these data, because the SeaDataNet decentralised scheme of databases is in place for managing the chemical data sets, and the discovery and access services will be implemented by using the SeaDataNet Common Data Index (CDI) system (based upon ISO 19115). The network of national partners and their national networks will be mobilised to collect, process, manage and give access to the collated data sets and products;
- The existing SeaDataNet expertise in data processing, statistical analyses and quality control as well as in generating aggregated data products will be used and further developed as part of the EMODNET pilot.
- Other data providers will be more willing to contribute and to continue contributing data sets to the EMODNET pilot, because it is undertaken by familiar data centres with a long term perspective and objectives and not by an occasional ad-hoc consortium. The latter is even more true, because many of the SeaDataNet partners are also the prime data centres for national monitoring data in their countries.

### **3. Coverage of data and access restrictions**

The Data Centres in the SeaDataNet network already manage a large volume of relevant data sets that will be brought to the EMODNET pilot. In addition, the SeaDataNet partners have contacted a number of data holders in their country with relevant data sets, that will be collated as part of the EMODNET activities, and that will enlarge the available data collections. Moreover the SeaDataNet partnership includes ICES, which acts as data centre for monitoring data for OSPAR, HELCOM and EIONET, and that will bring in this volume of data sets.

The EMODNET Chemical tender asks for data sets from the Greater North Sea and the Black Sea region. However in view of a later expansion to all European Seas and to explore the methods for achieving an overall consistent quality of data sets and products, the SeaDataNet consortium has decided to expand the pilot regions with some spots from the Mediterranean: Balearic Sea, Gulf of Lion, North Adriatic Sea, Gulf of Athens and NE Levantine basin.

The detailed overview of already known relevant data sets and sources for each of the 3 geographical regions, Greater North Sea, Black Sea and 5 spots in the Mediterranean, is described in the Data Inventory annex. As part of the collation activities even more relevant data sets and sources might come forward.

The Tender requires that at least one chemical should be defined for each of these 8 groups to make a minimum of 12 chemicals in all and that the same chemicals should be used for all maritime basins. They should be chosen on a basis of their threat to the environment.

Considering the Data Inventory and the OSPAR Quality Status Report 2000 the partnership has decided to focus on the following chemicals:

1. synthetic compounds (dichlorodiphenyldichloroethane (DDE), Dieldrine, DDT, polychlorinated biphenyls (PCBs), hexachlorobenzene (HCB), tributyltin (TBT))

2. heavy metals (Barium, Cadmium, (Cd) Mercury (Hg), Lead (Pb), Copper (Cu), Zinc (Zn), Nickel)
3. radionuclides (cesium-137, cesium-134, cerium-144, tritium (3H), radium-226, lead-210, polonium-210, uranium-238, cobalt-60, strontium-90, potassium-40)
4. fertilisers and N- and P-rich substances (NO<sub>3</sub>-N, NO<sub>2</sub>-N, PO<sub>4</sub>-P, Total P, Total N)
5. organic matter (total organic carbon)
6. hydrocarbons (polycyclic aromatic hydrocarbons (PAHs))

The present data-inventory demonstrates a very good coverage of available data, which will offer quite sufficient critical mass for the EMODNET pilot and for developing qualitative good data products. For the latter use will be made of sophisticated software tools, Ocean Data View (ODV) and Data Interpolating Variational Analysis (DIVA), that have proven track records for QC/QA and statistical processing and that are part of the SeaDataNet infrastructure components. The Workplan will give more detail on these tools and their application in the project.

**Data access:**

The metadata and aggregated data products (GIS layers) in the EMODNET pilot will be public domain and freely available for all users. However for data access (= downloading) the SeaDataNet consortium and thus the EMODNET pilot must respect the data copyrights of owners, in particular for the background data as detailed in the data inventory. This fact is also one of the draft outcomes of the Legal Study that was recently commissioned by the EU in preparation of EMODNET. But the possible problem of various data access restrictions is solved by the SeaDataNet V1 infrastructure, by including in its metadata a value for data access restriction for every data set it manages. This value is derived from a SeaDataNet Common Vocabulary (L081), that ensures standardisation. It varies from 'unrestricted' to 'restricted' with a number of values in between. Firstly, this label gives users clear and well defined information about the possible data access restrictions. (Note: Most of the data sets in SeaDataNet and the EMODNET pilot will be 'unrestricted').

Secondly SeaDataNet and thus the EMODNET pilot will require users to register once to a Central User Register, that will give the id-password for data access and delivery services. By registering, the users will agree implicitly with the SeaDataNet Data Policy and its user licence agreement. The SeaDataNet data policy is consistent with, and in the spirit of, national and international policies and laws. Applicable policies or laws are those related to UN conventions, policies of international bodies often within the UN, policies and laws of the European Union. The SeaDataNet data policy is intended to be fully compatible with the Directive of the European Parliament and of the Council on public access to environmental information, the INSPIRE Directive, IOC, ICES, WMO, GCOS, GEOSS and CLIVAR data principles.

The SeaDataNet Licence Agreement has the following terms:

1. The Licensor grants to the Licensee a non-exclusive and non-transferable licence to retrieve and use data sets and products from the SeaDataNet service in accordance with this licence.
2. Retrieval, by electronic download, and the use of Data Sets is free of charge, unless otherwise stipulated.
3. Regardless of whether the data are quality controlled or not, SeaDataNet and the data source do not accept any liability for the correctness and/or appropriate interpretation of

the data. Interpretation should follow scientific rules and is always the user's responsibility. Correct and appropriate data interpretation is solely the responsibility of data users.

4. Users must acknowledge data sources. It is not ethical to publish data without proper attribution or co-authorship. Any person making substantial use of data must communicate with the data source prior to publication, and should possibly consider the data source(s) for co-authorship of published results.
5. Data Users should not give to third parties any SeaDataNet data or product without prior consent from the source Data Centre.
6. Data Users must respect any and all restrictions on the use or reproduction of data. The use or reproduction of data for commercial purpose might require prior written permission from the data source.

Because these terms are in conformance to national and local licence agreements as in use by many data sources, it is encouraged that data sources in the EMODNET pilot will adopt the 'SeaDataNet licence' data access restriction as appropriate also for their data (in case these are not 'unrestricted' as preferred and encouraged by SeaDataNet). In practice this will then imply that a registered SeaDataNet user, having accepted the overall SeaDataNet licence agreement, can thus get access to the data sets via SeaDataNet automatically, without any problems, via the V1 services. Of course, the user must respect the licence terms (see above).

#### 4. Methodology + time/work schedule.

The EMODNET Chemical project is undertaken by a European network of 26 partners from 18 coastal countries, comprising 22 data centres, 1 international organisation ICES and 3 institutes, that bring in additional expertise in informatics and data product development. Geographically the Greater North Sea, the Black Sea and spots in the Mediterranean are covered.

Participant Number *	Participant organisation name	Country
1 (project coordinator)	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS)	Italy
2 (technical coordinator)	Mariene Informatie Service 'MARIS' BV (MARIS)	Netherlands
3	NERC British Oceanographic Data Centre (NERC-BODC)	United Kingdom
4	Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER)	France
5	Bundesamt für Seeschifffahrt und Hydrographie (BSH-DOD)	Germany
6	Norwegian Marine Data Centre - Institute of Marine Research (IMR)	Norway
7	National Environmental Research Institute (NERI-MAR)	Denmark
8	Flanders Marine Institute (VLIZ)	Belgium
9	Royal Belgian Institute of Natural Sciences, Management Unit of	Belgium

	the North Sea Mathematical Models (RBINS – MUMM)	
10	NIOZ Royal Netherlands Institute for Sea Research (NIOZ)	Netherlands
11	Sveriges Meteorologiska och Hydrologiska Institut (SMHI)	Sweden
12	Hellenic Oceanographic Data Centre-Hellenic Centre for Marine Research (HNODC-HCMR)	Greece
13	All Russian Research Institute of Hydro-meteorological Information – WDC B (RIHMI-WDC)	Russia
14	Shirshov Institute of Oceanology Russian Academy of Science (SIO-RAS)	Russia
15	Marine Hydro-physical Institute (MHI)	Ukraine
16	Institute of Oceanology Bulgarian Academy of Science (IO-BAS)	Bulgaria
17	National Institute for Marine Research and Development “Grigore Antipa” (NIMRD)	Romania
18	Iv. Javakhishvili Tbilisi State University (TSU-DNA)	Georgia
19	International Council for the Exploration of the Sea (ICES)	International
20	Alfred Wegener Institute for Polar and Marine Research (AWI)	Germany
21	University of Liege - GeoHydrodynamics and Environment Research (ULG)	Belgium
22	Instituto Español de Oceanografía (IEO)	Spain
23	Collecte Localisation Satellites (CLS)	France
24	Marine Institute (MI)	Ireland
25	University of Cyprus-Oceanography Centre (OC-UCY)	Cyprus

In addition, support will be given by UNESCO IOC-IODE (see included Letter of Support).

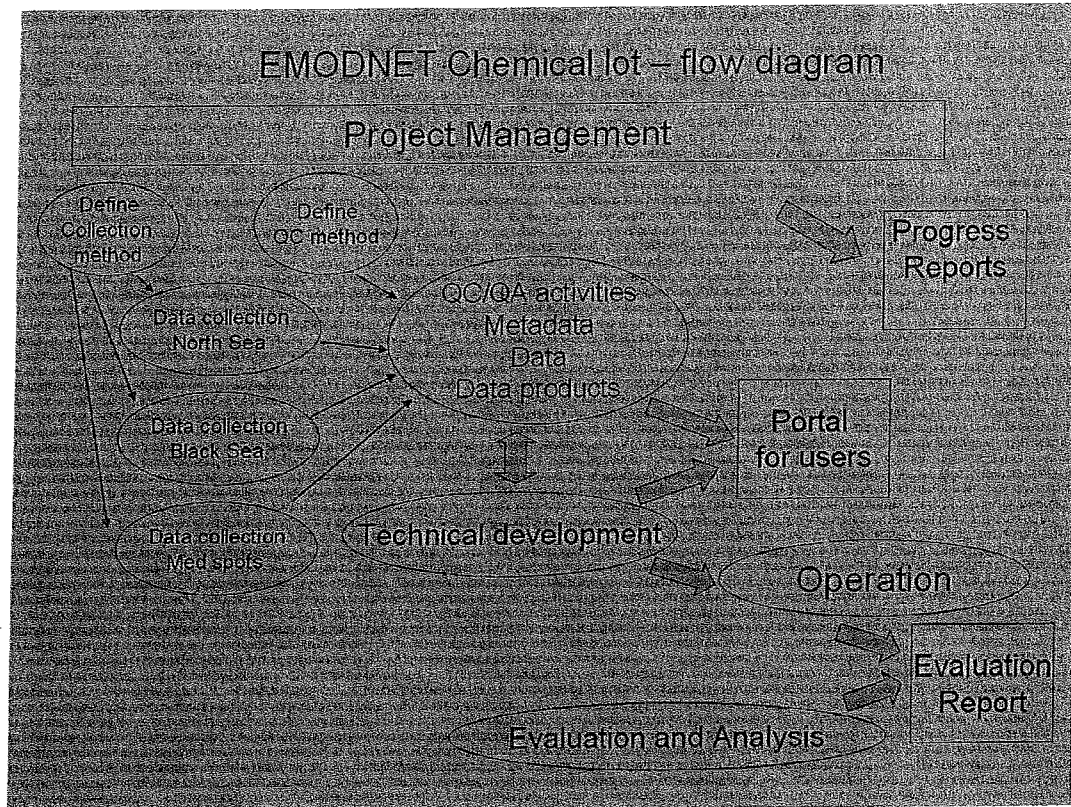
Details about the qualifications of the partners and their key persons can be found in the Annex.

**Workplan:**

To achieve the objectives of the EMODNET Chemical pilot the work plan is divided in the following Work Packages (WP):

<b>WP1</b>	<b>Project management</b>
<b>WP2</b>	<b>Data collection and metadata compilation</b>
<b>WP3</b>	<b>QC/QA and products</b>
<b>WP4</b>	<b>Technical development and operation</b>
<b>WP5</b>	<b>Analysis and evaluation</b>

The work flow is illustrated in the following diagram:



The project is executed in 4 Phases:

- Phase 1 - Months 1-12 - Development and build
- Phase 2 - Months 13-18 - Test and monitor
- Phase 3 - Months 19-24 - Upgrade
- Phase 4 - Months 25-36 - Maintenance and operation



The Work packages are detailed in the following pages:

Work package number	WP1								
Work package title	Project Management								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	OGS	MARIS	NERC-BODC	IFREMER	BSH-DOD	IMR	NERI-MAR	VLIZ	RBINS-MUMM
Involved	X	X							
Participant number	10	11	12	13	14	15	16	17	18
Participant short name	NIOZ	SMHI	HCMR	RIHMI-WDC	SIO-RAS	MHI	IO-BAS	NIMRD	TSU-DNA
Involved									
Participant number	19	20	21	22	23	24	25		
Participant short name	ICES	AWI	ULG	IEO	CLS	MI	OC-UCY		
Involved									

#### Objectives

- To manage and to coordinate all project activities, ensuring timely delivery and high quality of results and products

#### Description of work:

The overall project management activities include:

- preparation and organization of Partner Group meetings
- preparation and organization of Coordination Group meetings
- preparation of minutes and action lists of the meetings
- coordination of agreed actions and deliverables
- monitoring progress and possible revised planning of activities
- financial administration
- preparation of 2-monthly concise progress reports to be posted on the project web-site indicating meetings held, difficulties encountered, inventories of data made available, through phases 1 to 3
- preparation and submissions of management reports and progress reports for each phase, including invoices, to the EC.

