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CONCEPTUAL DESIGN OF THE MED POL PHASE III DATABASE

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Forward

Since MED POL Phase III was initiated, its main aim has been to provide valid data and information on pollution trends of contaminants, loads, biological effects of pollutants and compliance to existing legislation for the management of Mediterranean coastal zones. These different objective-oriented aspects of MED POL Phase III impose the collation of high quality data and their proper and timely processing and analysis. Therefore, the data flow from the participating laboratories should be efficient and achieved through the use of uniform reporting formats which allow quick access to data for analysis and evaluation, mainly in relation to trend and biological effects monitoring. The proper storage and management of the data in an appropriate database structure is also required to allow quick selection and evaluation of data for various purposes, such as the application of different data analysis techniques, presentation of the results, preparation of reports and possible reformulation of the trend objectives of the pilot programmes, as needed. In addition, the possibility to access Databases via Internet already exists in other regions and has now become an essential requirement in the Mediterranean as well.

In view of the above, MED POL has set off a work plan by early 2001 to re-structure its database according to the needs of MED POL Phase III, to further increase the capabilities to manage the stored data and to establish a network for the flow of information between all end-users. The work plan includes two major steps: the preparation of the conceptual design of the database, achieved through the identification of the needs and requirements, and the actual development and testing of the database. The first step was completed in 2001; the present document (UNEP(DEC)/MED WG.202/2) presents in fact the conceptual design of the database. The data reporting formats were standardized by the MED POL Secretariat and are presented in Annex I to the document. The document was prepared through a consultation effort and in particular with the assistance of Mr. V. Myroshnychenko, a database scientist, under the guidance of MED POL. At this stage, there is the need to further discuss the document and endorse its content to enable the Secretariat to enter into the second step towards the finalization of the database.

The preparation of the MED POL database was the object of several discussions that took place on the occasion of a number of MED POL Meetings. Information can be found in documents UNEP(DEC)/MED WG.183/Inf.5, UNEP(DEC)/MED WG. 196/3 and 196/5.

Table of contents

Table of Figures

1. Introduction

1.1. Purpose of the document

This document contains Report on Conceptual Design of the MEDPOL Phase III Database. It summarises and compiles the user requirements to provide a common understanding of the final product among end users and developers. Based on the user requirements the technical solution is proposed.

The document is written based on formal discussion, and general knowledge about the capabilities and constraints of available technologies.

1.2. Main goals of the work

For the specific needs of the MED POL Phase III Programme a new database should be developed including some necessary data management facilities. The MEDPOL Phase I and Phase II database of validated data only, will also be integrated with the newly established database. To find a proper technical solution work on Conceptual Design of the Database was submitted. The major tasks of this work are:

- Collecting and analysing of information about structure of existing MED POL data tables, data volumes, forthcoming data flows, MED POL needs
- Defining of general database structure
- Defining of main features, possibilities and functionality
- Defining of user interface
- Defining/standardization of Input/Export data formats
- Defining of data exchange policy (the way the data exchange between the contributors and the DB will be handled).
- Defining of data access/update policy

1.3. Definitions, acronyms and abbreviations

- ADO - ActiveX Data Objects
- ASP - Active Server Pages
- CRM – certified reference material
- CSV – Comma Separated Values
- DBMS - Database Management System
- EEA - European Environment Agency
- GIS – Geographic Information System
- HTML - Hypertext Mark-up Language
- HTTP - Hypertext Transfer Protocol
- ISAPI – Internet Server API
- MS – Microsoft
- MS IIS – Microsoft Internet Information Server
- MSDE – Microsoft Database Engine
- ODBC- Open Database Connectivity
- SQL - Structured Query Language
- WWW - World Wide Web

2. REQUIREMENTS TO THE DATABASE

2.1. Data to be included into the database

2.1.1. MED POL Phase III Programme data

MED POL Phase III Programme is primarily aimed to contribute to the management of Mediterranean coastal waters and sensitive areas by trend monitoring of contaminants and loads, biological effects monitoring and compliance control of pollutants. Collection of data in framework of the MED POL Phase III Programme is fulfilled according to monitoring agreements signed between UNEP/MAP and Mediterranean countries. Monitoring agreement contains description of the National Monitoring Programme including list of pollution hot spots (stations) and parameters to be monitored, monitoring frequencies, participating institutes etc. Agreement stipulates periodical reporting of monitoring data to the MED POL Unit. Basically reported data consist of:

1) (State and) Trend Monitoring data on next matrices:Loads
   a) Loads
   b) Biota
   c) Sediments
   d) Waters
   e) Atmosphere

2) Supplementary data:
   a) Certified material analysis data
   b) Methods used for the analysis
   c) Quality Assurance data

3) Compliance Monitoring data

Seven monitoring agreements have been already signed during 1999-2001 period. Six counties have already submitted most of their 1st year monitoring data in electronic form but different formats. Some data were also submitted in printed form. MED POL Unit completed the work on development of standardized reporting formats at the last quarter of 2001 and distributed them to the partners. So starting from 2001 report, data (hopefully) will be collected in standardized computerized form - as MS Excel worksheets. Data formats for different data types are presented in **Annex 1**.

Estimation of data volumes is rather difficult in situation when only 7 countries developed their monitoring programmes, which are in fact still subject for revision. However, as an example it can be estimated as 10,000 records for trend monitoring of trace metals in biota during 10 years for all the Mediterranean states. Although the trend monitoring objectives state that the sampling would be carried out once a year, the number of samples may be 5-10 for each station. Presuming that data on other monitoring activities will not be so numerous as biota data we may estimate total amount of records as < 50,000 for whole 10 years period. On the other hand, MED POL is going to collect eutrophication data as soon as the monitoring strategy for eutrophication is adopted. However, it is impossible to estimate the volume of forthcoming eutrophication data at this stage. In any case, it should be kept in mind that at least sea water data might increase considerably.

2.1.2. Data collected in framework of previous MED POL Programme phases

MED POL Programme Phase I and Phase II provided scientific community with big amount of data collected in the Mediterranean basin for previous three decades. From these next data have to be included into the MED POL Phase III Database:

1) Biota Data
2) Sea Water Data
3) Sediment Data
4) Suspended Matter Data

The maximum number of records is for Trace Metal measurements in biota, which are around 35,000. Number of records for Hydrocarbons in biota is around 15,000. Only computerized and validated data are planned to be included into the database. Mostly data are stored in DBF format. Validated data on Biota Matrix components: Halogenated Hydrocarbons and Trace Metals – are stored in Excel worksheets in format similar to format of DBF files.

2.2. Database functionality

Standard database functionality is usually provided by DBMS. This typically includes:

- Basic data loading.
- Data querying.
- Data reporting.
- Data export in common-used formats, such as CSV.

Specific requirements to database functionality are defined as follows:

1) Easy and convenient loading of data in standardized formats
2) Convenient selection of data on different criteria
3) Obtaining of aggregated data from raw data
4) Availability of Administrative Tools for Data Manager
5) Access to the Database from Internet
6) Possibilities for Quality Assurance
7) Basic mapping functionality
8) Preparation of specific report(s), such as Compatibility report i.e. report on correspondence of real monitoring data to pre-concerted Monitoring Programme
9) Export of data in specified format for data exchange with EEA.

Administrative Tools for Data Manager should provide possibility for quick obtaining of general information about Database: what is total volume of data in terms of stations, samples, and individual parameter values; what percentage of data is quality checked etc. Regular Database backup is considered as essential component of data management.

Data selection should be available on countries, year, institute, parameter, and station type (hot spot, coastal etc). Aggregated data – means, annual means of contaminants - are particularly important data flow to EEA and presentation of data in basic maps and graphics. Basic mapping functionality includes possibility to draw Basic Map of Mediterranean with monitoring station positions. Basic Map of Mediterranean must contain coastline, isobaths, political boundaries, and main rivers**.**

It is recommended to integrate Quality Flags for pollution data into the Database. These Flags have to be filled by experts during of Quality Assurance and used later in data selection and presentation. There are many schemes used to flag data quality. As an example scheme described in GETADE Formatting Guidelines for Oceanographic Data Exchange can be recommended. The same scheme is used in the MEDATLAS EC project.

This scheme is universal and can be applied to different types of data. It uses Quality Flags with the following interpretation:

0 = data are not checked
1 = data are checked and appear correct
2 = data are checked and appear inconsistent but correct
3 = data are checked and appear doubtful
4 = data are checked and appear to be wrong
5 = data are checked and the value has been altered

Quality Flag is usually assigned to "not checked" value during data loading. Also some empirical criteria can be used to assign QF value at this stage, for example, Salinity can't exceed 40 in Mediterranean, so QF "wrong" can be assigned to those values of Salinity > 40. But mainly assignment of Quality Flags should be done by experts during quality control procedure.

2.3. Data Import and Export

Reporting data formats for MED POL Programme Phase III have been developed and fixed in November 2001. There are 9 reporting data formats for different types of monitoring data, 1 format for Certified Material Analysis data and 1 format for Compliance monitoring data. All these formats (in total – 11) are designed as MS Excel worksheets and presented in **Annex 1** MED POL Programme Phase III Database must be compatible with all these data formats, i.e. it must provide possibility for easy loading of data presented in these formats.

Another source of information for the Database are Monitoring Agreements between UNEP/MAP/MED POL and Mediterranean countries, which are objective oriented in the framework of MED POL Phase III and contain lists of monitoring stations, parameters, areas etc. This information has to be included into the Database to provide possibility for preparation of specific reports such as Compatibility Report. So Database should have possibility to load this information in case it is available in electronic form, for example, as tables in MS Word document. This situation is similar to previous one, since MS Word tables can be easily transformed into Excel worksheets. In case Monitoring Programme data are not available in electronic form, the Database should be supplied with convenient tool for manual entering of data.

At the moment there are no specific requirements on export of data from the Database and on export formats as well. Data exchange with EEA **Marinebase** involves only annual aggregated data and also doesn't require specific format, but data should be coded using of MED POL computerization codes. So main requirement to data export is support of import formats, i.e. Database should provide possibility to export data at the same formats as were defined for Import.

2.4. Data access, update and exchange policy

User groups. In general there are 3 categories (groups) of users, which will access MED POL Phase III Programme Database:

1) MED POL office managers
2) Experts
3) General public

Data access. Different user groups will have different type of access to the Database. Also different user groups will ask for information at different degree of detail. Most detailed information is necessary for experts working with data. MED POL managers should have possibility to work with different levels of data details, whereas general public will be provided with summarized database data via Internet.

First two user groups are local users, i.e. users, which have access to the Database in local network. These users should have full access to the Database, i.e. they have to be able view and edit data. 3rd group is, in general, Internet users. They should have read-only access to Database information. Hence user groups with different type of data access are separated physically, corresponding type of data access can be provided on application level, i.e. different Database Application for local and Internet users should be developed. On the other hand, it may be necessary to secure some part of Database information even from local users. For example, information on Laboratories' Quality Codes may be done available only for selected users. So Database and Database Application should provide possibility to secure some data on individual user level.

Data update. Update of the Database will be done routinely one time per year, usually at the beginning of year after receiving of annual reports and data from originators. Database should provide tools for convenient data editing for data managers and experts.

Data exchange. For the moment there is no specific requirements to data exchange. In general it can be defined as data exchange on request, i.e. Database should provide possibility for fast export of data in coordinated formats upon request.

2.5. Technical Requirements

General technical requirements are as follows.

Local users. The database must be accessible in local network from personal computers, operating under Microsoft Windows 95/98/ME/NT/2000 operation system.

Internet users. Access to the database information must be available from main Internet browsers: Microsoft Internet Explorer version 5 or higher or Netscape Navigator version 4.7 or higher on Microsoft Windows 95/98/ME/NT/2000.

Note: The main server of the MED POL Unit runs under Windows NT 4.0 SP 6.0a. Web Server is IIS 4.

3. CONCEPTUAL DESIGN OF THE DATABASE

3.1. Analysis of requirements and data

Analysis of user requirements, existed data and data formats, estimation of data volumes allow to state the next:

1) Data to be included into the Database are various. Besides main monitoring data on 5 matrices a number of tables with MED POL computerization codes have to be included into the Database. More over, requirements on providing of Quality Assurance and preparation of specific report result the addition tables with information on Monitoring Programmes and Quality Assurance have to be included into the Database.
2) Data formats are various. Most probably it will be impossible to develop one universal module for data loading, and separate module for each format will be required. From the other hand, if difference in data formats comes from internal data structure, the more complicated database structure will be required.
3) Estimation of total data volume shows, that it is not big, within the limits of 10-20Mb. This includes as historical data received in framework of previous MED POL phases as data of MED POL Phase III Programme.
4) Estimated volume of data flows is not big, about several hundreds Kb per year. This estimation is based on assumption, that not more than 5,000 data records will be reported each year.
5) Main updates of the Database will be done one time per year, after receiving of annual reports and data from originators.
6) Routine database updates are supposed to be rare and not complex.
7) Database reports can be rather specific and complex.
8) In order to provide Internet access to the Database either it should be placed on the computer serving as Internet server or Internet server should be accessible through the local network.
9) The number of simultaneously working user is estimated as less than 5 (not taking into account Internet users, which is limited only by Web Server performance).