The project organisation consists of the following elements:

- Project coordinator
- Technical coordinator
- Coordination Group, consisting of leaders of each Work Package (OGS, MARIS, NERC-BODC, NERI-MAR, ICES and IFREMER as SeaDataNet coordinator)
- Partners

The Project Management activities will be performed by the Project Coordinator and Technical Coordinator, supported by the Coordination Group members. Project management is a continuous activity during the full project period of 36 months.

The Project and Technical coordinators will meet with the Commission in Brussels for:

1. A kick-off meeting at the beginning of the project with representatives of all lots,
2. A meeting at the end of the first phase to present the first interim report, review progress,

- present the operational portal and exchange experience between different lots of the project,
3. A meeting after the end of the second phase to present the second interim report,
  4. A meeting two months before the end of the third phase to coincide with the release of the final prototype product and draft final report.

Task lead by OGS

**Deliverables :**

- bimonthly progress reports to be posted on the project web-site indicating meetings held, difficulties encountered, inventories of data made available. These start at month 2 and continue through phases 1 to 3
- a first interim report after phase 2
- a second interim report after phase 3
- a draft final report to be presented 2 months before the end of phase 4
- a final report at the end of phase 4 indicating:
  - what was done in the project
  - challenges faced
  - analysis of performance and lessons learned
  - analysis of sustainability
  - maintenance report at the end of phase 4
  - 15-page executive summary that can be read by a non-specialist



Work package number	WP2								
Work package title	Data collection and metadata compilation								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	OGS	MARIS	NERC-BODC	IFREMER	BSH-DOD	IMR	NERI-MAR	VLIZ	RBINS-MUMM
Involved	X		X	X	X	X	X	X	X
Participant number	10	11	12	13	14	15	16	17	18
Participant short name	NIOZ	SMHI	HCMR	RIHMI-WDC	SIO-RAS	MHI	IO-BAS	NIMRD	TSU-DNA
Involved	X	X	X	X	X	X	X	X	X
Participant number	19	20	21	22	23	24	25		
Participant short name	ICES	AWI	ULG	IEO	CLS	MI	OC-UCY		
Involved	X			X			X		

### Objectives

- To gather all identified chemical data sets into the NODC databases
- To compile metadata for all chemical data sets in CDI format

### Description of work:

Right after the start the partners will discuss and formulate an effective method for gathering and preparing the data sets from the data centres and identified other data sources, including related documentation. The V1 standards of SeaDataNet will be adopted and where needed, extended for:

- Metadata: the Common Data Index (CDI) metadata profile has been defined, based on ISO 19115
- Data formats: for profiles, time series and trajectories the SeaDataNet ODV ASCII data format has been defined as the SeaDataNet output format and directly suited for import into the ODV and DIVA software
- Common vocabularies, governed by an international board and provided as Web services, for describing parameters, platforms, instruments, etc

### Adopting the CDI metadataformat and tools:

The Common Data Index (CDI) is the central discovery service in SeaDataNet enabling users to have a detailed insight of the availability and geographical extent of marine data, archived at the connected data centres. It gives the description of individual data sets and measurements with key fields (what, where, when, how, who etc.). It also provides the linking pin from the discovery services towards the delivery services, because it is directly related to the data sets, to which the users can request access. Users can freely search and browse the CDI discovery services and identify relevant data sets. The CDI User Interface includes a shopping basket and transaction processing mechanism, by which users can request access to selected data sets. Access is given as downloading services, whereby the data sets can be downloaded by users from the data centres in the SeaDataNet ODV ASCII data exchange formats.

Considerable work has been undertaken, first in Sea-Search and later in its successor SeaDataNet, to define the CDI metadata format (xml) and XML schema (xsd) as an extended profile of the ISO 19115 standard for geographical data sets. The latest version makes use of standard mark-up terms, wherever possible, which are managed in the Common Vocabularies, while for Organisation information, standard references are included to the EDMO – European Directory of Marine Organisations. Furthermore tools and services have been developed for generating CDI XML records from the data management systems of data centres, a CDI XML validation Web service, parsing the CDI XML records against an extended CDI schema including vocabularies support, and tools for

importing CDI records into the central SeaDataNet CDI Directory and its Portal User Interface. The latter includes a combined alphanumeric – geographical interface.

**Adopting and extending the SeaDataNet Common Vocabularies:**

The SeaDataNet Vocabulary Web services have been set-up to provide ‘controlled vocabularies’, which are used to mark up the CDI metadata and to label data. These common vocabularies provide access to lists of standardised terms that cover a broad spectrum of disciplines of relevance to the oceanographic and wider community. Using standardised sets of terms solves the problem of ambiguities associated with data markup and also enables records to be interpreted by computers.

Content governance of these vocabularies is very important to stay up-to-date and synchronised with ongoing developments. Therefore a combined SeaDataNet and MarineXML Vocabulary Content Governance Group (SeaVoX) has been set up, moderated by NERC (BODC), and with active membership from experts from SeaDataNet, MMI, MOTIIVE, JCOMMOPS and further international groups. SeaVox operates by mailing list server.

The common vocabularies comprise various lists, such as related to variables, but also other relevant topics, such as sea area names, platform classes, instrument types, and so on. Already the vocabularies comprise various terms from the chemical domain, but these have to be validated and where needed, extended for the EMODNET Chemical pilot. In practice this will be done by proposing additions or modifications to the international SeaVox governance group, that will respond quickly by accepting or denying proposed items. If accepted, these terms will be added to the operational vocabularies via the moderator NERC (BODC).

**Adopt the SeaDataNet standards for transport of chemical data**

The access to data sets in SeaDataNet V1 and the EMODNET pilot is restricted to downloading services. Users are able to download selected data sets in a common exchange format. For the chemical data the standard ODV ASCII data format will be adopted. A JavaTool (NEMO) is available to support other data centres in a local conversion from their in-house formats to the ODV ASCII format.

A guideline document will be prepared, including these standards and available tools, that will be applied for preparing all data sets in the EMODNET chemical pilot and for facilitating the process of gathering and organising data sets from other data sources into the SeaDataNet infrastructure.

Using the guideline and tools all relevant data sets at the data centres will be prepared and described with CDI metadata, where still needed. Moreover identified data sets from other data sources will be gathered, loaded into the SeaDataNet NODC databases and described with CDI metadata.

The CDI population and maintenance will include sub-activities:

- Analysis of the formats and local availability of metadata at partners
- Mapping and local editing activities
- Compiling and validating a first test batch of metadata
- Compilation and/or updating of the metadata by the data centres and validation
- Importing into the central CDI directory

These activities will take place in Phase 1 of the project and will provide the data sets, that together form the pilot collection.

Taskleader Greater North Sea area: NERI-MAR

Taskleader Black Sea: MHI

Taskleader Mediterranean spots: NCMR  
Overall Taskleader: NERI-MAR

**Deliverables :**

- Guideline with standards for metadata, data format, and vocabularies and procedure for gathering data sets
- Data sets from data centres available in standard formats and included in CDI
- Data sets from other data centres gathered and loaded into the SeaDataNet infrastructure in standard data format and included in CDI

Work package number	WP3								
Work package title	Quality Control / Quality Assurance and Products								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	OGS	MARIS	NERC-BODC	IFREMER	BSH-DOD	IMR	NERI-MAR	VLIZ	RBINS-MUMM
Involved	X		X	X	X	X	X	X	X
Participant number	10	11	12	13	14	15	16	17	18
Participant short name	NIOZ	SMHI	HCMR	RIHMI-WDC	SIO-RAS	MHI	IO-BAS	NIMRD	TSU-DNA
Involved	X	X	X	X	X	X	X	X	X
Participant number	19	20	21	22	23	24	25		
Participant short name	ICES	AWI	ULG	IEO	CLS	MI	OC-UCY		
Involved	X	X	X	X		X			

### Objectives

- To define a standard QC and QA method
- To validate and to harmonise the quality of all chemical data sets
- To generate integrated and high quality map products for selected parameters
- To generate indicators about accuracy and reliability

### Description of work:

The chemical data are very diverse in terms of data type, analytical methodology and quality. Spatial and temporal coverage of the chemical data tend to be very inhomogeneous, and in cases of time series, it is common that sampling and measurement techniques have been frequently modified over time. These complications make it necessary to apply rigid quality control procedures before the data are released to the public and are used to produce scientific products, such as distribution maps or temporal evolution plots.

Partner ICES will lead the way in defining the Quality Control procedures, that will be applied in the project to screen and to validate all the gathered chemical data sets from WP2 by the NODC's.

Robust and effective quality assurance routines must be applied to all data sets, to identify data inconsistencies and outliers out of expected ranges. This will be undertaken in accordance with the standard practices and procedures utilised within ICES for data collected on behalf of OSPAR and HELCOM - as much of this data is - also relevant to Marine indicators work with the EEA, it also applies there.

The ICES experience is especially triggered to chemical data sets for ICES, OSPAR and HELCOM sea regions. The Mediterranean Sea and Black Sea communities have considerable experience with joint QC/QA activities through the MEDAR/MEDATLAS Projects, in which the ICES Hydrographer was involved as advisor. (see e.g. <http://www.ifremer.fr/medar/quality.htm>). Therefore extra attention will be given in the preparatory phase to defining a balanced approach for the different geographical areas, taking into account the ICES and the MEDAR/MEDATLAS experiences.

There are Conventions for each of the geographical regions (HELCOM, OSPAR, MAP and the Commission on the protection of the Black Sea against Pollution), joined by the Member States, which are involved and experienced in regional assessments. For the EMODNET pilot it can be very useful to consult with the Conventions during the pilot, e.g. for products definition, also because the EMODNET Chemical portal has the potential to become an important instrument for the work of the

Conventions. Therefore it is suggested to the EU to initiate such a cooperation.

**Guideline with methodology and software:**

A guideline will be prepared with the prescribed methodology for quality control and quality flags to be used. This will be the result of the analysis described above, combining the ICES and MEDAR/MEDATLAS experiences.

The data centres will use software packages for the Quality Control of all the collected data sets. Many data centers already have their in-house software, that will be configured according to the agreed methodology and quality flag scale. E.g. in the Mediterranean Sea and Black Sea communities many make use and are very familiar with the MEDATLAS QC software tools. As an alternative partners can adopt the latest version of the Ocean Data View software (ODV; <http://odv.awi.de>).

Ocean Data View (ODV) is a software package for the interactive exploration, analysis and visualization of oceanographic and other geo-referenced profile or sequence data, that is available for all major computer platforms and currently has more than 10,000 registered users. ODV has a very rich set of interactive capabilities and a very wide range of supported plot types. This makes ODV ideal for visual and automated quality control. The latest release, ODV4, developed as part of SeaDataNet, overcomes many limitations of previous versions and now supports more flexible metadata models, an unlimited number of variables and custom quality flag schemes, and is fit for loading data sets in the SeaDataNet ODV ASCII format.

A training course will be organized to train data centre personal to apply the common QC methods and software tools efficiently for visual and automated data quality control as well as quality flagging. In addition, also the latest version of the DIVA/ODV software package will be provided that allows facilitated usage of advanced gridding methods for production of a great variety of data plot types. Heterogeneously distributed datasets, such as the ones covered in the EMODNET chemical pilot, pose special problems to gridding algorithms. Support will be given to data centres to ensure proper usage of these methods.

**Quality Control and Quality Assurance:**

After this preparatory phase all NODC's will validate their data sets in the standard procedure, using the common tools. This is essential to ensure high quality, and harmonized data sets.

But the overall quality of this distributed QC must also be assured. Therefore it is planned that the QC processed data sets will be forwarded to ICES for additional Quality Assurance. ICES will load the received data in one of the ICES Databases, where the consistency of the data will be checked. The fundamental chemical parameter data are exchanged with the WDC for Oceanography (USA) for comparison and checking against their data and checking routines, this acts as an external check on data coming into ICES.