Conclusions:

1) Personal DBMS can be used to store and manage MED POL Phase III data.
2) Most of specific tasks described in “Users requirements” section can’t be performed only by means of embedded DBMS possibilities. So, special Database Application(s) should be developed, but once developed it can be used during all period of the Database exploitation and modified when necessary
3) Internet access to the database can be organized using MED POL Web server, which functions under Windows NT Server OS.
4) Special module has to be developed to provide interaction of Internet users with the database.

3.2. Architectural Model

Architectural model is based on requirements to the MED POL Phase II Database, available technologies and technical possibilities. Database should operate in the local MED POL Unit office network and be accessible from any PC in this network. On the other hand, Database information should be presented in Internet, so Database should be accessible from MED POL Unit Web Server for publishing information in Internet.

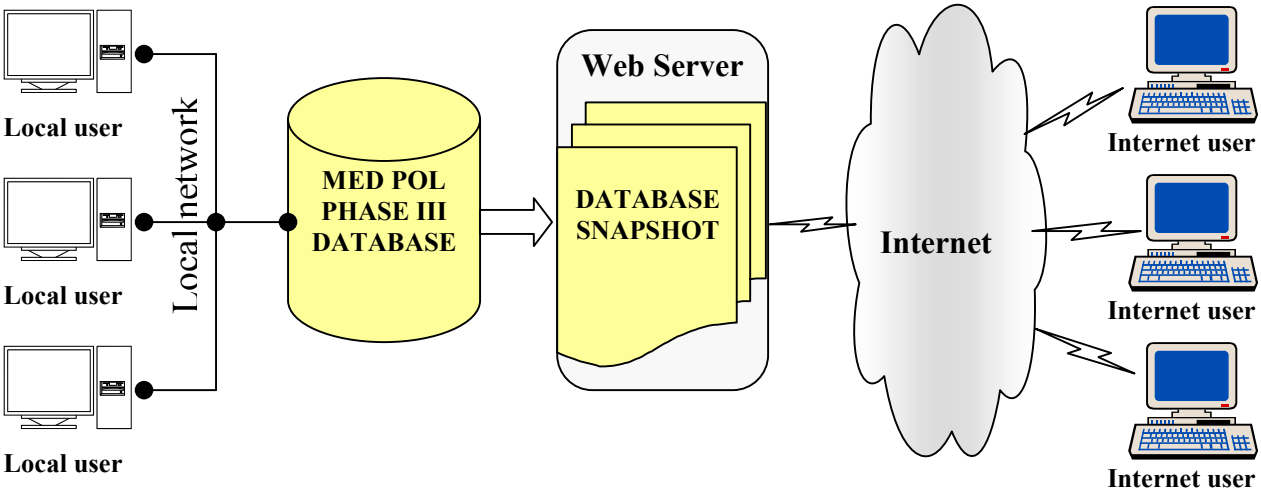


Figure 3.2.1 Architectural Model: general view

The above drawing constitutes the top-level view of the MED POL Phase III Programme Database architecture. Database is stored on a PC, which is connected to the local network and serves as file server for database files. Computer operating under Windows NT or Windows 2000 is recommended. Database will be accessible to the MED POL Unit users through the local network. Several users may work with database at the same time. It is recommended that only one dedicated person will be responsible for data loading and editing, while other users will have read-only access to database. Special database application will be developed to make work with database convenient and to present database information in different forms such as tables, graphs, map etc.

Since during loading and updating Database can contain raw or incomplete data, access to the Database at that time should be restricted for Internet users. This is organised by creating and publishing of Database Snapshot on the Web Server. Database Snapshot is a copy of Database done at the moment when Database contains only verified data. Internet users will access Database information published on the Web server with the help of most popular Internet Browsers: Internet Explorer and Netscape Communicator.

3.3. Selection of the DBMS

Microsoft Access is proposed as most appropriate DBMS giving end-to-end solution for all tasks of MED POL Database. MS Access is a relational DBMS for the Windows Operating System. In addition to the basic database management functions it includes WYSIWYG design tools for easy creation of tables, reports, forms and queries and a database programming language called VBA (Visual Basic for Applications). It provides access to data in the Database as through the local network as via Internet. MS Access gives possibility to create a good working relational database with referential integrity options and flexible schemes to secure data.

MS Access is optimal for not big databases with not a big number of users accessing data at the same time, which corresponds to MED POL Phase III Programme Database requirements, especially at the beginning stage of its development. In case of increasing of database requirements and decreasing of performance, MS Access provides tools for easy migrations to MS SQL Server, which provides real client-server solution with very good scalability. A special utility – so called Upsizing Wizard - helps to convert Access database to MS SQL database. For MED POL Database most convenient will be using of new MSDE

(Microsoft Database Engine) technology, which gives possibility to use almost full functionality of SQL server with unchanged MS Access applications.

Aggregated functions are essential part of MS Access, so calculation of statistics on set of values is easy and convenient. It is possible to calculate average, minimum, maximum, standard deviation and other statistical characteristics for any subset of pollution parameters loaded into the Database.

Selection of MS Access as a DBMS for MED POL Phase III Database opens wide possibilities for exporting of data in different formats. Data can be adjusted and transformed in any way according to requirements. Formats can be Text, HTML, Excel, RTF, etc. MED POL computerization codes will be used in export data identification. Since these codes are well known in scientific community working with pollution data, the data exchange with other organizations will not create serious problems for the Database.

MS Access is very flexible in securing of database, starting from simplest method of protection of database file with password and finishing with comprehensive user-level security protection. Under user-level security, users are required to identify themselves by an id and password when they open MS Access Database. Permissions are granted to groups and users to regulate how they are allowed to work with each table, query, form, report, and macro in a database. It is possible totally deny any access to specific table for some user or user group. Members of the Administrators group have full permissions on all of a database's tables, queries, forms, reports, and macros.

Very flexible database application with any required level of complexity can be developed using full power of MS Access and VBA on Microsoft Windows platforms. Since MS Access is a part of the Microsoft Office, it is usually available on every MS Windows PC. That means, that MED POL Database will not demand special installation procedure and will be ready for using on any standard office PC in the office network.

3.4. Database contents

The main purpose of the MED POL Phase III Database is storing and management of the monitoring data on pollutants in Mediterranean. Monitoring data refer to Pollution Parameters Names, Analysis Methods, Species Names, Tissue Types, etc. Most part of these codes, types and names was standardized by MED POL for computerization and should be included into the Database as Dictionaries, i.e. referred tables. In addition to main pollution data the Database must also contain information necessary for Quality Assurance of the data. And finally, to satisfy specific requirements (Compatibility report), information on characteristics of Monitoring Programme for each country should also be included.

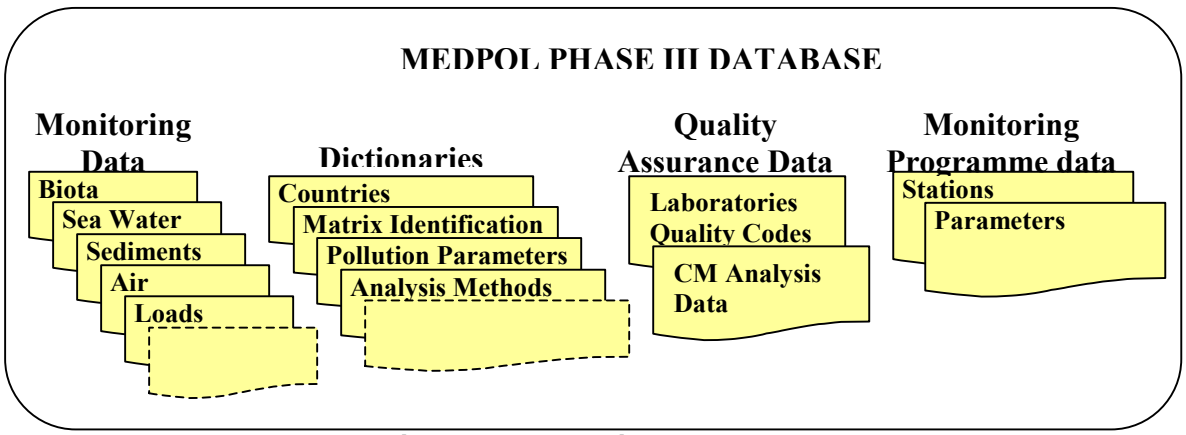


Figure 3.4.1 Database contents

Monitoring data contain observed data on pollution on next matrices:

- Biota,
- Sea Water,
- Sediments,
- Air,
- Loads,

and information on Compliance Monitoring. In its part, Biota Monitoring data consist of data on Trace Metals, Organic Contaminants and Bio-Monitoring (biomarkers); Sediments Monitoring Data consist of data on Trace Metals, Organic Contaminants data; Air Monitoring Data consist of data on Wet and Dry Deposition.

Dictionaries include set of tables with MED POL computerization codes (and other codes) for:

- Matrix Identification
- Station Types
- Pollution Parameters
- Analysis Methods
- Species
- Tissues
- Monitoring Frequencies
- Countries
- Institutes
- CRM Codes

Main idea of using these codes is structuring of data in the database and standardization of data exchange with providers and holders of pollution data. Dictionaries serve as an intermediate layer, which implements links between different types of data and combine them into one entity.

Certified Material Analysis Data and (inter-calibration) Laboratories Quality Codes are used in procedure of Quality Assurance of data. These data are not designed for general public and must be available only for privileged users: experts and managers.

Monitoring Agreements information includes information on country, monitoring areas, list of monitoring matrices, stations, frequencies, parameters, list of institutes, participated in monitoring, etc. This information as well as list of mandatory monitoring parameters is necessary for preparation Compatibility Reports.

Any other additional information can be defined and included into the Database during its exploitation.

3.5. Database Structure

Database structure is designed by taking into account the characteristics of monitoring data and reporting formats as well as general MS Access requirement on normalization of database. (Normalization is the process of structuring data into a form that reduces data redundancies, is easily accessed and maintainable.)

Hierarchical structure of MED POL monitoring is presented on **Figure 3.5.1**. Monitoring stations are defined and fixed from the beginning of the Monitoring Programme. Samples for pollution parameters are taken regularly on each station, i.e. each station contains a set of samples. At least one analysis of each sample for pollution parameters is carried out, but in general several analyses can be done, for example, sediment sample can be analysed as for

Trace Metals as for Hydrocarbons. And finally, several pollution and background environmental parameters can be measured in analysis.

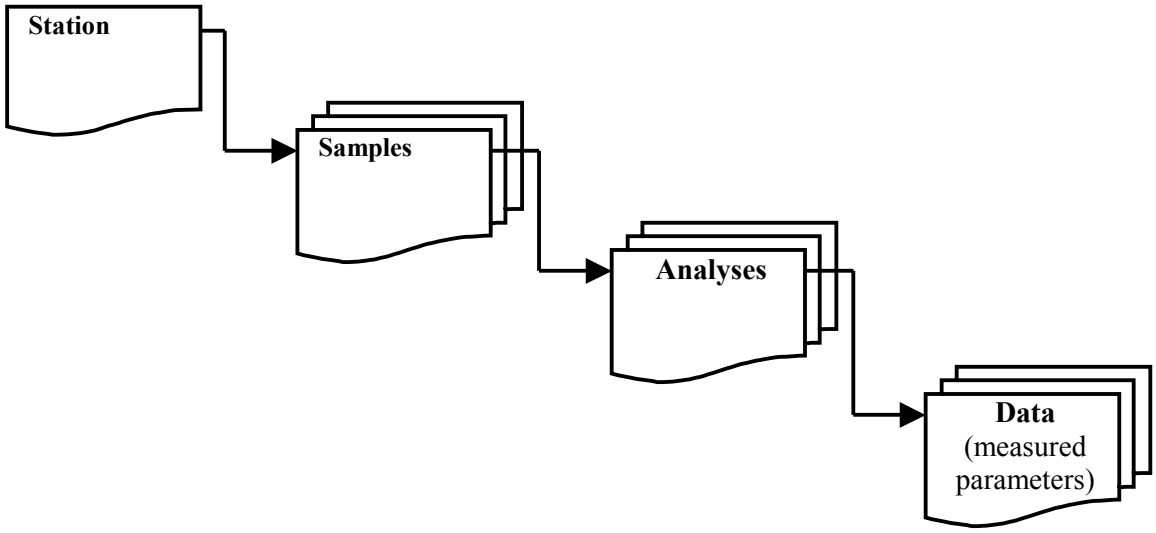


Figure 3.5.1. Hierarchical structure of monitoring data

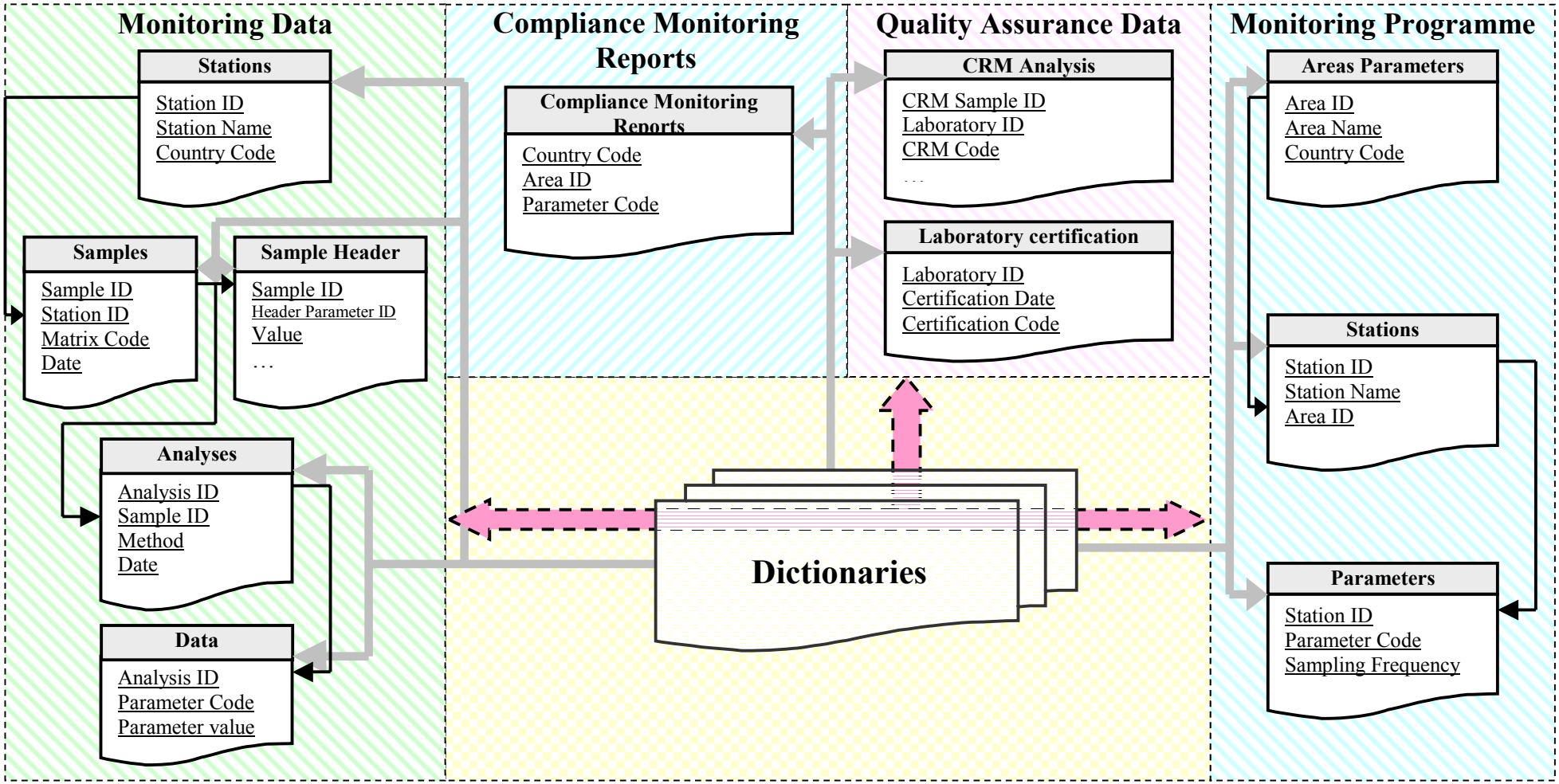
All data in the Database are stored in tables. Tables should be constructed accordingly to hierarchical structure of data. As a result the normalisation of data will be achieved. So in our case, four main tables linked each other should be created: ***Stations***, ***Samples***, ***Analyses***, and ***Data***. Since there are 5 types of monitoring matrices, 5 groups of such tables should be created – one group for each matrix makes in total 20 tables. The number of tables may even grow if new types of data will be included into the Database. In addition to main tables with monitoring data, Database must also contain tables with other information described in previous section. For dictionaries it will be 1 table per dictionary (around 10 tables), whereas Monitoring Programme information will consists of several tables. In total it will be necessary to construct more then 50 tables and establish links between them. Database structure and links will be entangled, so it is a good idea to find a way to simplify them.

Thorough analysis of reporting formats (see **Annex 1**) shows, that structure of all types of monitoring data (matrices) is similar but with some peculiarities. For example, station is described by station type, area and location (coordinates). These characteristics are common for all data types, but for sea sampling stations the bottom depth should be indicated whereas for air sampling stations – altitude, distance to shore and some other additional parameters. The same situation is with samples: along with common characteristics such as laboratory code, date and time of sampling there are matrix specific characteristics: sea water temperature and salinity, species code and tissue type for Biota; air volume for Air; dry weight/wet weight ratio for Sediments etc. Analysis information is the same for all data types – it consists of method used and analysis date. Pollution data (all data types) can be described as pairs: *parameter name – parameter value*.

Since general structure of monitoring data is the same, it is possible to use only one set of **Stations**, **Samples**, **Analyses**, and **Data** tables for all data types, but structure of these tables should be adjusted to satisfy all data type peculiarities. As it was found, the difference exists only in station and sample information. For stations the problem can be solved by including of all matrix specific parameters as fields into the ***Stations*** table (see **Annex 2** Table 1). Since number of different parameters is not big, redundancy of table can be ignored.

For samples the number of matrix specific parameter is rather big, so it is proposed to separate sample information between 2 tables, first of which named ***Samples*** will contain common fields, whereas second one named ***Sample Header Data*** will contain matrix specific sample parameters, such as sea water temperature or dry/wet ratio or bottom oxygen etc (see **Annex 2** Table 2 and Table 5). ***Sample Header Data*** table is linked with ***Samples*** table by Sample ID. Its structure is similar to structure of ***Data*** table, i.e. it contains pairs *name – value* for sample header parameters. Special dictionary with names of all possible sample parameters should be created.

Figure 3.5.2. MED POL Phase III Database Structure



Flowchart of the Database structure is presented on Figure 3.5.2. It consists of 5 informational blocks. Four blocks contain monitoring-related data:

- (State and) Trend Monitoring Data on 5 monitoring matrices, and Compliance Monitoring Data - raw data on Compliance monitoring of shellfish/aquaculture waters, effluents and hot spots areas
- Compliance Monitoring Reports: on bathing waters from the beginning of Programme, on shellfish/aquaculture waters, effluents and hot spots areas – upon defining of reporting formats.
- Quality Assurance
- Monitoring Programme Data.

Fifth block contains Dictionaries. As it was mentioned earlier, this block serves as an intermediate layer, which implements links between different types of data and combine them into one entity.

Table composition of monitoring-related data blocks is presented completely, whereas table composition of 5th block – Dictionaries, which consists of 13 tables – is not depicted on flowchart to make it more understandable. Direct links between tables are painted with solid lines – these are presented for main data tables. Links between Dictionaries and data tables are painted with thick grey lines. One should take into account that each such line may contain multiple links, for example, table ***Stations*** (see p.44) is linked to next Dictionaries: ***Countries*** (field ***Country***), ***Areas*** (field ***Area***) and ***Station Types*** (field ***Station Type***). Dashed block arrows show indirect links between different data blocks realized through Dictionaries. Such links exist because monitoring-related data tables refers to the same Dictionaries. So it becomes possible to make cross-analysis of data in the Database, for example, select monitoring data on Biota matrix together with Quality Codes assigned to Laboratories, which provided analysis of these data; list real monitoring parameters along with those defined in Monitoring Programme etc.

Detailed structure of every Database table with description of relationships (links) between tables is presented in **Annex 2**. Database consists of 24 tables. When establishing a relationship between tables referential integrity should be enforced. Referential integrity is a system of rules that MS Access uses to ensure that relationships between records in related tables are valid, and as result it is not possible accidentally delete or change related data.

It is necessary to give an example in which way specific data can be searched in the Database. All station differs each other by station type (field ***Station Type*** in ***Stations*** table): Reference (code “R”, for example), Impact=Hot Spot (“H”), Trend (“T”), Compliance (“C”), etc. Each sample is identified by Matrix Code (field ***Matrix Code*** in ***Samples*** table), i.e. it can belong either to Biota Matrix, or to Sea Water Matrix, or to Sediments Matrix etc. In its turn, each observed pollution parameter belongs to some Parameter Group (field ***Parameter Group*** in ***Pollution Parameters*** table): Trace Metals, Halogenated Hydrocarbons, Nutrients, etc. So, for selection of Trace Metals in Biota on Reference stations user should construct query to the Database, in which he/she will select parameters values from ***Data*** table for parameters belonging to Trace Metals group and belonging to **Samples** on Biota Matrix from Reference **Stations**. Since relationships between Database table are already established, construction of such kind of query is not difficult task: it is necessary only specify criteria and list fields to be selected from linked tables.

3.6. Interaction with Internet user

MS Access, which is chosen as DBMS for the Database, provides 3 approaches to organize interaction of Internet user with database:

- Data Access Pages
- Server generated HTML
- Static HTML

Data access pages provide to Internet User full access to the database using Dynamic HTML. User can use pages to view, edit, update, delete, filter, group, and sort live data in Microsoft Internet Explorer 5 or later. A page can also contain additional controls called including a spreadsheet, a PivotTable list (an interactive table which allows to analyse data dynamically), and a chart.

Server-generated HTML usually is based on ASP technology. Server-generated HTML files are displayed in a table format in a Web browser. Each time a user opens or refreshes an ASP file from a Web browser, the Web server dynamically creates an HTML file, and then sends that HTML file to the Web browser. In contrast to data access pages generated HTML files can be used with any Web browser, but user can only see live read-only data.

Static HTML files can be easily created from tables, queries, forms, and reports in MS Access and published to Web server. When accessing the data through a Web browser, the browser only needs to download the static HTML file once from the Web server to let user view the data. However, the resulting HTML files are a snapshot of the data at the time of publishing. This approach is recommended when database is not big and data does not change frequently.

Taking into account needs of MED POL Phase III Programme, it is proposed to develop Internet access to the Database 2 stages:

- 1st stage –creation of Inventory to the Database in Internet,
- 2nd stage – creation of interactive access to the Database from Internet.

On the **1st stage** (initial stage) static HTML approach should be used, i.e. a snapshot of the Database will be periodically published on the Web Server in form of static HTML files. General view of this approach is presented on Figure 3.2.1. The frequency of renewing is expected 1-2 times per year. Web contents at that stage has to contain next information:

- Brief information on Monitoring Programme for each country which has agreement with UNEP/MAP
- Full list of institutes participating in Monitoring Programme
- List of monitoring stations (for each country and total)
- List of monitoring parameters (for each country and total)
- Map of Mediterranean with station positions.

From listed above items only producing of maps is not clearly supported in MS Access. Latest version of MS Access - 2002 – is supplied with Map Point tool, which can be used for publishing of Maps. Unfortunately, Map Point is designed mainly for busyness application and does not contain full Mediterranean Map (except for European countries) at the moment. But more serious problem is licence limitation on number of produced maps, which significantly restricts possibilities of using of Map Point for Web Publishing.

It is a good idea to use GIS for producing of maps. For example, well known ArcView GIS can be integrated with MS Access database and used as a tool for producing of professional-quality static maps and publishing them in Internet. Unfortunately, ArcView GIS is not good for using as universal mapping tool on each working place, first of all due to its high cost and strict license policy. As an alternative way step by step approach is proposed.

On the **1st stage** data volume will not be big, and it will not create difficulties to produce a snapshot of database by publishing limited number of HTML pages with fixed contents only a few times per year. But as Database volume will grow and its contents will become more various, the static HTML will not satisfy to new requirements. Static HTML pages do not provide flexibility, which is inhered to interactive Web pages: With static HTML Internet user

sees database contents always frozen, whereas with interactive pages one can query database for specific data.

On the **2nd stage** development of interactive Web pages will be required. Approach with server generated HTML is preferable, since on the one hand it is compatible with any type of Web browsers, and on the other hand, there is no necessity for full mode access to the Database via Internet. Server generated HTML brings live data from the Database to Internet user. The copy (snapshot) of the Database should be periodically created on the Web Server in order to optimise server-database interaction and avoid possible errors when Database is modifying or updating.

Server generated HTML is based on Client-Server approach. All complexity of this interaction is hidden from Internet user. Internet user – Client – usually opens Web page with query form in his (her) Internet Browser, fills this form and press confirmation button. Client's Internet Browser sends query information to the Web Server. Web Server communicates with database, processes request, generates HTML and sends it to be displayed in Client's Internet Browser. It is necessary to note, that processing of request in general can consists of many steps: Web Server executes special program module, which establishes connection to database, extracts data, formats report, and send it back to Web Server, afterwards Web Servers sends result in form of generated HTML to the Client.

The native way to organize such kind of interaction in MS environment (since MED POL server is MS Windows NT Server) is using of combination of ASP (Active Server Pages) and ADO (ActiveX Data Objects) technologies (see figure below). This approach is widely used, clear in designing and implementation. It should be noted that it allows developers to use various Database Management Systems (MS Access, Paradox and other SQL-based DBMS) and web servers (MS IIS, PWS, etc).