Furthermore it is considered to seek assistance of the ICES assessment working groups. These working groups have defined guidelines and quality criteria specified for OSPAR/HELCOM assessments and they analyse all relevant data held in the ICES Data Centre that relate to the assessment. The data is filtered and ranked according to specific quality criteria, for example the chemical measurements that originate from national laboratories that pass the QUASIMEME intercalibration exercise (external assessment of the quality of the laboratories ability to accurately measure chemical parameters in the marine environment) are given a higher ranking. As an example in the OSPAR MON assessment no data would be excluded, but data of good quality would be weighted more strongly (weight 1,0) than data with poor or absent QA information (weight 0,2).

Afterwards the NODC's will be informed of the assessment results and which data failed to be included in the assessment. This will result in improving the quality of the local databases at the NODC's and thus the overall quality of the EMODNET chemical pilot database. Feedback will be provided to the original data owner/supplier and any problems with the data will be discussed, resolved and/or documented as appropriate. This information will be stored alongside the data as part of the data documentation.

**Data products:**

An important objective of the EMODNET Chemical pilot is to prepare integrated data products by means of maps, that can be provided to users via viewing services to illustrate variability in space and time and trends in time of the given chemical parameters. Preparing these maps, which can be delivered as GIS layers or via WMS services, requires interpolation of available data sets.

In practice, the in-situ measurements of chemical data are often sparse and heterogeneously distributed. The DIVA software tool (Data-Interpolating Variational Analysis) allows to spatially interpolate (or analyse) those observations on a regular grid in an optimal way. The analysis is performed on a finite element grid allowing for a spatial variable resolution and a good representation of the coastline and isobaths. As some areas covered in this project have complex coastlines, the finite-element grid of DIVA will be able to adequately resolve those.

The signal-to-noise ratio and correlation length are crucial parameters describing the covariance function. They can be estimated by computing an empiric covariance function from the observations or by generalized cross-validation. The covariance function used for the analysis takes the topography into account and avoids spurious propagation of information across islands. The more realistic the covariance function is, the more accurate the analysis will be. This is particularly useful for datasets with low spatial coverage as the variables considered in this tender.

It is also possible to compute error maps for the gridded fields which reflect the accuracy of the observations and their distribution. This allows to assess the reliability of the gridded fields and to objectively identify areas with poor coverage. In an approach similar to the generalized cross-validation, the value of the gridded fields without taking a particular observation into account can also be computed. By comparing this analysed value with the observations, one can establish how consistent one particular observation is with the remaining dataset. This information can be used by the data centres to identify bad data.

This method has been integrated into ODV, and the integration greatly facilitates the usage of DIVA. Features supported by the ODV/DIVA integration include proper treatment of domain separation due to land masses and undersea ridges or seamounts and the realistic estimation of water mass properties on both sides of the divides. This is important in areas, such as the Kattegat, with many islands separated by narrow channels.

The DIVA software can also load the data sets, prepared via the MEDATLAS QC software and other in-house QC systems. The command line interface of DIVA allows for batch processing of large data sets.

The DIVA software is thus an important tool next to MEDATLAS QC, ODV and other in-house QC software for the Quality Control process and moreover for preparing integrated maps for selected parameters. Using DIVA will be included in the initial training.

The actual production of integrated maps for the selected geographic regions will be undertaken, once all data sets have undergone QC and QA. Data sets from all data centres will be retrieved via the SeaDataNet infrastructure and aggregated into pools of data for specific parameters, that are loaded into ODV/DIVA for expert interpolation and visualization, resulting in high quality maps. These maps will be transferred to a GIS environment.

Note: ICES is already producing products for OSPAR and HELCOM. It can be a valuable exercise to generate some of these also with the new EMODNET chemical data.

The maps will also be suited to exchange with other initiatives, e.g. via the WMS services:

- for the prototype European Atlas of the Seas
- to support the broad-scale European Marine Habitats map
- for the pilot project for Environmental Monitoring in Black Sea
- for environmental reporting in WISE-Marine

Taskleader: ICES

**Deliverables :**

- Guideline with standard procedure and tools for QC/QA of chemical data sets in the European sea regions
- All chemical data sets processed and quality controlled in the NODC databases
- Gridded fields of selected parameters representing climatological averages
- Error maps to reflect the accuracy and the distribution of the observations

Work package number	WP4								
Work package title	Technical development and operation of the portal								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	OGS	MARIS	NERC-BODC	IFREMER	BSH-DOD	IMR	NERI-MAR	VLIZ	RBINS-MUMM
Involved	X	X	X	X	X				
Participant number	10	11	12	13	14	15	16	17	18
Participant short name	NIOZ	SMHI	HCMR	RIHMI-WDC	SIO-RAS	MHI	IO-BAS	NIMRD	TSU-DNA
Involved			X	X					
Participant number	19	20	21	22	23	24	25		
Participant short name	ICES	AWI	ULG	IEO	CLS	MI	OC-UCY		
Involved		X	X		X				

### Objectives

- To develop and launch the EMODNET portal and services
- To keep the website and services operational, including monitoring

### Description of work:

A dedicated website and portal will be developed for the EMODNET Chemical portal. The website gives background and progress information about the project and is maintained via an online Content Management System. It will also give information on the QC/QA procedures, formats and involved partners.

One of the core services of the EMODNET Chemical portal is the Common Data Index (CDI) User Interface including its services for accessing and downloading data sets. This can be realised virtually with its own look & feel and chemicals subset, while it is driven by the underlying central SeaDataNet Common Data Index database, interface and infrastructure of connected data centres.

The effect will be that users can search and retrieve data sets via the dedicated EMODNET Chemical portal, but also in a wider data context via the SeaDataNet portal.

Further core services of the EMODNET Chemical portal are the catalogue and viewing services for the integrated maps of selected parameters. This is implemented by adopting the product catalogue services as developed earlier within the framework of MERSEA and recently updated within ECOOP. The catalogue gives an ISO 19115 metadata description for each standard product, including instances of products (each month, season, at different vertical depths, etc.). The metadata relate to the actual maps that can be retrieved and viewed via WMS services (OGC). The maps can be enriched by a layer of the actual observations, as included in the CDI directory. Clicking on observations leads to CDI details and thus to options for requesting access to the underlying data set.

These technical developments can be combined with comparable planned activities for SeaDataNet V2, which again gives crossfertilization and a cost effective approach, in particular for the EMODNET Chemical pilot. It also makes these functionalities feasible in the limited timeframe of the EMODNET building phase.

The EMODNET website is launched within 2 months after the project start and also will include an extranet for project documentation. The EMODNET core services are launched, once the data sets have been fully processed and the data products have been prepared. This is planned in Month 12, to



conclude the Phase 1 of the project.

Thereafter the website and services are kept operational and monitoring data are collected via general web statistics (e.g. via the Open Source software for web statistics AW Stats) and via the actual user transactions, that are registered in the portal via its Request Status Manager (RSM) module. This gives useful information about users, data centres, data requests (what and when). That information gives input to WP5 Analysis and Evaluation.

Input is expected from the meeting with the other portals (biological, geological and hydrographic), and WISE-MARINE, which seek for interlinking and tuning functionalities. These upgrades will be undertaken in Phase 3, if feasible and not beyond budget, and added to the portal.

Then, in Phase 4, the website and core services will run operationally for another 12 months, thereby collecting more user feedback. It is expected that the user feedback from WP5 in this phase will generate requests for additional useful and extra functionalities or upgrades of existing features of the portal. These requests will be collected for the analysis report. Selected upgrades will be undertaken in Phase 4, if feasible, not beyond budget and really giving added-value.

Taskleader: MARIS

**Deliverables :**

- Dedicated website with project information, maintained by CMS
- EMODNET CDI Core service for discovery and delivery of chemical data sets
- EMODNET Products Core service for discovery of maps and viewing of maps via WMS
- EMODNET metadata integrated into the SeaDataNet portal to serve extra users and to merge with other multi-disciplinary data sets
- Upgraded services
- Monitoring data about visits and usage

Work package number	WP5								
Work package title	Analysis and evaluation								
Participant number	1	2	3	4	5	6	7	8	9
Participant short name	OGS	MARIS	NERC-BODC	IFREMER	BSH-DOD	IMR	NERI-MAR	VLIZ	RBINS-MUMM
Involved	X	X	X				X		
Participant number	10	11	12	13	14	15	16	17	18
Participant short name	NIOZ	SMHI	HCMR	RIHMI-WDC	SIO-RAS	MHI	IO-BAS	NIMRD	TSU-DNA
Involved			X	X					
Participant number	19	20	21	22	23	24	25		
Participant short name	ICES	AWI	ULG	IEO	CLS	MI	OC-UCY		
Involved		X	X		X				

### Objectives

- To report on the effectiveness of the system in meeting the needs of users
- To analyse what further steps need to be taken for improvement, expansion and sustainability

### Description of work:

The portal will run in pre-operational mode in Phase 2 and in full operational mode for at least 6 months in Phase 4. During this time statistics will be collected (number of hits, amount and type of data used, purpose for which it is intended). During phase 4 users will be questioned about their experiences and their assessment of ease-of-use and fitness for purpose of the data. A report on intensity of use as well as possible improvements relating to the ease of use of the portal will be submitted as part of the final report. All communications of users by e-mail to the portal will be logged and annexed to the report. Ease of use improvements will be implemented by the end of the contract, if feasible, not beyond budget and really giving added-value.

An analysis of the lessons learned during this project will be prepared, including analysis of:

- The main barriers to the provision of data by data holders – scientific (uncertainties in measuring or obtaining indicator for required parameters), institutional (willingness of bodies to share data), legal (rules limiting access to data), commercial (cost of data), information technology (formats, standards, information systems) and financial (effort required to prepare data). The contractor will suggest a plan outlining how to overcome those barriers.
- The challenges to rendering data interoperable including different measurement techniques, different baselines, different standards, different nomenclature etc. The contractor should indicate what steps that might be taken by data holders or the portal operator to improve interoperability.
- The challenges to producing contiguous data over a maritime basin from fragmented, inhomogeneous data and how to overcome these challenges.
- The fitness for purpose of the data for measuring ecosystem health of the maritime basin and what might be done to overcome any shortcomings.
- The priorities and effort required for improving the accuracy, precision and coverage of the data collated including a description of how an appropriate data quality assurance and control system can be established.
- The performance of the chosen portal technology in terms of speed of response, user-friendliness.

Finally a set of recommendations will be prepared as part of the final project report describing what

would be necessary for the overall EMODNET to remain as a sustained infrastructure. This will cover at least recommendations on:

- availability of standard procedures facilitating data flow,
- maintenance,
- the model for governance by actors in the system,
- the institutional setting,
- required resources including cost.

Taskleader: NERC-BODC

**Deliverables :**

- report on the effectiveness of the system in meeting the needs of users
- report on analysis of the lessons learned
- set of recommendations for sustainability of the infrastructure

03 OCT 2008

Stamp, date and signature of tenderer



IL PRESIDENTE  
Iginio Marson

Greater North Sea

PARAMETER GROUP (choose between Synthetic compounds, Heavy metals, Hydrocarbons including oil pollution, Radionuclides, Fertilisers and other nitrogen- and phosphorus-rich substances, Organic matter)	Parameters (indicate unit of measure and precision)	National collator (= NODC)	Data Holding Organization	No of meas. (specify data volume)	Spatial coverage (specify region covered by the data)	Temporal coverage (specify start and end of data series with sampling interval)	Data Policy (refer to SDN Vocabulary L081)	Monitoring System (specify if data are part of a continuous monitoring programme)
MATRIX (choose between Sediment, Water column, Biota)	Synthetic compounds, Heavy metals, Hydrocarbons including oil pollution, Radionuclides, Fertilisers and other nitrogen- and phosphorus-rich substances, Organic matter)	NERC/BODC	NERC/BODC	5 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Monitoring System (specify if data are part of a continuous monitoring programme)
Sediment	Brominated Flame Retardants (17), TB Tin, Chlorinated Biphenols (>7). (ng/g)	NERC/BODC	NERC/BODC	5 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Sediment	Heavy metals	NERC/BODC	NERC/BODC	5 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Sediment	Hydrocarbons including oil pollution	NERC/BODC	NERC/BODC	5 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Sediment	Organic matter	NERC/BODC	NERC/BODC	5 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Water (marine)	Fertilisers and other phosphorus-rich substances	NERC/BODC	NERC/BODC	5 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Water (marine)	Synthetic compounds	NERC/BODC	NERC/BODC	5 replicates at approximately 8 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Water (marine)	Heavy metals	NERC/BODC	NERC/BODC	5 replicates at approximately 8 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence
Water (marine)	Hydrocarbons including oil pollution	NERC/BODC	NERC/BODC	5 replicates at approximately 8 stations	North Sea, English Channel	1999-2008 annual	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'. licence