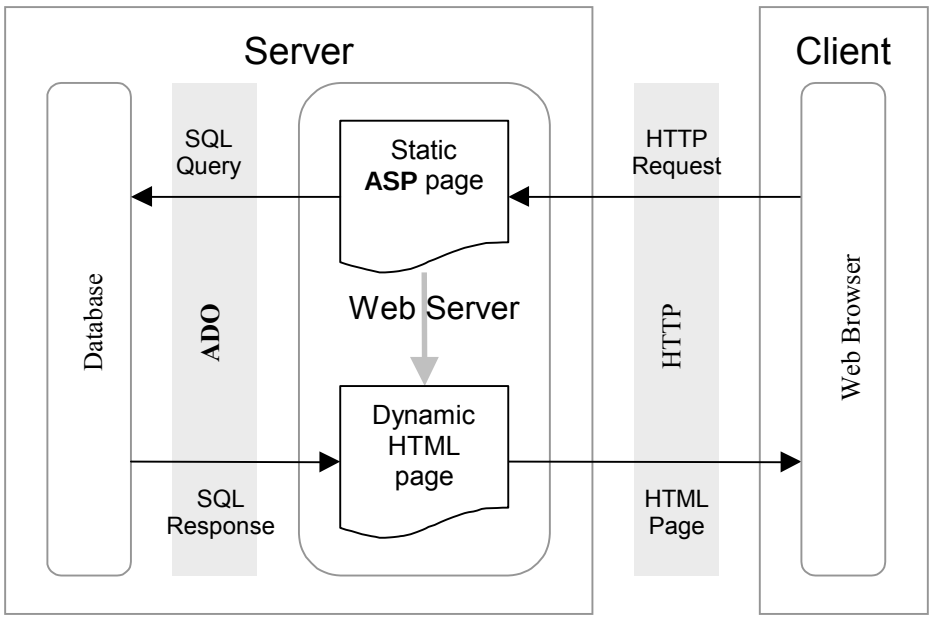


Figure 3.6.1 ASP-ADO approach in interaction with Internet user

MS Access provides possibility to create ASP pages from a table, query, or form exporting them into .asp files with corresponding option. The .asp file contains HTML tags interspersed with one or more queries in the form of SQL statements, template directives, and Visual

Basic Script code containing references to ActiveX Server Controls. The .asp file also contains ODBC connection information to connect to an ODBC data source, in this case, an Access or Microsoft SQL Server database. After publishing of ASP files on MS IIS they becomes available in the Web. Internet user downloads .asp file in its browser and sends request for querying of database. MS IIS, upon request from a Web browser, runs the Visual Basic Scripting code, calls the ActiveX Data Objects, opens the database (using the appropriate ODBC driver and the .asp file connection information), runs the queries in the .asp file to access the data, merges the results and HTML tags in the .asp file into one .html file, and then sends the dynamically created .html file to the Web browser for display as a Web page.

Combination of MS Access with ASP technology is perfect for presentation in the Web of texts and figures from database, while dynamically generated graphics are not supported directly. In order to provide Internet users with drawing of Mediterranean map with monitoring station positions it is necessary to develop special mapping tool (object) based on ASP or ISAPI technology.

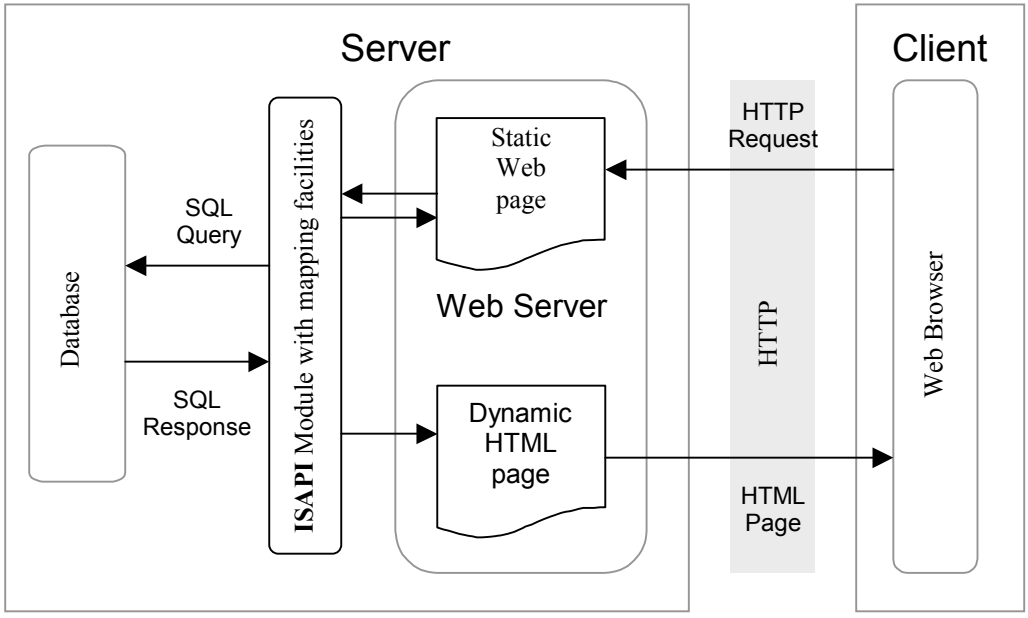


Figure 3.6.2 ISAPI approach in interaction with Internet user

For MED POL Phase III Programme Database it is proposed to develop mapping module using ISAPI technology as it is presented on Figure 3.6.2. Development of mapping module should be done with using of compiled language, such as Delphi or C++, which would be good for performance. The static Web page contains reference to ISAPI module with mapping facilities. Internet user downloads the Web page in its browser and sends request for querying of database and drawing map. MS IIS, upon request from a Web browser, runs the mapping module, which opens the database (using the appropriate ODBC driver), runs the query to access geographical data, constructs image of the Mediterranean map in memory, and sends dynamically created .html file to the Web browser for display as a Web page.

3.7. Basic User Interface

This section doesn't make its aim the specification of the full user interface for the Database, as it can be various due to variability of data. The main goal is defining of basic components of the user interface.

User Interface for the MED POL Phase III Database should be developed using all advantages of MS Access WYSIWYG design tools and VBA programming language. Simple data entry/edit/view forms and reports, without a lot of behind-the-scenes code, can be developed very quickly in MS Access. More serious applications will demand more time for development, but they can be as complex as user requires.

Development of User Interface must take into account existence of different users group. In principle, there should be different interface for advanced users (expert and managers) and general public. Fortunately, first category of users is local users, whereas second – Internet users. So, basic interface components for local and Internet users should be specified.

3.7.1. Basic Interface for local users

Basic Interface for local user should provide next possibilities:

1. Loading of data
2. Quick view of data, stored in the Database
3. Editing of data
4. Selection of data on different criteria
5. Visualization of data

Loading of Data. MED POL Phase III data will be collected in standardized MS Excel worksheets (see **Annex 2**). It is easy to import data from MS Excel worksheets to MS Access, if structure of tables in both applications is the same. Since MED POL Phase III Database is normalized and structure of tables doesn't correspond to reporting formats, the direct import of data from Excel tables is not possible. On the first stage it is proposed to load data from Excel worksheet into the Database step by step using embedded tools of MS Access:

1. Excel table is imported into the temporary table in the MS Access Database.
2. 3 Append Queries are executed to load data into tables: Stations, Samples, and Analyses.
3. Joint pair of Select-Append Queries is executed to load Sample Header Data into the corresponding table.
4. Joint pair of Select-Append Queries is executed to load reported data into the table Data.
5. Temporary table is deleted from the Database

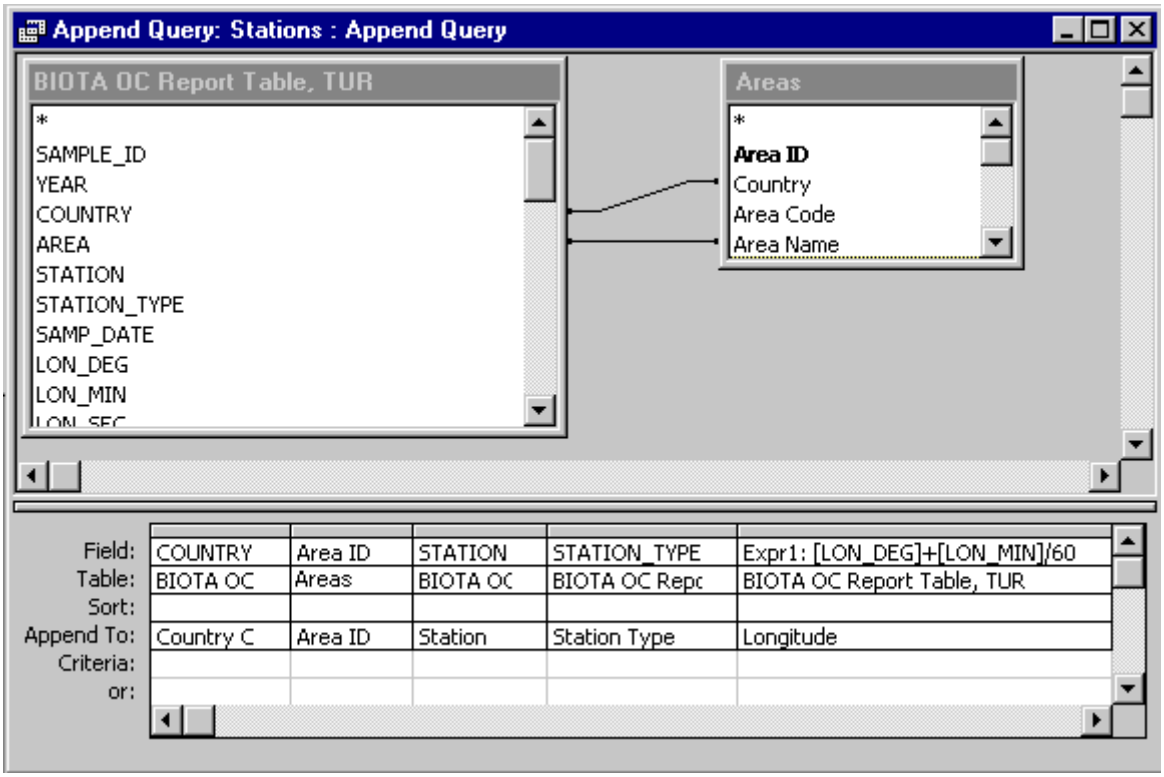


Figure 3.7.1 Design View of Append Query for Stations.

An example of Append Query for stations is presented on Figure 3.7.1. Once developed Append Query can be stored in the Database and used for loading other data in standard format. In case data format differs or report table contains additional data, user has to open Append Query in Design View and adjust it. Special VBA module can and should be developed to combine all Append Queries and make loading done in one step.

MS Access itself without special development and/or programming, in general, provides quick view and editing of data. Such Database tables as dictionaries, Compliance Monitoring, CRM Analysis etc can be opened for view and editing directly in MS Access Tables page. Different situation is with Monitoring Data, because data from one reporting table are split between several tables: Stations, Samples, Sample Header, Analyses and Data. In this case special data access forms should be developed to give user possibility to work (view and edit) with these data in convenient way, combining all component on one page, as it shown on Figure 3.7.2.

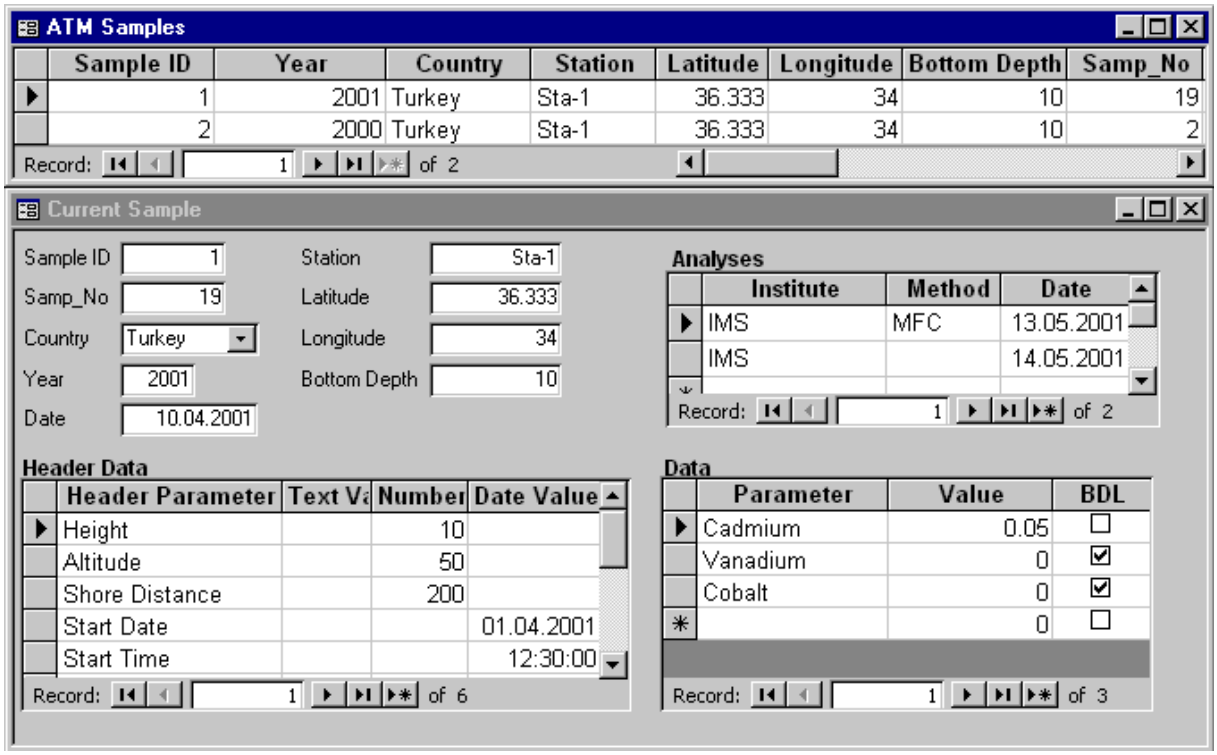


Figure 3.7.2 Monitoring Data Entry Form for atmospheric samples.