Water (riverine input)	Fertilisers and other nitrogen- and phosphorus-rich substances	NO3, NO2, SiO2, PHOS, NH4	NERC/BODC	NERC/BODC	NERC/BODC	Approximately 20 stations	North Sea, English Channel	1999-2008 monthly sampling reported as annual inputs to regions 1999-2008	licence	Data form part of the UKs contribution to OSPAR RID. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Water (riverine input)	Heavy metals	Cd, Hg, Pb, Zn, Cu, As, Ni, Fe, Al, Mn (ug/g or ng/g)	NERC/BODC	NERC/BODC	NERC/BODC	Approximately 20 stations	North Sea, English Channel	1999-2008 monthly sampling reported as annual inputs to regions 1999-2008	licence	Data form part of the UKs contribution to OSPAR RID. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Water (riverine input)	Synthetic compounds	Chlorinated Biphenols (>7). (ng/g)	NERC/BODC	NERC/BODC	NERC/BODC	Approximately 20 stations	North Sea, English Channel	1999-2008 monthly sampling reported as annual inputs to regions 1999-2008	licence	Data form part of the UKs contribution to OSPAR RID. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Biota (mussels)	Synthetic compounds	Brominated Flame Retardants (17), TB Tin, Chlorinated Biphenols (>7). (ng/g)	NERC/BODC	NERC/BODC	NERC/BODC	4 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Biota (mussels)	Heavy metals	Cd, Hg, Pb, Zn, Cu, As, Ni, Fe, Al, Mn (ug/g or ng/g)	NERC/BODC	NERC/BODC	NERC/BODC	4 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Biota (mussels)	Hydrocarbons including oil pollution	PAHs (>9) and alkyl PAHs (>12) (ng/g)	NERC/BODC	NERC/BODC	NERC/BODC	4 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Biota (mussels)	Organic matter	Carbon and Nitrogen (%)	NERC/BODC	NERC/BODC	NERC/BODC	4 replicates at approximately 20 stations	North Sea, English Channel	1999-2008 annual	licence	Data form part of the UKs contribution to OSPAR CEMP. In UK the monitoring programme is titled 'The Clean Seas Environmental Monitoring Programme (previously NMMP)'.
Sediment	Synthetic compounds	Pesticide [ug/kg]	BSH	BSH	BSH	4017	North Sea	1986 - 2006	licence/academic	yes
Sediment	Synthetic compounds	Furan [ng/kg]	BSH	BSH	BSH	24	North Sea	15.06.1998 - 10.06.1999	licence/academic	yes
Sediment	Synthetic compounds	BDE [ug/kg]	BSH	BSH	BSH	18	North Sea	31.05.2005 - 31.05.2005	licence/academic	no
Sediment	Synthetic compounds	Chlorobenzene [ug/kg]	BSH	BSH	BSH	2631	North Sea	03.08.1986 - 31.08.2006	licence/academic	yes
Sediment	Synthetic compounds	Organochlorine [ug/kg]	BSH	BSH	BSH	1651	North Sea	03.08.1986 - 31.08.2006	licence/academic	yes
Sediment	Synthetic compounds	Solvent [ug/kg]	BSH	BSH	BSH	75	North Sea	1997 - 2002	licence/academic	yes
Sediment	Synthetic compounds	TBT [ug/kg]	BSH	BSH	BSH	2098	North Sea	1997 - 2006	licence/academic	yes
Sediment	Synthetic compounds	HCH [ug/kg]	BSH	BSH	BSH	3115	North Sea	1986 - 2006	licence/academic	yes
Sediment	Synthetic compounds	Nitro compound [ug/kg]	BSH	BSH	BSH	80	North Sea	1990 - 2002	licence/academic	yes
Sediment	Synthetic compounds	PFPC [ug/kg]	BSH	BSH	BSH	72	North Sea	19.05.2004 - 26.05.2004	licence/academic	no
Sediment	Synthetic compounds	PCB [ug/kg]	BSH	BSH	BSH	8224	North Sea	1984 - 2007	licence/academic	yes
Sediment	Synthetic compounds	PAH [ug/kg]	BSH	BSH	BSH	9006	North Sea	1990 - 2007	licence/academic	yes

Sediment	Synthetic compounds	Phenols [µg/kg]	BSH	BSH	4201	North Sea	1992 - 2006	license/academic	yes
Sediment	Synthetic compounds	DDT [µg/kg]	BSH	BSH	3900	North Sea	1986 - 2007	license/academic	yes
Sediment	Synthetic compounds	Dioxin [ng/kg]	BSH	BSH	18	North Sea	15.06.1998 - 10.06.1999	license/academic	yes
Sediment	Heavy metals	cadmium, chromium, cobalt, copper, ..titanium, ..zinc [mg/kg], [g/kg]	BSH	BSH	52800	North Sea	1975 - 2007	license/academic	yes
Sediment	Radionuclides	americium-241, antimony-125, beryllium-7, cerium-144, cesium-134, cesium-137, cobalt-60, curium-244, europium-154, europium-155, lead-210, niobium-95, plutonium-238, plutonium-239/240, potassium-40, radium-226, ruthenium-106, thorium-232 (actinium-228), uranium-238 (thorium-234), zirconium-95 [Bq/kg]	BSH	BSH	36602	North Sea	06.06.1990 - 21.06.2004	license/academic	yes
Sediment	Fertilisers and other nitrogen- and phosphorus-rich substances	total nitrogen in dry sediment [g/kg], total phosphorus in dry sediment [mg/kg]	BSH	BSH	3342	North Sea	1975 - 2007	license/academic	yes
Sediment	General chemical	calcium carbonate in dry sediment, inorganic carbon in dry sediment, total organic carbon in dry sediment [g/kg]	BSH	BSH	5457	North Sea	1975 - 2007	license/academic	yes
Water column	Synthetic compounds	Pesticide [µg/kg]	BSH	BSH	10575	North Sea	1984 - 2007	license/academic	yes
Water column	Synthetic compounds	Chlorobenzene [µg/kg]	BSH	BSH	4400	North Sea	1984 - 2006	license/academic	yes
Water column	Synthetic compounds	Solvent [µg/kg]	BSH	BSH	2611	North Sea	1984 - 2004	license/academic	yes
Water column	Synthetic compounds	Organochlorine [µg/kg]	BSH	BSH	2916	North Sea	03.01.1994 - 03.01.1994	license/academic	no
Water column	Synthetic compounds	HCH [µg/kg]	BSH	BSH	13515	North Sea	1984 - 2007	license/academic	yes
Water column	Synthetic compounds	Nitro compound [µg/kg]	BSH	BSH	156	North Sea	23.01.1997 - 09.11.1998	license/academic	yes?
Water column	Synthetic compounds	PFC [µg/kg]	BSH	BSH	324	North Sea	10.08.2005 - 03.09.2005	license/academic	yes?
Water column	Synthetic compounds	PCB [µg/kg]	BSH	BSH	20051	North Sea	1984 - 2007	license/academic	yes
Water column	Synthetic compounds	PAH [µg/kg]	BSH	BSH	17416	North Sea	1990 - 2006	license/academic	yes
Water column	Synthetic compounds	Phenols [µg/kg]	BSH	BSH	284	North Sea	1994 - 2002	license/academic	yes
Water column	Synthetic compounds	DDT [µg/kg]	BSH	BSH	4226	North Sea	1990 - 2007	license/academic	yes
Water column	Heavy metals	cadmium, chromium, cobalt, copper, ..titanium, ..zinc in pore water [µg/l]	BSH	BSH	52800	North Sea	1975 - 2007	license/academic	yes
Water column	Hydrocarbons including oil pollution	Oil	BSH	BSH	15742	North Sea	1990 - 2006	license/academic	yes

Water column	Radionuclides	americium-241, antimony-125, beryllium-7, cesium-134, cesium-137, cobalt-60, curium-244, lead-210, plutonium-238, plutonium-239, plutonium-241, potassium-40, radium-226, ruthenium-106, strontium-90, technetium-99, thorium-232 (actinium-228), tritium, uranium-238 (thorium-234) [3q/kg]	BSH	BSH	17546	North Sea	23.07.1980-24.06.2005	license/academic	yes
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	ammonium, hydrogen sulphide, total nitrogen, nitrate, nitrite, phosphate, total phosphorus, silicate, siliciumdioxide in sea water	BSH	BSH	407596	North Sea	1962 - 2008	license/academic	yes
Water column	General Chemical		BSH	BSH	5457	North Sea	1975 - 2007	license/academic	yes
Water	Nutrients	ammonium, nitrate + nitrite, phosphate, silicate in sea water	BSH	BSH	125318	North Sea	1998 - 2005 (timeseries)	license/academic	yes
Biota	Synthetic compounds	PCB [µg/kg]	BSH	BSH	15946	North Sea	1990 - 2007	license/academic	yes
Biota	Synthetic compounds	Pesticide [µg/kg]	BSH	BSH	2686	North Sea	1990 - 2006	license/academic	yes
Biota	Synthetic compounds	DDT [µg/kg]	BSH	BSH	5292	North Sea	1993 - 2006	license/academic	yes
Biota	Synthetic compounds	HCH [µg/kg]	BSH	BSH	5899	North Sea	1990 - 2006	license/academic	yes
Biota	Heavy metals	cadmium in organisms [µg/kg]	BSH	BSH	1559	North Sea	1995 - 2007	license/academic	yes
Biota	Heavy metals	zinc in organisms [µg/kg]	BSH	BSH	1904	North Sea	1994 - 2007	license/academic	yes
Biota	Heavy metals	mercury in organisms [µg/kg]	BSH	BSH	1832	North Sea	1994 - 2007	license/academic	yes
Biota	Heavy metals	copper in organisms [µg/kg]	BSH	BSH	1915	North Sea	1994 - 2007	license/academic	yes
Biota	Heavy metals	chromium in organisms [µg/kg]	BSH	BSH	957	North Sea	1995 - 2004	license/academic	yes
Biota	Heavy metals	lead in organisms [µg/kg]	BSH	BSH	1633	North Sea	1995 - 2007	license/academic	yes
Biota	Heavy metals	silver in organisms [µg/kg]	BSH	BSH	29	North Sea	1999 - 2003	license/academic	yes
Biota	Heavy metals	arsenic in organisms [µg/kg]	BSH	BSH	952	North Sea	1994 - 2004	license/academic	yes
Biota	Heavy metals	nickel in organisms [µg/kg]	BSH	BSH	63	North Sea	1997 - 2003	license/academic	yes
Water column	Fertilisers	DIN, DIP, TN, TP	SMHI	SMHI	21 national monitoring stations	Eastern North Sea, Baltic Sea: Coastal and off-shore waters	1960- monthly from 90ies	Data are publicly available	Data are included in national and regional monitoring, and are currently reported by SMHI to EEA, ICES, HELCOM & OSPAR
Mussels, Fish, Sediment	Synthetic compounds	TBT compounds, Organochlorines, PBDEs, Dioxins, PAHs, PFOS, Phthalates, Nonylphenol	SMHI	IVL, SGU, Naturhistoriska Riksmuseet	21 national monitoring stations	Eastern North Sea, Baltic Sea: Coastal and off-shore waters	2000- 1-2 times/year	Data are publicly available	Data are included in national and regional monitoring, and are currently reported by SMHI to EEA
Mussels, Fish, Sediment	Heavy metals	Hg, Cd, Ni, Cu, Zn, Pb, etc.	SMHI	IVL, SGU, Naturhistoriska Riksmuseet	21 national monitoring stations	Eastern North Sea, Baltic Sea: Coastal and off-shore waters	2000- 1-2 times/year	Data are publicly available	Data are included in national and regional monitoring, and are currently reported by SMHI to EEA
Mussels	Synthetic compounds	TBT compounds, Organochlorines, PBDEs, Dioxins, PFOS	NER/MAR	NER/MAR	Medium - 35 samples/stations pr. year	High spatial: North Sea, Skagerrak Kattegat Belt Sea, Western Baltic Sea	1998 - 2008 Temporal coverage high	SR (academic)	Regional: NOVANA Int.: OSPAR continuous monitoring programme
Sediment	Synthetic compounds	TBT compounds, Organochlorines, PBDEs, Dioxins, PFOS, Phthalates, Nonylphenol	NER/MAR	NER/MAR	Medium - 50 samples/stations every sixth year	Medium spatial: North Sea, Skagerrak Kattegat Belt Sea, Western Baltic Sea	1998 - 2008 Temporal coverage low	SR (academic)	Regional: NOVANA Int.: OSPAR continuous monitoring programme

Mussels and Fish	Heavy metals	Hg, Cd, Ni, Cu, Zn, Pb, etc.	NERI/MAR	NERI/MAR	Medium - 35 samples/stations pr. year	High spatial: North Sea, Skagerrak Kattegat Belt Sea, Western Baltic Sea	1998 - 2008 Temporal coverage high SR (academic)	Regional: NOVANA Int.: OSPAR continuous monitoring programme
Sediment	Heavy metals	Hg, Cd, Ni, Cu, Zn, Pb, etc.	NERI/MAR	NERI/MAR	Medium - 50 samples/stations every sixth year	Medium spatial: North Sea, Skagerrak Kattegat Belt Sea, Western Baltic Sea	1998 - 2008 Temporal coverage low SR (academic)	Regional: NOVANA Int.: OSPAR continuous monitoring programme
Water column	Fertilisers	N, P	NERI/MAR	NERI/MAR	Large - about 75,000 samples in total for the years 1998-2008	High spatial: Skagerrak Kattegat Belt Sea, Western Baltic Sea	1998 - 2008 Temporal coverage very high SR (academic)	Regional: NOVANA continuous monitoring programme - back to 1972 at least
Water column	Synthetic compounds	Antifouling agents and Pesticides	NERI/MAR	NERI/MAR	Small - 20 samples in total	Low spatial: Kattegat, Belt Sea	1998 - 2003 Temporal coverage low SR (academic)	Regional: NOVANA stop at the moment
Mussel and Hydrocarbons including Sediment oil pollution	PAH	PAH	NERI/MAR	NERI/MAR	Medium - 35 samples/stations pr. year	Medium spatial: Skagerrak Kattegat Belt Sea, Western Baltic Sea	1998 - 2008 Temporal coverage high SR (academic)	Regional: NOVANA continuous monitoring programme
Water column	General Chemical	See attached table	ICES	See attached table	See attached table	North Sea	See attached table	
Sediment	Contaminants	CB153	ICES	Belgium	7	North Sea	1990-1991	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Belgium	14	North Sea	1990-1991	LI (licence)
Sediment	Contaminants	CB153	ICES	Germany	698	North Sea	1987-2005	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Germany	2371	North Sea	1985-2006	LI (licence)
Sediment	Contaminants	CB153	ICES	Denmark	117	North Sea	1999-2003	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Denmark	192	North Sea	1988-2003	LI (licence)
Sediment	Contaminants	CB153	ICES	UK	1827	North Sea	1990-2006	LI (licence)
Sediment	Contaminants	Cadmium	ICES	UK	2620	North Sea	1986-2006	LI (licence)
Sediment	Contaminants	CB153	ICES	Ireland	19	North Sea	1993-1995	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Ireland	109	North Sea	1990-1995	LI (licence)
Sediment	Contaminants	CB153	ICES	Netherlands	341	North Sea	1985-2006	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Netherlands	340	North Sea	1985-2006	LI (licence)
Sediment	Contaminants	CB153	ICES	Norway	175	North Sea	1990-2004	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Norway	353	North Sea	1986-2004	LI (licence)
Sediment	Contaminants	Dieldrin	ICES	Norway	123	North Sea	1990-1990	LI (licence)
Sediment	Contaminants	CB153	ICES	Norway	8	North Sea	1990-1990	LI (licence)
Sediment	Contaminants	Cadmium	ICES	Sweden	8	North Sea	1990-1990	LI (licence)
Biota	Contaminants	CB153	ICES	Belgium	587	North Sea	1990-2006	LI (licence)
Biota	Contaminants	Cadmium	ICES	Belgium	953	North Sea	1979-2006	LI (licence)
Biota	Contaminants	Dieldrin	ICES	Belgium	560	North Sea	1983-2006	LI (licence)
Biota	Contaminants	CB153	ICES	Germany	2338	North Sea	1986-2004	LI (licence)
Biota	Contaminants	Cadmium	ICES	Germany	1298	North Sea	1985-2003	LI (licence)
Biota	Contaminants	Dieldrin	ICES	Germany	298	North Sea	1979-2004	LI (licence)
Biota	Contaminants	CB153	ICES	Denmark	731	North Sea	1985-2006	LI (licence)
Biota	Contaminants	Cadmium	ICES	Denmark	2243	North Sea	1979-2006	LI (licence)
Biota	Contaminants	CB153	ICES	France	11	North Sea	2004-2004	LI (licence)
Biota	Contaminants	Cadmium	ICES	France	42	North Sea	2004-2005	LI (licence)
Biota	Contaminants	CB153	ICES	UK	1688	North Sea	1991-2007	LI (licence)
Biota	Contaminants	Cadmium	ICES	UK	1957	North Sea	1982-2007	LI (licence)
Biota	Contaminants	Dieldrin	ICES	UK	1061	North Sea	1982-2006	LI (licence)
Biota	Contaminants	CB153	ICES	Ireland	48	North Sea	1990-2006	LI (licence)
Biota	Contaminants	Cadmium	ICES	Ireland	156	North Sea	1990-2005	LI (licence)
Biota	Contaminants	Dieldrin	ICES	Ireland	32	North Sea	1980-2006	LI (licence)
Biota	Contaminants	CB153	ICES	Netherlands	1784	North Sea	1981-2006	LI (licence)



Biota	Contaminants	Cadmium	ICES	Netherlands	1904	North Sea	1983-2006	LI (licence)	
Biota	Contaminants	Dieldrin	ICES	Netherlands	59	North Sea	1981-1991	LI (licence)	
Biota	Contaminants	CB153	ICES	Norway	2738	North Sea	1985-2006	LI (licence)	
Biota	Contaminants	Cadmium	ICES	Norway	2568	North Sea	1981-2006	LI (licence)	
Biota	Contaminants	CB153	ICES	Sweden	646	North Sea	1988-2005	LI (licence)	
Biota	Contaminants	Cadmium	ICES	Sweden	3	North Sea	2001-2001	LI (licence)	
Biota	Contaminants	Cadmium	ICES	Sweden	1747	North Sea	1981-2005	LI (licence)	
Water column	Synthetic compounds	TBT	NL-NODC	NIOZ	35	North Sea	1999-2000	UN, MO	Research cruises
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	N, P	NL-NODC	NIOZ	70	North Sea	1995 - present	UN, MO	Research cruises
Sediment	Fertilisers and other nitrogen- and phosphorus-rich substances	N, P	NL-NODC	NIOZ	40	North Sea	1995 - present	UN, MO	Research cruises
Water column	Organic matter	DOM, DOC, etc.	NL-NODC	NIOZ	600	North Sea	1995 - present	UN, MO	Research cruises
Sediment	Organic matter		NL-NODC	NIOZ	50	North Sea	1995 - present	UN, MO	Research cruises
Water column	Nutrients	N, P, NH4, NO2, NO3, PO4, SiO2, POC, DOC	NODC/RWS	Rijkswaterstaat (RWS)	52 stations sampled once up to 20 times a year	North Sea, Wadden Sea	1973- present	Public	MWTL-programme
Water column, Sediment	Heavy metals	As, Cd, Cr, Cu, Hg, Ni, Pb, Zn	NODC/RWS	Rijkswaterstaat (RWS)	52 stations sampled once up to 20 times a year	North Sea, Wadden Sea	1973- present	Public	MWTL-programme
Water column	Micro contaminants	OPB, MAK, PAK, VCK	NODC/RWS	Rijkswaterstaat (RWS)	52 stations sampled once up to 20 times a year	North Sea, Wadden Sea	1973- present	Public	MWTL-programme
Sediment	Micro contaminants	PAK, PCB, Organitin, OCB, NCB, CP, Dioxines	NODC/RWS	Rijkswaterstaat (RWS)	52 stations sampled once up to 20 times a year	North Sea, Wadden Sea	1973- present	Public	MWTL-programme
Water column	Radionuclides	Alpha, Beta, rest-Beta, Tritium, Strontium90, Radium226, Lood210, Polonium210, Cobalt58+60, Cesium134+137 Jood131 Mangaan54	NODC/RWS	Rijkswaterstaat (RWS)	52 stations sampled once up to 20 times a year	North Sea, Wadden Sea	1995- present	Public	MWTL-programme
Water colour	Fertilisers	Nutrients, Si, PO, NO3-	IMR	IMR	Aprox 1000 observations per year	North Sea, coastal area	1990-2008	SR (academic)	Data at transects are part of monitoring.
Water column	Organic matter, synthetic compounds	POC, DOC, estrogens, organochlorine and organonitrogen pesticides	VLIZ	VLIZ	>3000 measurements for 15 stations	Scheldt estuary	1995-1998; 2002-2008; variable intervals	SR (academic)	
Water column	other nitrogen- and phosphorus-rich substances	NH4, NO3, NO2, SI, NO3- NO2, SI, PO4	VLIZ	VLIZ	> 6000 measurements for 9 stations	Belgian continental shelf	2002-2008; monthly monitoring; including 13h-measurements	SR (academic)	Zeeleuw RV Monitoring Cruises; Long term multidisciplinary monitoring of the BCS

Water column	Synthetic compounds	BENZ, DCMA, TCEE, CBENZ, ... (in µg/l)	RBINS-MUMMM	RBINS-MUMMM	ca. 60 values/parameter	Belgian continental shelf	2002-2005	MO	Project data
Water column	Synthetic compounds	TBT, TPT, DBT, DPT, MBT, MPT (in µg/l)	RBINS-MUMMM	RBINS-MUMMM	ca. 50 values/parameter	Belgian continental shelf	2003-2005	UN	Shipborne regular monitoring
Water column	Heavy metals	Major and minor elements (in µg/l)	RBINS-MUMMM	RBINS-MUMMM	100-500 values/parameter	Belgian continental shelf	1995-2000	UN	Shipborne regular monitoring and project data
Water column	Hydrocarbons including oil pollution	Observations in the frame of our official aerial surveillance programme	RBINS-MUMMM	RBINS-MUMMM	To be checked with data originator (contacted)	Belgian continental shelf	To be checked with data originator (contacted)	MO	Airborne regular monitoring
Water column	Fertilisers	PN, PHOS, SLCA, NTRA, NTRI, NTOT, PTOT (in µmol/l)	RBINS-MUMMM	RBINS-MUMMM	2000-3000 values/parameter	Belgian continental shelf	1987-2007 (3 times/year)	UN	Shipborne regular monitoring
Water column	Organic matter	POC, PON, DOC, DON, TOC, organic matter (in mg/l)	RBINS-MUMMM	RBINS-MUMMM	ca. 600 values/parameter	Belgian continental shelf	1998-2007 (3 times/year)	UN	Shipborne regular monitoring
Water column	Radionuclides	To be checked with data originator	RBINS-MUMMM	State scientific institute of public health	To be checked with data originator	Belgian continental shelf	To be checked with data originator	UN	Shipborne regular monitoring
Sediment	Synthetic compounds	TBT, TPT, DBT, DPT, MBT, MPT (in µg/g dw)	RBINS-MUMMM	RBINS-MUMMM	ca. 160 values/parameter	Belgian continental shelf	2003-2007 (3 times/year)	UN	Shipborne regular monitoring
Sediment	Synthetic compounds	Endrin, Dieldrin, ... (in µg/g)	RBINS-MUMMM	RBINS-MUMMM	ca. 400 values/parameter	Belgian continental shelf	1991-2007 (3 times/year)	UN	Shipborne regular monitoring
Sediment	Synthetic compounds	Polybrominated diphenyl ethers (µg/g dw)	RBINS-MUMMM	RBINS-MUMMM	ca. 80 values/parameter	Belgian continental shelf	2003-2007 (3 times/year)	UN	Shipborne regular monitoring
Sediment	Synthetic compounds	Chlorobiphenyls (µg/g dw)	RBINS-MUMMM	RBINS-MUMMM	ca. 400 values/parameter	Belgian continental shelf	1991-2007 (3 times/year)	UN	Shipborne regular monitoring
Sediment	Heavy metals	Major and minor elements (in µg/g dw)	RBINS-MUMMM	RBINS-MUMMM	ca. 1150 values/parameter	Belgian continental shelf	1991-2007 (3 times/year)	UN	Shipborne regular monitoring
Sediment	Hydrocarbons	Anthracene, pyrene, ... (in µg/g dw)	RBINS-MUMMM	RBINS-MUMMM	ca. 200 values/parameter	Belgian continental shelf	2001-2007 (3 times/year)	MO	Shipborne regular monitoring
Sediment	Fertilisers	PTOT, PN (in %)	RBINS-MUMMM	RBINS-MUMMM	ca. 200 values/parameter	Belgian continental shelf	2001-2007 (3 times/year)	UN	Shipborne regular monitoring
Sediment	Organic matter	POC, organic matter (in % dw)	RBINS-MUMMM	RBINS-MUMMM	ca. 200 values/parameter	Belgian continental shelf	2001-2007 (3 times/year)	UN	Shipborne regular monitoring
Biota*	Synthetic compounds	Chlorobiphenyls (µg/g)	RBINS-MUMMM	RBINS-MUMMM	between 40 and 1000 values/parameter	Belgian continental shelf	1996-2007	UN	Shipborne regular monitoring
Biota/Crangoon, Gobius	Synthetic compounds	Polybrominated Diphenyl Ethers (PBDE) (µg/g)	RBINS-MUMMM	RBINS-MUMMM	ca. 25 values/parameter	Scheldt Estuary	2002-2004	MO	Project data
Biota/Crangoon, Gobius	Synthetic compounds	dioxines (µg/g) (ca 20 parameters)	RBINS-MUMMM	RBINS-MUMMM	ca. 40 values/parameter	Belgian continental shelf (strandings on beach incl. north of France)	1999-2004	MO	Project data