Selection of data on different criteria can be easily fulfilled in MS Access using Queries. User needs to open Query in Design view (as it shown on Figure 3.7.3), bring to Query tables which contain necessary data, choose fields to be selected, and specify query criteria. In our example query criteria is: Country Name = “Greece” and Matrix is Biota (“BIO”). It should be noted, that it is possible to select data not only from tables but also from queries, i.e. make query on query. This flexibility allows construct very complex queries with various selection criteria.
A set of predefined queries for most common task should be developed and included into the Database as a part of database application. Predefined queries will make work with database more convenient, providing selection of data with just one mouse click.

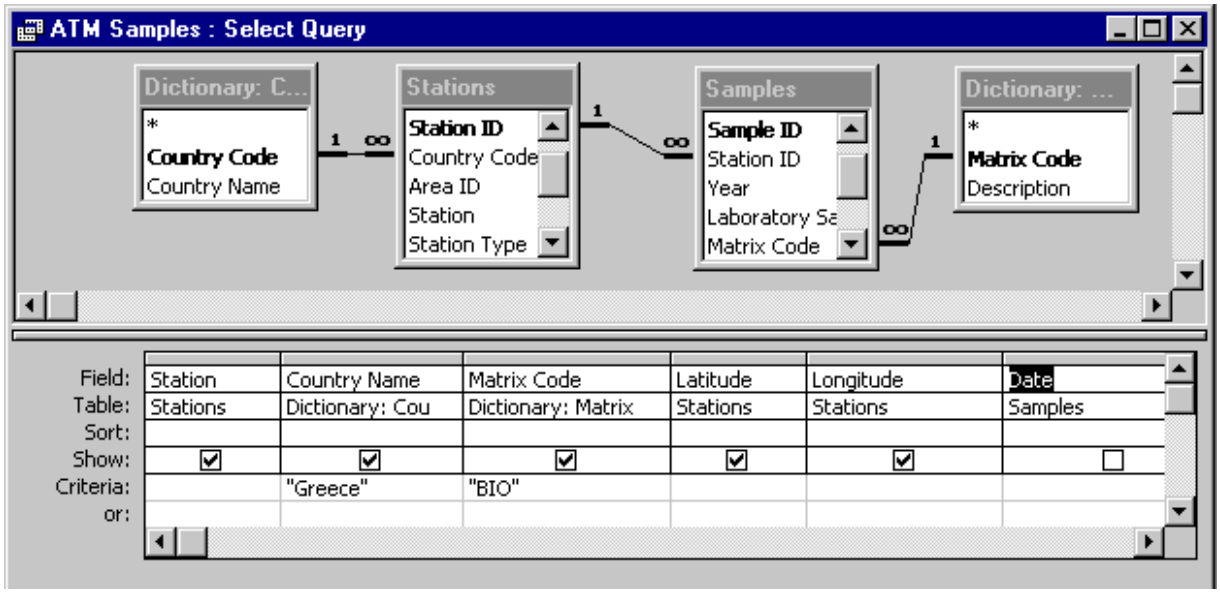


Figure 3.7.3 Design View of Select Query.

Basically, **visualization of data** includes 2 different types of graphics: charts and maps. MS Access contains Chart tool, which is typical for Microsoft Office environment, and support many chart types such as Column, Bar, Line etc. Possibilities of MS Access Chart are not so rich as in MS Excel, but for most tasks it is enough. Chart can be included into report or form. Charts were not defined in user requirements, but it is clear that after few years of the Database functioning time series charts should become one of main tools in trend analysis.

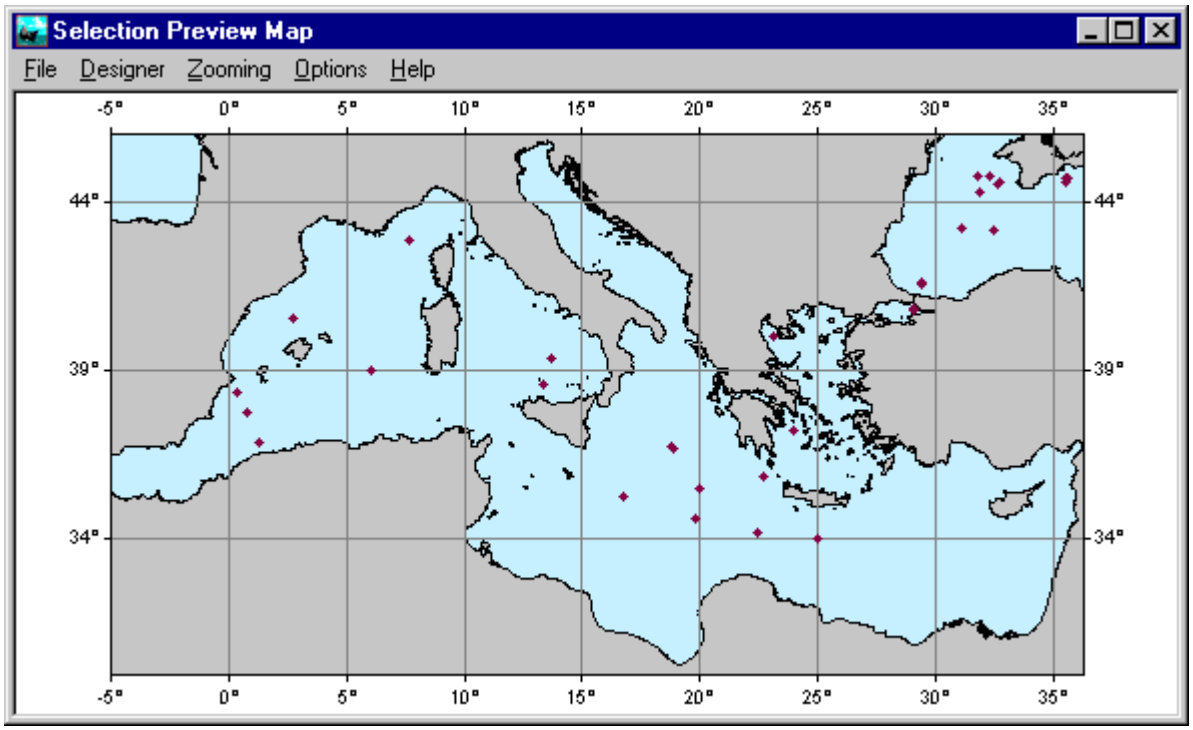


Figure 3.7.4 Example of mapping tool view

Basic mapping possibilities should be included into the Database according to user requirements. As it was noted in section 3.5, MS Map Point at the moment doesn't include map of Mediterranean, so it can't be used as a mapping tool. At the first stage of the Database exploitation it was recommended to use ArcView GIS (or another software with mapping facilities) for publishing maps in Internet. Afterwards a special mapping module should be developed to dynamically create maps and send them to Internet user. The similar approach can be used for local users as well, i.e. specialized software (GIS or another) will be used for printing of professionally looking maps for including them into final reports, whereas development of mapping module will be organized to include it into the Database for quick view of maps. An example of Mediterranean map plotted by mapping module in OceanBase system is presented on Figure 3.7.4. This module provides base mapping functionality: plotting of coastline, isobaths and station positions, zooming of map. In addition to this functionality MED POL Phase III Database mapping module should also plot main rivers, state boundaries, areas, and legends to data. It is recommended to develop mapping module using compiled programming language like Delphi or C++ to provide good performance. Embedding of mapping module into the Database can be done with using of VBA code. In combination with forms it will provide user with instant map of selected monitoring stations.

3.7.2. Basic Interface for Internet users

As it was described above in this document, development of interaction between Database and Internet User should be done in 2 stages. On the first stage Database Information should be periodically exported into Static HTML files and published on MED POL Unit Web Server. Interface of Internet User on this stage will be just set of Web pages. Main Web page should contain general information about Database and hyperlinks to prepared Static HTML files with

- List of Participants (countries and institutions),
- Lists of Monitoring Stations and Parameters, and
- Mediterranean Map with Station Position.

On the second stage interface of Internet User will be extended with interactive forms. Using these forms user will have possibility to formulate a query to the Database and select live information on Monitoring Station, Parameter and even real data values for specified country, matrix, time period etc. Optionally user will have possibility to request information either in form of table or as map of Mediterranean with position of stations satisfying to query criteria.

3.7.2. Basic Reports

Since MS Access is chosen as DBMS for MED POL Phase III Database, all its power in reports designing and presentation should be used. A report is an effective way to present data in a printed format. With using of WYSIWYG technology database developer and user has control over the size and appearance of everything on a report, and can display the information the way he/she wants to see it. MS Access provides a set of Report Wizards, which allow easy create professionally looking reports on data stored in Database in columnar or tabular format, or in form of chart. These tools can be used for preparing of such typical reports as:

- List of Sampling Stations in the form of table
- List of Monitoring Parameters (including values) in the form of table
- Parameter time series in the form of table
- Parameter time series plot

Specific report(s), such as Compatibility Report, will require a little bit more complex technique. Firstly, special query should be constructed to prepare data, and afterwards Report Wizard can be applied to this query, i.e. a special query will compare real monitoring data stored in linked tables ***Data*****,** ***Analyses*****,** ***Samples*****,** ***Stations*** should be compared for correspondence to Monitoring Programme data stored in ***Programme Stations*** and ***Station Parameters*** tables, and result of this query can be reported, for example, as it presented on **Figure 3.7.5**.

Compatibility Report

Country: Turkey

Station: A1

Sea Water Matrix

Parameters	NO3	NO2	NO3-2-N	PO4	SiO4
2001	√	√	√	–	√
2002	√	√	√	√	√
2003	√	–	√	√	–
2004	√	√	√	√	√

Sediments Matrix

Parameters	As	Cd	Cr	Cu	Hg
2001	√	√	√	√	√
2002	√	√	√	–	√
2003	√	√	√	√	–
2004	√	–	√	√	√

Station: A2

Sea Water Matrix

Parameters	NO3	NO2	NO3-2-N	PO4	SiO4
2001	√	√	√	–	√
2002	√	√	√	√	√
2003	√	–	√	√	–
2004	√	√	√	√	√

Figure 3.7.5 Possible view of Compatibility Report

Similar reports can be constructed in the same way as Compatibility Report, for example:

- Report on comparison of real monitoring parameters with the list of mandatory parameters with indication of those absent and new extra parameters,
- Report on comparing of number of real monitoring stations with number of stations defined in Monitoring Programme for specific area,
- Report on corresponding of monitoring frequencies to those defined in Monitoring Programme, etc.

During some period from the beginning of MED POL PHASE III Programme countries will transmit Compliance Monitoring Report only on bathing waters, whereas on Compliance Monitoring of shellfish/aquaculture waters, effluents and hot spots areas countries should provide raw data. For raw data Compliance Monitoring reports can be prepared directly in the Database based on the information regarding any “common measure” (either UNEP/MAP or EU or any other). These reports will have the same view as standard one (see **Annex 1** Table 11), but without column containing information on compliance with the National Legislation.

Data, presented in any kind of reports, can be grouped in different ways: by country, by area, by station type, by Monitoring Matrix. Also they can be sorted in any order: chronologically, according to station coordinates etc. Once created reports should be stored in the Database and included into User Interface for repeated using.

4. CONCLUSION

In framework of the current work analysis of MED POL Phase III data and needs was carried out. As a result, requirements to the MED POL Phase III Database were settled and Conceptual Design of the MED POL Phase III Database was done. It is recommended to use Microsoft Access Database Management System to create Database. Database contents and detailed structure are described in the report on Conceptual Design of the Database. Special Database Application should be developed to integrate task on data loading (importing), viewing, editing, reporting and exporting. Special Mapping Module should be developed for visualization of Database information, i.e. for plotting of map of Mediterranean with monitoring station positions on it. Elements of User Interface of database Application are presented in the report.

One of the ultimate goals of the MED POL Phase III Database is dissemination of information on (State and) Trend Monitoring. This goal can be achieved with publishing of Database information in Internet using MED POL Unit Web Server. It is proposed to make it in 2 stages: on the 1st stage kind of Inventory to the Database should published in Internet by exporting most significant information into Static HTML Files; on the 2nd stage interactive access to the Database from Internet should be organized. Interactive access to the Database from Internet have to be based on Client-Server approach with using combinations of ASP – ADO and ISAPI technologies.

Selection of powerful and scalable MS Access DBMS and detailed developmental work on Database structure allow to state that implementation of main functionality of the MED POL Phase III Database may be completed in period of one year.

Annexes

Annex I MEDPOL Phase III reporting formats for (State and) Trend Monitoring

Table 1
BIOTA (TRACE METALS) DATA REPORTING TABLE for MEDPOL Phase III

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Mandatory	Sample reference code given by the laboratory		
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code (MED POL Codes)	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	Mandatory	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)	
SAMP_DATE	Mandatory	Date of Sampling	DATE	
LON_DEG	Mandatory	Longitude in degrees	NUM (2)	
LON_MIN	Mandatory	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LON_SEC	Mandatory	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
LON_HEMIS	Mandatory	Longitude hemisphere (codes: W=west, E=east)	CHAR (1)	
LAT_DEG	Mandatory	Latitude degree	NUM (2)	
LAT_MIN	Mandatory	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LAT_SEC	Mandatory	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
BOT_DEPTH	Mandatory	Bottom depth of the sampling station	NUM (5,1)	m
SAM_DEPTH	Mandatory	Sampling depth	NUM (5,1)	m
SAM_TEMP	Mandatory	Temperature at the sampling station and depth	NUM (5,2)	Deg C
SAM_SALIN	Mandatory	Salinity at the sampling station and depth	NUM (5,2)	
SAM_DO	Additional	Dissolved oxygen at the sampling station and depth	NUM (5,2)	mg/L
SPECY	Mandatory	Selected Specie for analysis (MED POL codes)	CHAR (2)	
TISSUE	Mandatory	Selected Tissue for analysis (MED POL codes)	CHAR (2)	
SAM_NO	Mandatory	Sample no. (1,...n) ("n"as used in trend objectives of the programme)	NUM (2)	
NS	Mandatory	Number of specimens (=num.Of pooled organisms in a sample)	NUM (2)	
LENGTH_AVG	Mandatory	Average length of specimens in a pool (Important: Use "fork length" for fish and "shell length" for mussels)	NUM (7,2)	cm
LENGTH_STD	Mandatory	Standard deviation of average length of specimens in a pool	NUM (6,2)	cm
LENGTH_UNIT	Mandatory	Unit given for length of organisms	CHAR (5)	
WEIGHT_AVG	Mandatory	Average weight of specimens in a pool	NUM (8,1)	grams
WEIGHT_STD	Mandatory	Standard deviation of average weight of specimens in a pool	NUM (7,1)	grams
WEIGHT_UNIT	Mandatory	Unit given for weight of organisms	CHAR (5)	
EOM	Additional	Extractable Organic Matter	NUM (5,2)	mg/g
EOM_UNIT		Unit for EOM	CHAR (5)	
DW / FW	Additional	Ratio of dry weight to fresh weight (dried to constant temperature)	NUM (5,2)	%
INST_CODE_TM	Mandatory	Trace Metal Institude code (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR(5)	
ANALY_DATE_TM	Mandatory	TM Analysis Date	DATE	
ANALY_METH_TM	Mandatory	TM Analysis method (MED POL codes)	CHAR (5)	

Fields	Requisite	Description	Format	Units
FW_DW	Mandatory	Mention if concentrations are based on fresh or dry weight (code as "**F**" for fresh weight and "**D**" for dry weight	CHAR (1)	
AS_CONC	Additional	Arsenic concentration	NUM (7,3)	ug/kg
AS_BDL	Additional	enter **BL** if As conc. Is below detection limit or level of determination	CHAR (2)	
AS_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
AS_UNIT	Additional	Unit for As_conc	CHAR (5)	
CD_CONC	**Mandatory**	**Cadmium Concentration**	NUM (7,3)	ug/kg
CD_BDL	**Mandatory**	**Enter BL if Cd conc. is below detection limit or level of determination**	**CHAR (2)**	
CD_DL	**Mandatory**	**Detection limit value**	NUM (7,3)	ug/kg
CD_UNIT	**Mandatory**	**Unit for Cd_conc**	**CHAR (5)**	
CR_CONC	Additional	Chromium Concentration	NUM (7,3)	ug/kg
CR_BDL	Additional	enter **BL** if Cr conc. Is below detection limit or level of determination	CHAR (2)	
CR_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
CR_UNIT	Additional	Unit for Cr_conc	CHAR (5)	
CU_CONC	Additional	Cupper concentration	NUM (7,3)	ug/kg
CU_BDL	Additional	Enter **BL** if Cu conc. Is below the detection limit or level of determination	CHAR (2)	
CU_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
CU_UNIT	Additional	Unit for Cu_conc	CHAR (5)	
HGT_CONC	**Mandatory**	**Total Hg concentration**	NUM (7,3)	ug/kg
HGT_BDL	**Mandatory**	**enter BL if HgT conc. is below detection limit or level of determination**	CHAR (2)	
HGT_DL	**Mandatory**	**Detection limit value**	NUM (7,3)	ug/kg
HGT_UNIT	**Mandatory**	**Unit for Hgt_conc**	**CHAR (5)**	
PB_CONC	Additional	Lead Concentration	NUM (7,3)	ug/kg
PB_BDL	Additional	enter **BL** if Pb conc. Is below detection limit or level of determination	CHAR (2)	
PB_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
PB_UNIT	Additional	Unit for Pb_conc	CHAR (5)	
ZN_CONC	Additional	Zinc concentration	NUM (7,3)	ug/kg
ZN_BDL	Additional	Enter **BL** if Zn conc. Is below the detection limit or level of determination	CHAR (2)	
ZN_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
ZN_UNIT	Additional	Unit for Zn_conc	CHAR (5)	
Other Trace Metals	Additional	to be included by the laboratories depending on the country agreements		

Table 2
BIOTA (ORGANIC CONTAMINANTS) DATA REPORTING TABLE for MEDPOL Phase III

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Mandatory	Sample reference code given by the laboratory		
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code (MED POL Codes)	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	Mandatory	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)	
SAMP_DATE	Mandatory	Date of Sampling	DATE	
LON_DEG	Mandatory	Longitude in degrees	NUM (2)	
LON_MIN	Mandatory	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LON_SEC	Mandatory	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
LON_HEMIS	Mandatory	Longitude hemisphere (codes: W=west, E=east)	CHAR (1)	
LAT_DEG	Mandatory	Latitude degree	NUM (2)	
LAT_MIN	Mandatory	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LAT_SEC	Mandatory	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
BOT_DEPTH	Mandatory	Bottom depth of the sampling station	NUM (5,1)	m
SAM_DEPTH	Mandatory	Sampling depth	NUM (5,1)	m
SAM_TEMP	Mandatory	Temperature at the sampling station and depth	NUM (5,2)	Deg C
SAM_SALIN	Mandatory	Salinity at the sampling station and depth	NUM (5,2)	
SAM_DO	Additional	Dissolved oxygen at the sampling station and depth	NUM (5,2)	mg/L
SPECY	Mandatory	Selected Specie for analysis (MED POL codes)	CHAR (2)	
TISSUE	Mandatory	Selected Tissue for analysis (MED POL codes)	CHAR (2)	
SAM_NO	Mandatory	Sample no. (1,...n) ("n"as used in trend objectives of the programme)	NUM (2)	
NS	Mandatory	Number of specimens (=num.Of pooled organisms in a sample)	NUM (2)	
LENGTH_AVG	Mandatory	Average length of specimens in a pool (Important: Use "fork length" for fish and "shell length" for mussels)	NUM (7,2)	cm
LENGTH_STD	Mandatory	Standard deviation of average length of specimens in a pool	NUM (6,2)	cm
LENGTH_UNIT	Mandatory	Unit given for length of organisms	CHAR (5)	
WEIGHT_AVG	Mandatory	Average weight of specimens in a pool	NUM (8,1)	grams
WEIGHT_STD	Mandatory	Standard deviation of average weight of specimens in a pool	NUM (7,1)	grams
WEIGHT_UNIT	Mandatory	Unit given for weight of organisms	CHAR (5)	
EOM	Mandatory	Extractable Organic Matter	NUM (5,2)	mg/g
EOM_UNIT		Unit for EOM	CHAR (5)	
DW / FW	Additional	Ratio of dry weight to fresh weight (dried to constant temperature)	NUM (5,2)	%
INST_CODE_OC	Mandatory	Institude code for organic contaminant analysis (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR(5)	
FW_DW	Mandatory	Mention if concentrations are based on fresh or dry weight (code as "**F**" for fresh weight and "**D**" for dry weight	CHAR (1)	
ANALY_DATE_PAH	Additional	Analysis Date	DATE	
ANALY_METH_PAH	Additional	Analysis method(s) for PAH (MED POL codes)	CHAR (5)	
PAH_CONC	Additional	PAH+ concentration	NUM (7,3)	ug/g
PAH_BDL	Additional	enter BL if PAH conc. is below detection limit or level of determination	CHAR (2)	
PAH_DL	Additional	Detection limit value	NUM (7,3)	ug/kg

Fields	Requisite	Description	Format	Units
PAH_UNIT	Additional	Unit for PAH_conc	CHAR (5)	
ANALY_DATE_HH	Additional	Analysis Date	DATE	
ANALY_METH_HH	Additional	Analysis method(s) for halogenated hydrocarbons (MED POL codes)	CHAR (5)	
HH_CONC	Additional	HH+ concentration	NUM (7,3)	ug/g
HH_BDL	Additional	enter BL if HH+ conc. is below detection limit or level of determination	CHAR (2)	
HH_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
HH_UNIT	Additional	Unit for HH_conc	CHAR (5)	
Other Organics	Additional	to be included by the laboratories depending on the country agreements		

Table 3
BIO-MONITORING DATA REPORTING TABLE for MED POL PHASE III

Fields	Description	Format	Units
SAMPLE_ID	Sample reference code given by the laboratory		
YEAR	Monitoring Year	NUM (4)	
COUNTRY	Country Code (existing coding)	CHAR (3)	
AREA	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)	
SAMP_DATE	Date of Sampling	DATE	
LON_DEG	Longitude in degrees	NUM (2)	
LON_MIN	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for	NUM (5,2)	
LON_SEC	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
LON_HEMIS	Longitude hemisphere (codes: W=west, E=east)	CHAR (1)	
LAT_DEG	Latitude degree	NUM (2)	
LAT_MIN	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for	NUM (5,2)	
LAT_SEC	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
BOT_DEPTH	Bottom depth of the sampling station	NUM (5,1)	m
SAMP_DEPTH	Sampling depth	NUM (5,1)	m
SAM_TEMP	Temperature at the sampling station and depth	NUM (5,2)	Deg C
SAM_SALIN	Salinity at the sampling station and depth	NUM (5,2)	
SAM_DO	Dissolved oxygen at the sampling station and depth	NUM (5,2)	mg/L
SPECY	Species Name (MEDPOL code list)	CHAR (2)	
TISSUE	Selected Tissue (MEDPOL code list)	CHAR (2)	
WILD/CAGED	If the selected organism is wild enter *'w'*, if caged use *'c'*	CHAR (1)	
CAGE_DUR	Caging duration	NUM (2)	Days
INS_CODE_BIOMON	Institute Code for bio-monitoring (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR (5)	
SAMPLE_NO	Sample no. (1,...)	NUM (2)	
ANALY_DATE_DNAx	Analysis Date	DATE	
ANALY_METH_DNAx	DNAx Analysis Methods (MEDPOL Code list)	CHAR (7)	
DNAx_ELUTION RATE_VOL	Fraction of DNA retained / volume	NUM (5,3)	Arbitrary units
DNAx_ELUTION RATE_TIME	Fraction of DNA retained / time	NUM (5,3)	Arbitrary units
DNAx_SSF	Strand Scission Factor	NUM (5,3)	unitless
DNAx_MICRONUCLEI	Micronuclei Frequency	NUM (5,1)	%
ANALY_DATE_EROD	Analysis Date	DATE	
ANALY_METH_EROD	EROD Analysis Method (MEDPOL code list)	CHAR (7)	
EROD_ACT	EROD Activity = pmol resofurin per mg-protein per minute	NUM ( )	
ANALY_DATE_LMS	Analysis Date	DATE	
ANALY_METH_LMS	Methods of LMS Analysis (MEDPOL code list)	CHAR (7)	
LMS_LP	The average Labilization Period	NUM (2)	min

Fields	Description	Format	Units
LMS_NRR	Neutral Red Retention	NUM (2)	min
ANALY_DATE_MT	Analysis Date	DATE	
ANALY_METH_MT	MT Analysis Method (MEDPOL code list)	CHAR (7)	
MT_LEVEL	MT Level in wet Tissue (w/w)	NUM (7,2)	ug/g