Biota**	Heavy metals	Arsenic, cadmium, chromium, copper, iron, mercury, total mercury, nickel, lead, selenium, zinc (µg/g)	RBINS-MUMMM	RBINS-MUMMM	between 100 and 3000 values/parameter	Belgian continental shelf	1996-2007	UN	Shipborne regular monitoring
Biota***	Synthetic compounds	hexachlorobenzene, DDT's, cyclodienes, hexachlorocyclohexanes (µg/g)	RBINS-MUMMM	RBINS-MUMMM	ca 450 values/parameter	Belgian continental shelf	1997-2007	UN	Shipborne regular monitoring
Biota/Mytilus edulis	Hydrocarbons	PAHs (µg/g)	RBINS-MUMMM	RBINS-MUMMM	ca 80 values/parameter	Belgian continental shelf	2001-2007	UN	Shipborne regular monitoring

\* Crangon crangon, Gadus morhua, Platichthys flesus, Alca torda, Fulmarus glacialis, Larus argentatus, Melanitta nigra, Rissa tridactyla, Uria algae, Phocoena phocoena, Asteria rubens, Mytilus edulis  
 \*\* Crangon crangon, Gadus morhua, Platichthys flesus, Alca torda, Fulmarus glacialis, Larus argentatus, Melanitta nigra, Rissa tridactyla, Uria algae, Phocoena phocoena, Asteria rubens, Mytilus edulis  
 ..... Lagenorhynchus sp., Phoca vitulina, POCOENA PHOCOENA, Stenella coeruleoalba, Asteria rubens, Mytilus edulis  
 \*\*\* Crangon crangon, Gadus morhua, Platichthys flesus, Mytilus edulis

## General chemicals in the water column

North-East Atlantic						
Country	FirstYear	LastYear	Determinand	DataSource	NoStations	NoMeasurements
BELGIUM	1951	1965	Alkalinity	ICES	468	1189
BELGIUM	1977	2006	Ammonium	ICES	3324	3327
BELGIUM	1990	2006	Chlorophyll.a	ICES	1575	1578
BELGIUM	1977	2006	Nitrate	ICES	3567	3571
BELGIUM	1991	2006	Nitrite	ICES	1416	1417
BELGIUM	1936	2006	Oxygen	ICES	1492	2741
BELGIUM	2000	2006	pH	ICES	448	448
BELGIUM	1977	2006	Phosphate	ICES	2513	2517
BELGIUM	1977	2006	Silicate	ICES	2573	2576
BELGIUM	2000	2006	Total.Nitrogen	ICES	559	559
BELGIUM	2000	2006	Total.Phosphorus	ICES	531	531
CANADA	1986	1986	Chlorophyll.a	ICES	19	369
CANADA	1982	1986	Nitrate	ICES	25	442
CANADA	1982	1982	Oxygen	ICES	6	82
CANADA	1982	1986	Phosphate	ICES	23	208
CANADA	1982	1986	Silicate	ICES	20	234
DENMARK	1969	1990	Alkalinity	ICES	152	158
DENMARK	1972	2006	Ammonium	ICES	13799	56812
DENMARK	1974	2006	Chlorophyll.a	ICES	12860	35496
DENMARK	1992	2005	Hydrog.Sulph.	ICES	8	15
DENMARK	1930	2006	Nitrate	ICES	15808	66981
DENMARK	1972	2006	Nitrite	ICES	8225	50116
DENMARK	1905	2007	Oxygen	ICES	17360	74863
DENMARK	1923	1990	pH	ICES	252	1108
DENMARK	1930	2006	Phosphate	ICES	16898	71485
DENMARK	1965	2006	Silicate	ICES	13283	59414
DENMARK	1972	2006	Total.Nitrogen	ICES	10748	34496
DENMARK	1969	2006	Total.Phosphorus	ICES	14421	58345
FINLAND	2004	2004	Alkalinity	ICES	1	1
FINLAND	1971	2004	Ammonium	ICES	28	169
FINLAND	1980	1980	Hydrog.Sulph.	ICES	1	1
FINLAND	1955	2004	Nitrate	ICES	34	227
FINLAND	1955	2004	Nitrite	ICES	29	173
FINLAND	1955	2004	Oxygen	ICES	128	849
FINLAND	1955	2004	pH	ICES	122	809
FINLAND	1955	2004	Phosphate	ICES	104	726
FINLAND	1955	2004	Silicate	ICES	106	739
FINLAND	1970	2004	Total.Nitrogen	ICES	38	209
FINLAND	1971	2004	Total.Phosphorus	ICES	28	169
FRANCE	2002	2002	Alkalinity	ICES	3	3
FRANCE	2004	2004	Chlorophyll.a	ICES	78	148
FRANCE	1984	2004	Nitrate	ICES	99	121
FRANCE	1984	2004	Nitrite	ICES	80	102
FRANCE	1988	1999	Oxygen	ICES	10	1037
FRANCE	2002	2002	pH	ICES	3	3
FRANCE	1984	2004	Phosphate	ICES	62	75
FRANCE	1984	2004	Silicate	ICES	99	119
GERMANY	1921	1994	Alkalinity	ICES	474	1931
GERMANY	1953	2007	Ammonium	ICES	13394	30546
GERMANY	1975	2005	Chlorophyll.a	ICES	1091	1862
GERMANY	1979	2005	Hydrog.Sulph.	ICES	160	193
GERMANY	1962	2007	Nitrate	ICES	15566	41353
GERMANY	1935	2007	Nitrite	ICES	14802	35184
GERMANY	1902	2007	Oxygen	ICES	12956	44683
GERMANY	1921	2007	pH	ICES	6644	14624

GERMANY	1935	2007	Phosphate	ICES	16942	45135
GERMANY	1935	2007	Silicate	ICES	13709	37007
GERMANY	1978	2007	Total.Nitrogen	ICES	6033	11859
GERMANY	1975	2007	Total.Phosphorus	ICES	6421	13446
GERMANY (ir	1966	2002	Ammonium	ICES	759	4676
GERMANY (ir	1990	2000	Chlorophyll.a	ICES	98	489
GERMANY (ir	1986	1986	Hydrog.Sulph.	ICES	1	1
GERMANY (ir	1966	2003	Nitrate	ICES	1708	11176
GERMANY (ir	1966	2003	Nitrite	ICES	1565	9483
GERMANY (ir	1968	2003	Oxygen	ICES	1959	19698
GERMANY (ir	1966	1966	pH	ICES	78	809
GERMANY (ir	1966	2003	Phosphate	ICES	1808	11938
GERMANY (ir	1966	2003	Silicate	ICES	568	3554
GERMANY (ir	1975	2001	Total.Nitrogen	ICES	118	413
GERMANY (ir	1966	2001	Total.Phosphorus	ICES	136	519
ICELAND	1984	1984	Nitrate	ICES	1	16
ICELAND	1984	1984	Oxygen	ICES	1	16
ICELAND	1984	1984	Phosphate	ICES	1	16
ICELAND	1984	1984	Silicate	ICES	1	16
IRELAND	1991	2006	Nitrate	ICES	2352	2730
IRELAND	1998	2006	Nitrite	ICES	2147	2525
IRELAND	1991	2006	Phosphate	ICES	2351	2729
IRELAND	1992	2006	Silicate	ICES	2226	2604
NETHERLAND	1974	2007	Ammonium	ICES	12707	12846
NETHERLAND	1986	2006	Chlorophyll.a	ICES	4721	4969
NETHERLAND	1968	2007	Nitrate	ICES	13110	14055
NETHERLAND	1968	2007	Nitrite	ICES	12932	13878
NETHERLAND	1903	2007	Oxygen	ICES	5311	8911
NETHERLAND	1968	2007	pH	ICES	2784	2837
NETHERLAND	1966	2007	Phosphate	ICES	13498	14879
NETHERLAND	1967	2007	Silicate	ICES	14091	15095
NETHERLAND	1991	2007	Total.Nitrogen	ICES	7486	7529
NETHERLAND	1966	2007	Total.Phosphorus	ICES	11759	12977
NORWAY	2003	2003	Alkalinity	ICES	8	73
NORWAY	1980	2007	Ammonium	ICES	1878	14818
NORWAY	1980	2007	Chlorophyll.a	ICES	6160	37298
NORWAY	1992	2004	Hydrog.Sulph.	ICES	87	163
NORWAY	1980	2007	Nitrate	ICES	14101	120245
NORWAY	1959	2004	Nitrite	ICES	12415	104705
NORWAY	1914	2007	Oxygen	ICES	6943	59390
NORWAY	1924	1946	pH	ICES	167	1600
NORWAY	1929	2007	Phosphate	ICES	14667	124391
NORWAY	1945	2007	Silicate	ICES	13277	113369
NORWAY	1990	2007	Total.Nitrogen	ICES	2133	16722
NORWAY	1959	2007	Total.Phosphorus	ICES	2134	16726
POLAND	1990	1990	Alkalinity	ICES	52	478
POLAND	1971	1991	Ammonium	ICES	157	1067
POLAND	1990	1991	Chlorophyll.a	ICES	181	723
POLAND	1971	1991	Nitrate	ICES	304	2114
POLAND	1971	1991	Nitrite	ICES	304	2121
POLAND	1965	1991	Oxygen	ICES	365	2336
POLAND	1990	1990	pH	ICES	53	496
POLAND	1971	1991	Phosphate	ICES	304	2120
POLAND	1990	1991	Silicate	ICES	222	1729
POLAND	1990	1990	Total.Nitrogen	ICES	53	486
POLAND	1990	1990	Total.Phosphorus	ICES	53	486
RUSSIA	1992	1992	Nitrate	ICES	14	73
RUSSIA	1992	1992	Nitrite	ICES	13	61
RUSSIA	1992	1993	Oxygen	ICES	37	442

RUSSIA	1992	1993	Phosphate	ICES	26	304
SWEDEN	1921	2007	Alkalinity	ICES	686	7445
SWEDEN	1968	2008	Ammonium	ICES	4632	38014
SWEDEN	1990	2008	Chlorophyll.a	ICES	1636	9447
SWEDEN	1972	1982	Hydrog.Sulph.	ICES	195	615
SWEDEN	1968	2008	Nitrate	ICES	5501	44047
SWEDEN	1968	2008	Nitrite	ICES	5172	42026
SWEDEN	1902	2008	Oxygen	ICES	10041	80264
SWEDEN	1921	2007	pH	ICES	2315	20429
SWEDEN	1949	2008	Phosphate	ICES	9494	78774
SWEDEN	1968	2008	Silicate	ICES	4229	35885
SWEDEN	1972	2008	Total.Nitrogen	ICES	5202	39324
SWEDEN	1968	2008	Total.Phosphorus	ICES	7370	58103
UNITED KING	1965	2008	Ammonium	ICES	11073	31179
UNITED KING	1960	2007	Chlorophyll.a	ICES	10415	34803
UNITED KING	1954	2008	Nitrate	ICES	24249	68250
UNITED KING	1961	2003	Nitrite	ICES	10353	19010
UNITED KING	1921	2007	Oxygen	ICES	8719	25674
UNITED KING	1921	2006	pH	ICES	117	232
UNITED KING	1922	2008	Phosphate	ICES	30315	83272
UNITED KING	1950	2008	Silicate	ICES	22459	63098
UNITED KING	1965	2007	Total.Nitrogen	ICES	931	1968
UNITED KING	1949	1968	Total.Phosphorus	ICES	40	228
UNITED STAT	2002	2002	Alkalinity	ICES	10	86
UNITED STAT	1976	1976	Oxygen	ICES	15	150
UNITED STAT	1976	1976	Phosphate	ICES	15	146
UNITED STAT	1976	1976	Silicate	ICES	15	148
USSR	1957	1973	Alkalinity	ICES	23	219
USSR	1957	1957	Ammonium	ICES	6	58
USSR	1990	1991	Chlorophyll.a	ICES	168	855
USSR	1957	1991	Nitrate	ICES	249	2298
USSR	1957	1991	Nitrite	ICES	235	1872
USSR	1939	1991	Oxygen	ICES	1930	18132
USSR	1957	1991	pH	ICES	464	3847
USSR	1957	1991	Phosphate	ICES	704	5861
USSR	1957	1991	Silicate	ICES	353	2847
USSR	1976	1976	Total.Phosphorus	ICES	19	185