Table 4
SEDIMENT (TRACE METALS) DATA REPORTING TABLE FOR MED POL PHASE III

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Mandatory	Sample reference code given by the laboratory		
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code (MED POL codes)	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	Mandatory	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)	
SAMP_NO	Mandatory	Sample no.(1,...) (as used in trend objectives of the programme)	NUM (2)	
SAMP_DATE	Mandatory	Date of Sampling	DATE	
LON_DEG	Mandatory	Longitude in degrees	NUM (2)	
LON_MIN	Mandatory	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LON_SEC	Mandatory	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
LON_HEMIS	Mandatory	Longitude hemisphere (codes: W=west, E=east)	CHAR (1)	
LAT_DEG	Mandatory	Latitude degree	NUM (2)	
LAT_MIN	Mandatory	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LAT_SEC	Mandatory	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
BOT_DEPTH	Mandatory	Bottom depth of the sampling station	NUM (5,1)	m
BOT_TEMP	Mandatory	Temperature value at the bottom of the sediment sampling station	NUM (5,2)	Deg C
BOT_SALIN	Mandatory	Salinity value at the bottom of the sediment sampling station	NUM (5,2)	
BOT_DO	Additional	Dissolved Oxygen value at the bottom of the sampling station	NUM (5,2)	mg/L
SAMP_LAYER	Mandatory	Sampling layer to be provided (e.g. 0-2 cm, 1 cm etc.)		cm
SAMP_FRAC	Mandatory	Sample size fraction to be provided (e.g. >60 μm etc.)		μm
DW / WW	Additional	Ratio of dry weight to wet weight (dried to constant temperature)	NUM (5,2)	%
INST_CODE_TM	Mandatory	Trace Metal Institude code (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR(5)	
ANALY_DATE_TM	Mandatory	TM Analysis Date	DATE	
ANALY_METH_TM	Mandatory	TM Analysis method (MED POL codes)	CHAR (5)	
WW_DW	Mandatory	Mention if concentrations are based on wet or dry weight (code as "**W**" for wet weight and "**D**" for dry weight	CHAR (1)	
AS_CONC	Additional	Arsenic concentration	NUM (7,3)	ug/kg
AS_BDL	Additional	enter **BL** if As conc. Is below detection limit or level of determination	CHAR (2)	
AS_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
AS_UNIT	Additional	Unit for As_conc	CHAR (5)	
CD_CONC	**Mandatory**	**Cadmium concentration**	**NUM (7,3)**	**ug/kg**
CD_BDL	**Mandatory**	**enter BL if Cd conc. is below detection limit or level of determination**	**CHAR (2)**	
CD_DL	**Mandatory**	**Detection limit value**	NUM (7,3)	ug/kg
CD_UNIT	**Additional**	**Unit for Cd_conc**	**CHAR (5)**	
CR_CONC	Additional	Chromium Concentration	NUM (7,3)	ug/kg
CR_BDL	Additional	enter **BL** if Cr conc. Is below detection limit or level of determination	CHAR (2)	

Fields	Requisite	Description	Format	Units
CR_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
CR_UNIT	Additional	Unit for Cr_conc	CHAR (5)	
CU_CONC	Additional	Cupper concentration	NUM (7,3)	ug/kg
CU_BDL	Additional	Enter **BL** if Cu conc. Is below the detection limit or level of determination	CHAR (2)	
CU_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
CU_UNIT	Additional	Unit for Cu_conc	CHAR (5)	
HGT_CONC	**Mandatory**	**Total Hg concentration**	**NUM (7,3)**	**ug/kg**
HGT_BDL	**Mandatory**	**enter BL if HgT conc. is below detection limit or level of determination**	**CHAR (2)**	
HGT_DL	**Mandatory**	**Detection limit value**	NUM (7,3)	ug/kg
HGT_UNIT	**Additional**	**Unit for HgT_conc**	**CHAR (5)**	
PB_CONC	Additional	Lead Concentration	NUM (7,3)	ug/kg
PB_BDL	Additional	enter **BL** if Pb conc. Is below detection limit or level of determination	CHAR (2)	
PB_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
PB_UNIT	Additional	Unit for Pb_conc	CHAR (5)	
ZN_CONC	Additional	Zinc concentration	NUM (7,3)	ug/kg
ZN_BDL	Additional	Enter **BL** if Zn conc. Is below the detection limit or level of determination	CHAR (2)	
ZN_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
ZN_UNIT	Additional	Unit for Zn_conc	CHAR (5)	
Other Trace Metals	Additional	to be included by the countries depending on their parameter settings		

Table 5
SEDIMENT (ORGANIC CONTAMINANTS) DATA REPORTING TABLE for MED POL PHASE III

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Mandatory	Sample reference code given by the laboratory		
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code (MED POL codes)	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	Mandatory	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)	
SAMP_NO	Mandatory	Sample no.(1,...) (as used in trend objectives of the programme)	NUM (2)	
SAMP_DATE	Mandatory	Date of Sampling	DATE	
LON_DEG	Mandatory	Longitude in degrees	NUM (2)	
LON_MIN	Mandatory	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LON_SEC	Mandatory	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
LON_HEMIS	Mandatory	Longitude hemisphere (codes: W=west, E=east)	CHAR (1)	
LAT_DEG	Mandatory	Latitude degree	NUM (2)	
LAT_MIN	Mandatory	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LAT_SEC	Mandatory	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
BOT_DEPTH	Mandatory	Bottom depth of the sampling station	NUM (5,1)	m
BOT_TEMP	Mandatory	Temperature value at the bottom of the sediment sampling station	NUM (5,2)	Deg C
BOT_SALIN	Mandatory	Salinity value at the bottom of the sediment sampling station	NUM (5,2)	
BOT_DO	Additional	Dissolved Oxygen value at the bottom of the sampling station	NUM (5,2)	mg/L
SAMP_LAYER	Mandatory	Sampling layer to be provided (e.g. 0-2 cm, 1 cm etc.)		cm
SAMP_FRAC	Mandatory	Sample size fraction to be provided (e.g. >60 μm etc.)		μm
DW / WW	Additional	Ratio of dry weight to wet weight (dried to constant temperature)	NUM (5,2)	%
INST_CODE_OC	Mandatory	Institute code for organic contaminant analysis (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR(5)	
WW_DW	Mandatory	Mention if concentrations are based on wet or dry weight (code as "**W**" for wet weight and "**D**" for dry weight	CHAR (1)	
ANALY_DATE_PAH	Additional	PAH+ Analysis Date	DATE	
ANALY_METH_PAH	Additional	PAH+ Analysis method (MED POL codes)	CHAR (5)	
PAH_CONC	Additional	PAH+ concentration	NUM (7,3)	ug/g
PAH_BDL	Additional	enter BL if PAH+ conc. is below detection limit or level of determination	CHAR (2)	
PAH_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
PAH_UNIT	Additional	Unit for PAH_conc	CHAR (5)	
ANALY_DATE_HH	Additional	HH+ Analysis Date	DATE	
ANALY_METH_HH	Additional	HH+ Analysis method (MED POL codes)	CHAR (5)	
HH_CONC	Additional	HH+ concentration	NUM (7,3)	ug/g

Fields	Requisite	Description	Format	Units
HH_BDL	Additional	Enter BL if HH+ conc. is below detection limit or level of determination	CHAR (2)	
HH_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
HH_UNIT	Additional	Unit for HH_conc	CHAR (5)	
Other Organics	Additional	to be included by the countries depending on their parameter settings		

Table 6
LOADS (point sources of pollution) DATA REPORTING TABLE for MED POL PHASE III

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Mandatory	Sample reference code given by the laboratory		
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	Mandatory	Station Type (EFF=Effluent, OUT=Outfall, RIV=River)	CHAR (3)	
SOURCE_TYPE	Mandatory	Effluent Source (MIX=Mixed, IND=Industrial, MUN=Municipal)	CHAR (3)	
SAMP_DATE	Mandatory	Date of Sampling	DATE	
SAMP_TIME	Mandatory	Sampling Time	TIME	
LON_DEG		Longitude in degrees	NUM (2)	
LON_MIN		Longitude minute	NUM (5,2)	
LON_SEC		Longitude seconds	NUM (2)	
LON_HEMIS		Longitude hemisphere (codes: W=west, E=east)	CHAR(1)	
LAT_DEG		Latitude degree	NUM (2)	
LAT_MIN		Latitude minute	NUM (5,2)	
LAT_SEC		Latitude seconds	NUM (2)	
SAMP_DEPTH		Sampling depth	NUM (5,1)	m
SAMP_TEMP		Water temperature at the sampling point	NUM (4,1)	°C
SAMP_DO		Dissolved Oxygen concentration at the sampling point	NUM (5,2)	mg/L
SAMP_PH		PH value at the sampling point	NUM (5,2)	
DISCHARGE_MIN	Mandatory	Minimum discharge value in the sampling year	NUM ( )	m3/day
DISCHARGE_AVE	Mandatory	Average discharge value in the sampling year	NUM ( )	m3/day
DISCHARGE_MAX	Mandatory	Maximum discharge value in the sampling year	NUM ( )	m3/day
DISCHARGE_UNIT	Mandatory	Unit for discharge values	CHAR (5)	
INST_CODE_TM	Mandatory	Trace Metal Institude code (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR(5)	
ANALY_DATE_TM	Mandatory	TM Analysis Date	DATE	
ANALY_METH_TM	Mandatory	TM Analysis method	CHAR (5)	
CD_CONC	**Mandatory**	**Total Cadmium concentration**	**NUM (7,3)**	**ug/L**
CD_BL	**Mandatory**	Enter ' BL ' if Cd concentration is below the detection limit or level of determination		
CD_DL	**Mandatory**	**Detection limit value**	NUM (7,3)	ug/kg
CD_UNIT	**Mandatory**	**Unit for the Cd_conc**	**CHAR (5)**	
CR_CONC	Additional	Total Chromium concentration	NUM (7,3)	ug/L
CR_BL		Enter ' BL ' if Cr concentration is below the detection limit or level of determination		
CR_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
CR_UNIT	Additional	Unit for Cr_conc	CHAR (5)	
CU_CONC	Additional	Total Cupper concentration	NUM (7,3)	ug/L
CU_BL		Enter ' BL ' if Cu concentration is below the detection limit or level of determination		
CU_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
CU_UNIT	Additional	Unit for Cu_conc	CHAR (5)	

Fields	Requisite	Description	Format	Units
HG_CONC	**Mandatory**	**Total mercury concentration**	**NUM (7,3)**	**ug/L**
HG_BL	**Mandatory**	Enter ' BL ' if Hg concentration is below the detection limit or level of determination		
HG_DL	**Mandatory**	**Detection limit value**	NUM (7,3)	ug/kg
HG_UNIT	**Mandatory**	**Unit for HgT_conc**	**CHAR (5)**	
NI_CONC	Additional	Total Nickel concentration	NUM (7,3)	ug/L
NI_BL		Enter ' BL ' if Ni concentration is below the detection limit or level of determination		
NI_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
NI_UNIT	Additional	Unit for Ni_conc	CHAR (5)	
PB_CONC	Additional	Total Lead concentration	NUM (7,3)	ug/L
PB_BL		Enter ' BL ' if Pb concentration is below the detection limit or level of determination		
PB_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
PB_UNIT	Additional	Unit for Pb_conc	CHAR (5)	
ZN_CONC	Additional	Total Zinc concentration	NUM (7,3)	ug/L
ZN_BL		Enter ' BL ' if Zn concentration is below the detection limit or level of determination		
ZN_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
ZN_UNIT	Additional	Unit for Zn_conc	CHAR (5)	
INST_CODE_OC	Additional	Organic Contaminant Institude code (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR (5)	
ANALY_DATE_HH	Additional	HH+ Analysis Date	DATE	
ANALY_METH_HH	Additional	HH+ Analysis method (MED POL codes)	CHAR (5)	
HH_CONC	Additional	HH+ concentration	NUM (7,3)	ug/L
HH_BL		Enter ' BL ' if HH concentration is below the detection limit or level of determination		
HH_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
HH_UNIT	Additional	Unit for HH_conc	CHAR (5)	
ANALY_DATE_PAH	Additional	PAH+ Analysis Date	DATE	
ANALY_METH_PAH	Additional	PAH+ Analysis method (MED POL codes)	CHAR (5)	
PAH_CONC	Additional	PAH+ concentration	NUM (7,3)	ug/L
PAH_BL		Enter ' BL ' if PAH concentration is below the detection limit or level of determination		
PAH_DL	Additional	Detection limit value	NUM (7,3)	ug/kg
PAH_UNIT	Additional	Unit for PAH_conc	CHAR (5)	
Other organics	Additional	DET, PHE etc. pls. Specify yours in the .XLS reporting tables		
INST_CODE_LOAD	Additional	Institude code for analysis of nutrients, TSS, COD, BOD etc. (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR (5)	
PO4-P_CONC	Optional	PO4-P concentration	NUM (7,3)	mg/L
PO4-P_UNIT		Unit for PO4-P_conc	CHAR (5)	
TP_CONC	Additional	Total Phosphorus concentration	NUM (7,3)	mg/L
TP_UNIT		Unit for TP_conc	CHAR (5)	
NH3-N_CONC	Optional	NH3-N concentration	NUM (7,4)	mg/L
NH3-N_UNIT		Unit for NH3-N_conc	CHAR (5)	