**Black Sea**

<b>MATRIX</b> (choose between Sediment, Water column, Biota)	<b>PARAMETER GROUP</b> (choose between Synthetic compounds, Heavy metals, Hydrocarbons including oil pollution, Radionuclides, Fertilisers and other nitrogen- and phosphorus-rich substances, Organic matter)	<b>Parameters</b> (indicate unit of measure and precision)	<b>National collator</b> (= NODC)	<b>Data Holding Organization</b>	<b>No of meas.</b> (specify data volume)	<b>Spatial coverage</b> (specify region covered by the data)	<b>Temporal coverage</b> (specify start and end of data series with sampling interval)	<b>Data Policy</b> (refer to SDN Vocabulary L081)	<b>Monitoring System</b> (specify if data are part of a continuous monitoring programme)
Sediment	Heavy metals	Major and Minor elements	HCMR	HCMR	39 stations with 1 or 2 samples per station)	Black Sea	Sept. 2002, Sept. 2004	RS	Research projects
Sediment	Radionuclides	Pb210	HCMR	HCMR	2 sedimentation rates from 2 stations	Black Sea	Oct. 2007	RS	Research projects
Water column	Heavy metals	Geochemistry of Major-Minor elements	HCMR	HCMR	39 stations (~100 samples)	Black Sea	Sept. 2002, Sept. 2004	RS	Research projects
Water column	Organic matter	Particulate Organic Matter	HCMR	HCMR		Black Sea	Sept. 2002, Sept. 2004, Oct. 2007	RS	Research projects
Water column	Pesticides	DDT	RIHMI-WDC	RIHMI-WDC	500	Black Sea	1975-1986	LI	Research cruises
Water column	Heavy metals	Pb, Cu, Fe, Zn	RIHMI-WDC	RIHMI-WDC	800	Black Sea	1975-1986	LI	Research cruises
Water column	Hydrocarbons including oil pollution	Oil pollution	RIHMI-WDC	RIHMI-WDC	1200	Black Sea	1975-1986	LI	Research cruises
Water column	Pesticides	DDT	RIHMI-WDC	RIHMI-WDC	Regularly sampled from the surface to 5 m or 10 m depth	Eastern coast of Black Sea	2001-2007	NA	Russian continuous monitoring programme
Water column	Heavy metals	Pb, Cu, Fe, Hg, Zn	RIHMI-WDC	RIHMI-WDC	Regularly sampled from the surface to 5 m or 10 m depth	Eastern coast of Black Sea	2001-2007	NA	Russian continuous monitoring programme
Water column	Heavy metals	Mn, Fe, Cu, Zn, Cd, Pb, Hg, As	SIO-RAS	SIO RAS, Southern branch SIO RAS	183 stations	north-eastern coast of Black Sea	2006-2008	LS (SDN_licence)	
Water column	Fertilisers	PO4-P, TP, NO3-N, NH4-N, TN	SIO-RAS	SIO RAS, Southern branch SIO RAS	~7800 stations	Eastern coast of Black Sea	1999-2008	LS (SDN_licence)	Monitoring program

Water column	Organic matter	BOD5, oxydizability (Mn), organic P, organic N	SIO-RAS	SIO RAS, Southern branch SIO RAS	~200 stations	Eastern coast of Black Sea	2006-2008	LS (SDN_licence)	Monitoring program
Water column	Some of the classes	O2, H2S, pH, Total alkalinity, Si	SIO-RAS	SIO RAS, Southern branch SIO RAS	~7800 stations	Eastern coast of Black Sea	1999-2008	LS (SDN_licence)	Monitoring program
Water column	Hydrocarbons including oil pollution		SIO-RAS	SIO RAS, Southern branch SIO RAS	183 stations	Eastern coast of Black Sea	2006-2008	LS (SDN_licence)	
Water column	Contaminants	Detergents, Fenols, Suspended solids, TPHs	SIO-RAS	SIO RAS, Southern branch SIO RAS	183 stations	Eastern coast of Black Sea	2006-2008	LS (SDN_licence)	Monitoring program
Sediment	Total PetroleumHydrocarbons (TPHs)		SIO-RAS	SIO RAS, Southern branch SIO RAS	58 stations	Black Sea	2007, 2008	LS (SDN_licence)	
Sediment	Heavy metals	Mn, Fe, Cu, Zn, Cd, Pb, Hg, Ni, As	SIO-RAS	SIO RAS, Southern branch SIO RAS	58 stations	Black Sea	2007, 2008	LS (SDN_licence)	
Water column	Radionuclides	Sr-90, Cs137	MHI-DMIST	MHI-DMIST	50 profiles	Black Sea	1970-1995	academic	Scientific cruises
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	inorganic nutrients, total phosphorus and nitrogen	MHI-DMIST	MHI-DMIST	500 profiles	Black Sea	1923-2007	academic	Scientific cruises
Water column	Organic matter	Particulate organic nitrogen and carbon	MHI-DMIST	MHI-DMIST	50 profiles	Black Sea	1985-1995	academic	Scientific cruises
Sediment	Heavy metals	Mn, Fe	MHI-DMIST	MHI-DMIST	20 profiles	Black Sea	2001-2005	academic	Scientific cruises
Water column	Hydrocarbons including oil pollution	oil pollution	MHI-DMIST	MHI-DMIST	20 profiles	Black Sea	1975-1990	academic	Scientific cruises
Water column	Pesticides	DDT etc.	IO-BAS	Ministry of Environment and Waters	15 observation points	Western Black Sea; Rivers of the Black Sea Basin	from 1960 for rivers and from 1970 for Black Sea	RS	Permanent monitoring (usually once a month)
Water column	Heavy metals	Mn, Fe, Cu	IO-BAS	Ministry of Environment and Waters + IO-BAS	15 observation points	Western Black Sea; Rivers of the Black Sea Basin	from 1960 for rivers and from 1970 for Black Sea	RS	Permanent monitoring (usually once a month)
Water column	Fertilisers	PO4-P, TP, NO3-N, NO2-N, NH4-N, TN	IO-BAS	Ministry of Environment and Waters + IO-BAS	15 observation points	Western Black Sea; Rivers of the Black Sea Basin	from 1960 for rivers and from 1970 for Black Sea	RS	Permanent monitoring (usually once a month)
Water column	Organic matter	BOD5, oxydizability (Mn), organic P, organic N	IO-BAS	Ministry of Environment and Waters	15 observation points	Western Black Sea; Rivers of the Black Sea Basin	from 1960 for rivers and from 1970 for Black Sea	RS	Permanent monitoring (usually once a month)



Water column	Hydrocarbons including oil pollution	IO-BAS	Maritime administration + MoEW	1856 stations	Western Black Sea	2005-2007	RS	
Water column	Fertilisers PO4-P(µM; 1%) NO3-N(µM; 5%) NO2-N(µM; 1%) NH4-N(µM; 5%)	NIMRD	NIMRD	1856 stations	Western Black Sea	1980-1995 monthly, seasonal	UN	No
Water column	Fertilisers PO4-P(µM; 1%) NO3-N(µM; 5%) NO2-N(µM; 1%) NH4-N(µM; 5%)	NIMRD	NIMRD	573 stations	Western Black Sea	1996-2002 monthly, seasonal	RS	No
Water column	Fertilisers PO4-P(µM; 5%) NO3-N(µM; 9%) NO2-N(µM; 8%) NH4-N(µM; 8%)	NIMRD	NIMRD	190 stations	Western Black Sea	2003-2007	RS	No
Water - surface	Fertilisers TP(µM) NO3-N(µM; 9%) NO2-N(µM; 8%) NH4-N(µM; 8%) TN(mg/dm3)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2003 biannual	RS	National Marine Monitoring Programme
Water column	Pesticides HCB, Lindane, Heptachlor, Aldin, Dieldrin, Endrin, pp' DDE, pp' DDD, pp' DDT (ng/l; 30% incertitude)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2003 biannual	RS	National Marine Monitoring Programme
Sediment	Pesticides HCB, Lindane, Heptachlor, Aldin, Dieldrin, Endrin, pp' DDE, pp' DDD, pp' DDT (ng/g dry sediment; 30% incertitude)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2003 biannual	RS	National Marine Monitoring Programme
Water - surface	Heavy metals Cu, Cd, Pb, Cr, Ni (µg/l; 25% incertitude)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2000 biannual	RS	National Marine Monitoring Programme
Sediment	Heavy metals Cu, Cd, Pb, Cr, Ni (µg/g dry sediment; 25% incertitude)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2000 biannual	RS	National Marine Monitoring Programme

Water - surface	Hydrocarbons including oil pollution	Naftalin, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Indeno(1.2.3-cd)pyrene (ng/l; 30% incertitude)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2003 biannual	RS	National Marine Monitoring Programme
Sediment	Hydrocarbons including oil pollution	Naftalin, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(k)fluoranthene, Benzo(a)pyrene, Dibenzo(ah)anthracene, Benzo(ghi)perylene, Indeno(1.2.3-cd)pyrene (ng/g dry sediment; 30% incertitude)	NIMRD	NIMRD	2x33 stations/year	Western Black Sea	from 2003 biannual	RS	National Marine Monitoring Programme
Water column	Pesticides	DDT etc. (Mg/L)	Institute of Hydrometeorology	TSU-DNA	5 observation points	Easter part of Black Sea; Rivers of the Black Sea Basin.	from 1970 biannual	LS (SDN_licence)	On the basis of research work
Water column	Heavy metals	Cu, Zn, Ni, Pb, Co, Cd, Mn (Mg/L)	Institute of Hydrometeorology	TSU-DNA	5 observation points	Eastern part of Black Sea	from 1970 biannual	LS (SDN_licence)	On the basis of research work
Water column	Hydrocarbons including oil pollution	Tot. petroleum hydrocarbons (TPH) (Mg/L)	Institute of Hydrometeorology	TSU-DNA	5 observation points	Eastern part of Black Sea; Rivers of the Black Sea Basin	from 1970 biannual	LS (SDN_licence)	On the basis of research work
Water column	Radionuclides	Sr 90; Cs 134/137/141; Be 7; Mn 54; (Zr 95+Nb 95) (BK/MB3)	Institute of Hydrometeorology	TSU-DNA	7 observation points	Eastern part of Black Sea	1986-1991 (permanent); 1961 to 1991	LS (SDN_licence)	Permanent monitoring (once a month) and also in extremal conditions
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances,	NO <sub>2</sub> <sup>-</sup> , NO <sub>3</sub> <sup>-</sup> , NH <sub>3</sub> <sup>+</sup> , NH <sub>4</sub> <sup>+</sup> , PO <sub>4</sub> <sup>3-</sup> (Mg/L)	Institute of Hydrometeorology	TSU-DNA	5 observation points	Eastern part of Black Sea; Rivers of the Black Sea Basin	from 1970 biannual	LS (SDN_licence)	On the basis of research work
Sediment	Heavy metals	Cu, Zn, Ni, Pb, Co	Institute of Hydrometeorology	TSU-DNA	5 observation points	Eastern part of Black Sea; Rivers of the Black Sea Basin	2006-2007	LS (SDN_licence)	Within the project

Sediment	Heavy metals	As, Al, Cd, Pb, Cu, Cr, Zn, Hg	TSU-DNA	GAMMA Ltd	90 stations	Eastern part of Black Sea	2005	OG (organisation)	Within the project
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances,	NO <sub>2</sub> , NH <sub>4</sub> , PO <sub>4</sub> , SiO <sub>2</sub>	TSU-DNA	GAMMA Ltd	75 stations	Eastern part of Black Sea	2000	OG (organisation)	Within the project
Water column	Heavy metals	Fe, Mn, Ni, Co, Cu, Zn, Pb, Sr,	TSU-DNA	GAMMA Ltd	12 stations	Eastern part of Black Sea	2001, 2006	OG (organisation)	Within the project
Water column	Hydrocarbons including oil pollution	Tot. petroleum hydrocarbons (TPH)	TSU-DNA	GAMMA Ltd	5 stations	Eastern part of Black Sea	2006	OG (organisation)	Within the project
Sediment	Organic pollutants	Lindane, Hexachlorobenzene, Heptachlor, Aldrin, Dieldrin, Endrin, PAHs, Acenaphthylene, Fluorene, Acenaphthene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene	Black Sea states	BSC	min 200	Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Sediment	Oil Pollution	Total Petroleum hydrocarbons	Black Sea states	BSC	min 1000	Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Sediment	Trace metals	Cu, Cd, Pb, Ni, Cr, Li, Zn, Al, Ni	Black Sea states	BSC	min 200	Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Water column	Organic pollutants	Pesticides (DDT, DDE, DDD), PAHs total, Phenols, Hexachlorobenzene, Heptachlor, Aldrin, Dieldrin, Endrin, Naphtalene, Acenaphthylene, Fluorene, Acenaphthene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene	Black Sea states (basically Romania and Turkey)	BSC	min 200	Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Water column	Trace metals	Cu, Cd, Pb, Ni, Cr	Black Sea states	BSC	min 200	Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Water column	Oil Pollution	Total Petroleum hydrocarbons	Black Sea states	BSC		Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Water column	Nutrients	P-PO4, OP, TP, N-NO2, N-NO3, N-NH4, ON, TN	Black Sea states	BSC	min 1000	Black Sea	2001-2007	MO (moratorium)	BSIMAP*
Water column	Others	BOD5, TSS, O2						MO (moratorium)	
Mussels	Trace metals, organic pollutants	Pb, Cd, Cu, Lindane, Hexachlorobenzene, Heptachlor, Aldrin, Dieldrin, Endrin, DDE, DDD, DDT	Romania, Turkey	BSC	twice a year	Black Sea	2001-2007, with lots of gaps	MO (moratorium)	BSIMAP*

\* see for BSIMAP: [www.blacksea-commission.org/BSIMAP](http://www.blacksea-commission.org/BSIMAP)

Mediterranean spots									
MATRIX (choose between Sediment, Water column, Biota)	PARAMETER GROUP (choose between Synthetic compounds, Heavy metals, Hydrocarbons including oil pollution, Radionuclides, Fertilisers and other nitrogen- and phosphorus-rich substances, Organic matter)	Parameters (indicate unit of measure and precision)	National collator (= NODC)	Data Holding Organization	No of meas. (specify data volume)	Spatial coverage (specify region covered by the data)	Temporal coverage (specify start and end of data series with sampling interval)	Data Policy (refer to SDN Vocabulary L081)	Monitoring System (specify if data are part of a continuous monitoring programme)
<b>Western Mediterranean</b>									
Water column	Dissolved gases	O <sub>2</sub> , Co <sub>2</sub>	Ifremer + CNRS+ Agencies for Water + Ministry of the Environment	Ifremer		Coastal and off-shore waters (see map 1)	1973, ongoing	Public	French Observation Network + others
Water column	Organic matter	chlorophyll, pigments, etc, ...	Ifremer + CNRS + Agencies for Water + Ministry of the Environment	Ifremer	more than 10 monitored locations, about 5000 measurements	Coastal and off-shore waters (see map 2)	1973, ongoing	Public	French Observation Network + others
Water column	Nutrients, fertilisers	(N, P)	Ifremer + Agencies for Water + Ministry of the Environment	Ifremer	more than 20 monitored locations, about 5000 measurements	Coastal and off-shore waters	1973, ongoing	Public	French Observation Network + others
Sediment + Biota (Mussels, Oysters)	Synthetic compounds	TBT compounds, Organochlorines, Dioxins, etc, ...	Ifremer + Agencies for Water + Ministry of the Environment	Ifremer	more than 20 monitored locations, about 5000 measurements	Coastal waters (see map 2)	1985, ongoing	Public	French Observation Network + others
Sediment + Biota (Mussels, Oysters)	Heavy metals	Hg, Cd, Ni, Cu, Zn, Pb, etc.	Ifremer + Agencies for Water + Ministry of the Environment	Ifremer	more than 20 monitored locations, about 5000 measurements	Coastal waters (see map 2)	1985, ongoing	Public	French Observation Network + others
Water column + Biota + Sediments	Hydrocarbons including oil pollution		Ifremer + Agencies for Water + Ministry of the Environment	Ifremer	more than 20 monitored locations, about 5000 measurements	Coastal waters (see map 2)	1985, ongoing	Public / License	French Observation Network + others

Biota (mussels)	Hydrocarburos polycyclic aromatic	Fenantreno Antraceno Fluoranteno Pireno Benzo[a]antraceno Criseno Benzo[b]fluoranteno Benzo[k]fluoranteno Benzo[a]pireno Benzo[e]pireno Benzo[g,h,i]perileno Dibenzo[ah]antraceno Indeno[1-2-3-cd]pireno	IEO	IEO	IEO	IEO	12 stations (84 samples)	Balearic-Sea	(2000 -2006) annually	LI	MED-POL
Biota (mussels)	heavy metals	Hg, Cd, Pb, Cu, Zn y As	IEO	IEO	IEO	IEO	12 stations (192 samples)	Balearic-Sea	(1991-2006) annually	LI	MED-POL
Biota (mussels)	Persistent Toxic compounds	Polychlorinated biphenyls (PCBs) Chlorinated pesticides DDTs hexachlorocyclohexane Hexachlorobenzene Aldrin Dieldrin Endrin Isodrin Trans-nonachlor (TNONC)	IEO	IEO	IEO	IEO	12 stations (108 samples)	Balearic-Sea	(1993-1995,2000-2006) annually	LI	MED-POL
<b>North Adriatic Sea</b>											
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	Nutrients, DIN, PO4,	OGS	OGS	ICRAM as coordinator	ICRAM as coordinator	1212 stations	Northern Adriatic (38.05-45.07 N, 10.85-14.44 E)	seasonal from 1999 to 2002	Restricted	MAT project
Water column	Organic matter	DOC, POC, TOC, TEP	OGS	OGS	ICRAM as coordinator	ICRAM as coordinator	890 stations	Northern Adriatic (38.1-45.07 N, 10.88-14.44 E)	seasonal from 1999 to 2002	Restricted	MAT project
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	Nutrients	OGS	OGS	Corila	Corila	grid of 11 stations sampled seasonally	Northern Adriatic (44.6-45.7 N, 12.3-13.5 E)	seasonal from 1999 to 2006	Restricted	EU INTERREG II and III projects
Water column	Hydrocarbons including oil pollution	Mineral oils, Tensioactive substances, Fenoli	OGS	OGS	Regional Environmental Agency ARPAVeneto	Regional Environmental Agency ARPAVeneto	93 stations	Control points in bathing waters close to potential contaminants sources	From 2000 (weekly during summer)	Restricted	Regional monitoring program for bathing water quality
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	Transparency, PH, Dissolved oxygen, Colour, TOTN, N-NH3, N-NO3, N-NO2, TOTP, P-PO4	OGS	OGS	Regional Environmental Agency ARPAVeneto	Regional Environmental Agency ARPAVeneto	48 stations	8 transects perpendicular to the coast	From 2005 monthly (biweekly during summer)	Restricted	Regional monitoring program for marine coastal water
Sediments	Synthetic compounds	DDT, DDE, DDTOT, a-HCH, b-HCH, c-HCH, d-HCH, aldrin, dieldrin, HCB, 4-CL	OGS	OGS	Regional Environmental Agency ARPAVeneto	Regional Environmental Agency ARPAVeneto	48 stations	8 transects perpendicular to the coast	From 2005 annual (March)	Restricted	Regional monitoring program for marine coastal water

Sediments	Heavy metals	Me, Cd, Cr, Pi, Zn, Cu, Va, As, Ni, Al, Fe	OGS	Regional Environmental Agency ARPAVeneto	48 stations	8 transects perpendicular to the coast	From 2005 annual (March)	Restricted	Regional monitoring program for marine coastal water
Biota (Mytilus galloprovincialis)	Synthetic compounds	DDT, DDE, DDTOT, a-HCH, b-HCH, c-HCH, d-HCH, aldrin, dieldrin, HCB, 4-CL	OGS	Regional Environmental Agency ARPAVeneto	48 stations	8 transects perpendicular to the coast	From 2005 annual (March)	Restricted	Regional monitoring program for marine coastal water
Biota (Mytilus galloprovincialis)	Heavy metals	Me, Cd, Cr, Pi, Zn, Cu, Va, As, Ni, Al, Fe, Ar	OGS	Regional Environmental Agency ARPAVeneto	48 stations	8 transects perpendicular to the coast	From 2005 annual (March)	Restricted	Regional monitoring program for marine coastal water
Water column	Hydrocarbons including oil pollution	Mineral oils, Tensioactive substances, Fenoli	OGS	Regional Environmental Agency ARPAEEmilia-Romagna	91 stations	Control points in bathing waters close to potential contaminants sources	From 2002 (biweekly during summer)	Restricted	Regional monitoring program for bathing water quality
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	Transparency, PH, Dissolved oxygen, Colour, TOTN, N-NH3, N-NO3, N-NO2, TOTP, P-PO4	OGS	Regional Environmental Agency ARPAEEmilia-Romagna	32 stations	8 transects perpendicular to the coast	From 2002 monthly (biweekly during summer)	Restricted	Regional monitoring program for marine coastal water
Sediments	Synthetic compounds	DDT, DDE, DDTOT, a-HCH, b-HCH, c-HCH, d-HCH, aldrin, dieldrin, HCB, 4-CL	OGS	Regional Environmental Agency ARPAEEmilia-Romagna	32 stations	8 transects perpendicular to the coast	From 2002 annual	Restricted	Regional monitoring program for marine coastal water
Sediments	Heavy metals	Me, Cd, Cr, Pi, Zn, Cu, Va, As, Ni, Al, Fe	OGS	Regional Environmental Agency ARPAEEmilia-Romagna	32 stations	8 transects perpendicular to the coast	From 2002 annual	Restricted	Regional monitoring program for marine coastal water
Biota (Mytilus galloprovincialis)	Synthetic compounds	DDT, DDE, DDTOT, a-HCH, b-HCH, c-HCH, d-HCH, aldrin, dieldrin, HCB, 4-CL	OGS	Regional Environmental Agency ARPAEEmilia-Romagna	32 stations	8 transects perpendicular to the coast	From 2002 annual	Restricted	Regional monitoring program for marine coastal water
Biota (Mytilus galloprovincialis)	Heavy metals	Me, Cd, Cr, Pi, Zn, Cu, Va, As, Ni, Al, Fe, Ar	OGS	Regional Environmental Agency ARPAEEmilia-Romagna	32 stations	8 transects perpendicular to the coast	From 2002 annual	Restricted	Regional monitoring program for marine coastal water
<b>Eastern Mediterranean</b>									
Sediment	Heavy metals	Zn, Cd, Pb, Cu, Ni, Mn, Fe, Cr	Univ. of Athens	Univ. of Athens	90 samples	Saronikos Gulf	1985-2006	LI	MEDPOL Saronikos Monitoring
Sediment	Hydrocarbons including oil pollution		HCMR	HCMR	45 samples	Saronikos Gulf	1998-2006	LI	MEDPOL Saronikos Monitoring
Sediment	Synthetic compounds	PAHs, DDTs, PCBs	HCMR	HCMR	75 samples	Saronikos Gulf	1998-2006	LI	MEDPOL Saronikos Monitoring
Sediment	Heavy metals	Al, Ti, Fe, Cr, Mn, Co, Ni, Cu, Zn, As, Pb	HCMR	HCMR	63 samples	Inner Saronikos Gulf	May 2001	LI	
Biota (Mussels, Fish)	Heavy metals	Zn, Cd, Pb, Cu, Ni, Mn, Fe, Cr	HCMR	HCMR	1650 samples	Saronikos Gulf	1985-2006	LI	MEDPOL Saronikos Monitoring

Biota (Mussels, Fish)	Synthetic compounds	PAHs, DDTs, PCBs	HCMR	HCMR	120 samples	Saronikos Gulf	1985-2006	LI	MEDPOL Saronikos Monitoring
Water column	Heavy metals	Zn, Cd, Pb, Cu, Ni, Mn, Fe, Cr	HCMR	HCMR	240 samples	Saronikos Gulf	1992-2006	LI	MEDPOL Saronikos Monitoring
Water column	Fertilisers	PO4-P, TP, NO3-N, NO2-N, NH4-N, TN	HCMR	HCMR	3740 samples	Saronikos Gulf	1987-2006	LI	MEDPOL Saronikos Monitoring
Water column	Heavy metals	Al, Ti, Fe, Mn, Ni, Cu, Pb, Cd	HCMR	HCMR	250 samples	Inner Saronikos Gulf	May 2001	LI	
Water column	Organic matter	POC	HCMR	HCMR	367 stations	Saronikos Gulf	2000-2004	LI	
Water column	Radionuclides	Cs 137	OC-UCY	Ministry of Environment	> 50 stations	NE Levantine Basin	Periodically	MO	No
Water column	Fertilisers and other nitrogen- and phosphorus-rich substances	Nitrogen, Phosphorus	OC-UCY	OC-UCY	> 50 stations	NE Levantine Basin	1996-2003	MO	No





ANNEX 2 TO THE CALL FOR TENDERS MARE/2008/03  
 "PREPARATORY ACTIONS FOR EUROPEAN MARINE OBSERVATION AND DATA NETWORK"

LOT NO: 3 – CHEMICAL DATA

**FINANCIAL TENDER FORM**

Company name Istituto Nazionale di Oceanografia e di Geofisica Sperimentale - OGS	Telephone +39 040 2140391
Address Borgo Grotta Gigante 42/C, 34010 Sgonico-Trieste (ITALY)	e-mail agiorgetti@ogs.trieste.it

Tenderers will quote a lump sum for the project.

The price must be a fixed amount, non revisable and including all costs.

Prices must be expressed in euros, not including VAT, and amounts must be quoted to two decimal places.

<b>A. Development Costs</b> Costs incurred for phases 1-3 of project (see section 2.4 of specifications)	€.....589000, 00
<b>B. Maintenance Costs</b> Costs incurred for phase 4 of project (see section 2.4 of specifications)	€.....110000, 00
<b>TOTAL COST (A+B)</b>	€.....699000, 00

Stamp, date and signature of tenderer

3 3 OTT 2008

IL PRESIDENTE  
Prof Iginio Marson