Fields	Requisite	Description	Format	Units
NH4-N_CONC	Optional	NH4-N concentration	NUM (7,4)	mg/L
NH4-N_UNIT		Unit for NH4-N_conc		
NO2-N_CONC	Optional	NO2-N concentration	NUM (7,4)	mg/L
NO2-N_UNIT		Unit for NO2-N_conc		
NO3-N_CONC	Optional	NO3-N concentration	NUM (7,4)	mg/L
NO3-N_UNIT		Unit for NO3-N_conc		
TN_CONC	Additional	Total Nitrogen concentration	NUM (7,2)	mg/L
TN_UNIT		Unit for TN_conc		
SIO4_CONC	Additional	Silicic acid concentration	NUM (7,2)	mg/L
SIO4_UNIT		Unit for SIO4_conc		
TSS_CONC	Additional	Total Suspended Sediment concentration	NUM(7,2)	mg/L
TSS_UNIT		Unit for TSS_conc		
BOD_CONC	Additional	Biochemical Oxygen Demand (5 day)	NUM(7,2)	mg/L
BOD_UNIT		Unit for BOD5		
COD_CONC	Additional	Chemical Oxygen Demand	NUM(7,2)	mg/L
COD_UNIT		COD_conc		
FC	Additional	Number of Fecal Coliforms		no/ 100 ml
FC_UNIT		Unit for FC		

Table 7
SEA WATER DATA REPORTING TABLE for MED POL PHASE III

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Additional	Sample reference code given by the laboratory		
YEAR	Additional	Monitoring Year	NUM (4)	
COUNTRY	Additional	Country Code (MED POL codes)	CHAR (3)	
AREA	Additional	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Additional	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_TYPE	Additional	for Hot Spots (H), Coastal (C), Reference (R)	CHAR (2)	
SAMP_DATE	Additional	Date of Sampling	DATE	
SAMP_TIME	Additional	Sampling Time	TIME	
LON_DEG	Additional	Longitude in degrees	NUM (2)	
LON_MIN	Additional	Longitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LON_SEC	Additional	Longitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
LON_HEMIS	Additional	Longitude hemisphere (codes: W=west, E=east)	CHAR(2)	
LAT_DEG	Additional	Latitude degree	NUM (2)	
LAT_MIN	Additional	Latitude minute, seconds (In case of GPS application use this field for minutes and seconds in decimals, otherwise use only for minutes)	NUM (5,2)	
LAT_SEC	Additional	Latitude seconds (Use this field only when GPS is not used for positioning)	NUM (2)	
BOT_DEPTH	Additional	Bottom depth of the sampling station	NUM (5,1)	m
SAMP_DEPTH	Additional	Sampling depth	NUM (5,1)	m
SAM_TEMP	Additional	Temperature at the sampling depth	NUM (5,2)	Deg C
SAM_SALIN	Additional	Salinity at the sampling depth	NUM (5,2)	
SAM_DO	Additional	Dissolved oxygen at the sampling depth	NUM (5,2)	mg/L
INST_CODE_SW	Additional	Institude code for analysis of nutrients, chlorophyll-a, TRIX etc (Country code+institute no. given in the MEDPOL Phase III Agreement)	CHAR (5)	
PO4-P_CONC	Additional	PO4-P concentration	NUM (6,2)	µmol/L
PO4-P_UNIT		Unit for PO4-P_conc	CHAR (6)	
TP_CONC	Optional	Total Phosphorus concentration	NUM (6,2)	µmol/L
TP_UNIT		Unit for TP_conc	CHAR (6)	
NH4-N_CONC	Additional	NH4-N concentration	NUM (6,2)	µmol/L
NH4-N_UNIT		Unit for NH4-N_conc	CHAR (6)	
NO2-N_CONC	Additional	NO2-N concentration	NUM (6,2)	µmol/L
NO2-N_UNIT		Unit for NO2-N_conc	CHAR (6)	
NO3-N_CONC	Additional	NO3-N concentration	NUM (6,2)	µmol/L
NO3-N_UNIT		Unit for NO3-N_conc	CHAR (6)	
NO3-2-N_CONC	Additional	NO3+NO2-N concentration	NUM (6,2)	µmol/L
TN_CONC	Optional	Total Nitrogen concentration	NUM (6,2)	µmol/L
TN_UNIT		Unit for TN_conc	CHAR (6)	
SIO4_CONC	Additional	Silicic acid concentration	NUM (6,2)	µmol/L

Fields	Requisite	Description	Format	Units
SIO4_UNIT		Nit for SIO4_conc	CHAR (6)	
CHL-A_CONC	Additional	Chlorophyll-a concentration	NUM (6,2)	ug/L
CHL-A_UNIT		Unit for Chl-a_conc	CHAR (6)	
TRIX	Additional	Trophic Index	NUM (5,2)	
Others		Other parameters could be included depending on the country aggrements.		

Table 8
ATMOSPHERIC DRY DEPOSITION DATA REPORTING TABLE for MED POL (III)

Fields	Requisite	Description	Format	Units
SAMPLE_ID	Mandatroy	Sample reference code given by the laboratory		
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code (MED POL codes)	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_ID	Mandatory	Station identity ('R' for reference and 'I' for Impact=hot spot)	CHAR (1)	
HEIGHT	Mandatory	Height of station from the ground	NUM (5,1)	m
ALTITUDE	Mandatory	Altitude/Elevation of st. ground level above sea level	NUM (6,1)	m
DISTANCE_SHORE	Mandatory	Distance of atmospheric station to shore	NUM (7,1)	m
METEO_DIST	Mandatory	Distance to nearest meteorological station	NUM (7,1)	m
LAT_DEG	Mandatory	Latitude degree	NUM (2)	
LAT_MIN	Mandatory	Latitude minute	NUM (5,2)	
LAT_SEC	Mandatory	Latitude seconds	NUM (2)	
LON_DEG	Mandatory	Longitude in degrees	NUM (2)	
LON_MIN	Mandatory	Longitude minute	NUM (5,2)	
LON_SEC	Mandatory	Longitude seconds	NUM (2)	
SAMP_START_DATE	Mandatory	Start Date of Sampling	DATE	
SAMP_START_HOUR	Mandatory	Start Hour of Sampling	NUM (2)	
SAMP_END_DATE	Mandatory	End Date of Sampling	DATE	
SAMP_END_HOUR	Mandatory	End Hour of Sampling	NUM (2)	
SAMP_TIME-TOT	Mandatory	Total Sampling Hours	NUM (2)	
AIR_VOLUME	Mandatory	Total Air volume filtered during the total sampling time	NUM (7,2)	m3
SAMP_INST_CODE	Mandatory	Sampling Institute Code	NUM (9)	
INST_CODE_DUST		Institude code for dust analysis	CHAR(9)	
ANALY_DATE_DUST		Dust Analysis Date	DATE	
ANALY_METH_DUST		Dust Analysis method	CHAR (5)	
DUST_CONC		Dust Concentration	NUM ( )	
DUST_UNIT		Unit for dust_conc	CHAR (5)	
INST_CODE_TM	Mandatory	Trace Metal Institude code	CHAR(9)	
ANALY_DATE_TM	Mandatory	TM Analysis Date	DATE	
ANALY_METH_TM	Mandatory	TM Analysis	CHAR (5)	
CD_CONC		Cadmium concentration	NUM (7,3)	
CD_BDL		enter BL if Cd conc. is below detection limit or level of determination	CHAR (2)	
CD_DL		Detection limit value	NUM (7,3)	ug/kg
CD_UNIT		Unit for Cd_conc	CHAR (5)	
Other Trace Metals	As specified in the programme			
Organic contaminants	As specified in the programme			

Table 9
ATMOSPHERIC WET DEPOSITION DATA REPORTING TABLE for MED POL (III)

Fields	Requisite	Description	Format	Units
YEAR	Mandatory	Monitoring Year	NUM (4)	
COUNTRY	Mandatory	Country Code (MED POL codes)	CHAR (3)	
AREA	Mandatory	Area Code (as used in Phase III Agreement)	CHAR (6)	
STATION	Mandatory	Station Code (as used in Phase III Agreement)	CHAR (6)	
STATION_ID	Mandatory	Station identity ('R' for reference and 'I' for Impact=hot spot)	CHAR (1)	
HEIGHT	Mandatory	Height of station from the ground	NUM (5,1)	m
ALTITUDE	Mandatory	Altitude/Elevation of station ground level above sea level	NUM (6,1)	m
DISTANCE_SHORE	Mandatory	Distance of atmospheric station to shore	NUM (7,1)	m
METEO_DIST		Distance to nearest meteorological station	NUM (7,1)	m
LAT_DEG	Mandatory	Latitude degree	NUM (2)	
LAT_MIN	Mandatory	Latitude minute	NUM (5,2)	
LAT_SEC	Mandatory	Latitude seconds	NUM (2)	
LON_DEG	Mandatory	Longitude in degrees	NUM (2)	
LON_MIN	Mandatory	Longitude minute	NUM (5,2)	
LON_SEC	Mandatory	Longitude seconds	NUM (2)	
SAMP_START_DATE		Start Date of Sampling	DATE	
SAMP_START_HOUR		Start Hour of Sampling	NUM (2)	
SAMP_END_DATE		End Date of Sampling	DATE	
SAMP_END_HOUR		End Hour of Sampling	NUM (2)	
SAMP_TIME-TOT		Total Sampling Hours	NUM (2)	
PRECIPITATION_NG		Precipitation (National gauge)	NUM (5)	mm
SAMP_INST_CODE		Sampling Institute Code	NUM (9)	
INST_CODE_TM		Trace Metal Institude code	CHAR(9)	
ANALY_DATE_TM		TM Analysis Date	DATE	
ANALY_METH_TM		TM Analysis method	CHAR (5)	
CD_CONC		Cadmium concentration	NUM (7,3)	ug/kg
CD_BDL		enter BL if Cd conc. is below detection limit or level of determination	CHAR (2)	
CD_DL		Detection limit value	NUM (7,3)	ug/kg
CD_UNIT		Unit for Cd_conc	CHAR (5)	
Other Trace Metals				
Other fields		organic contaminants		

Table 10
CERTIFIED REFERENCE MATERIAL (CRM) ANALYSIS DATA REPORTING TABLE for MEDPOL PHASE III

Fields	Description	Format	Units
CRM SAMPLE_ID	Sample reference code given by the laboratory		
YEAR	Monitoring Year	NUM (4)	
COUNTRY	Country Code	CHAR (3)	
INST_CODE_TM_BIO	**Institude code for trace metal analysis in biota** (Country code+institute no. given in the MEDPOL Phase III Agreement)	**CHAR (5)**	
CRM_BIO_TM_CD	Name of the certified reference material used for Cadmium analysis in biota (will be coded)	CHAR (10)	
CRM_BIO_CD_VALUE	The expected concentration value for Cd in CRM	NUM (7,3)	ug/kg
CRM_BIO_CD_SAMPLE NO	Number of sample (1,…,n**)	NUM (2)	
CRM_BIO_CD_CONC	Concentration of cadmium measured in each CRM sample (1,…n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_BIO_CD_UNIT	Unit for both expected and measured Cd_conc in CRM	CHAR (5)	
ANALY_DATE_CD_BIO	Cd Analysis Date	DATE	
ANALY_METH_CD_BIO	Cd Analysis method (MED POL codes)	CHAR (5)	
CRM_BIO_TM_HGT	Name of the certified reference material used for total Mercury analysis in biota (will be coded)	CHAR (10)	
CRM_BIO_HGT_VALUE	The expected concentration value for total Hg in CRM	NUM (7,3)	ug/kg
CRM_BIO_HGT_SAMPLE NO	Number of sample (1,...,n**)	NUM (2)	
CRM_BIO_HGT_CONC	Concentration of total mercury in each CRM sample (1,…n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_BIO_HGT_UNIT	Unit for both expected and measured HgT_conc in CRM	CHAR (5)	
ANALY_DATE_HGT_BIO	Hgt Analysis Date	DATE	
ANALY_METH_HGT_BIO	Hgt Analysis method (MEDPOL codes)	CHAR (5)	
INST_CODE_TM_SED	**Institude code for trace metal analysis in sediment** (Country code+institute no. given in the MEDPOL Phase III Agreement)	**CHAR (5)**	
CRM_SED_TM_CD	Name of the certified reference material used for Cadmium analysis in sediment (will be coded)	CHAR (10)	
CRM_SED_CD_VALUE	The expected concentration value for Cd in CRM	NUM (7,3)	ug/kg
CRM_SED_CD_SAMPLE NO	Number of sample (1,...,n**)	NUM (2)	
CRM_SED_CD_CONC	Concentration of Cd in each CRM sample (1,…n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_SED_CD_UNIT	Unit for both expected and measured Cd_conc in CRM	CHAR (5)	
ANALY_DATE_CD_SED	Cd Analysis Date	DATE	
ANALY_METH_CD_SED	Cd Analysis method (MED POL codes)	CHAR (5)	
CRM_SED_TM_HGT	Name of the certified reference material used for t- Mercury analysis in sediment (will be coded)	CHAR (10)	
CRM_SED_HGT_VALUE	The expected concentration value for total Hg in CRM	NUM (7,3)	ug/kg
CRM_SED_HGT_SAMPLE NO	Number of sample (1,...,n)	NUM (2)	
CRM_SED_HGT_CONC	Concentration of Hg-T in each CRM sample (1,…n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_SED_HGT_UNIT	Unit for both expected and measured HgT_conc in CRM	CHAR (5)	

** **n:** number of individual runs of CRM during the analysis date of field samples

Fields	Description	Format	Units
ANALY_DATE_HGT_SED	Hgt Analysis Date	DATE	
ANALY_METH_HGT_SED	Hgt Analysis method (MED POL codes)	CHAR (5)	
INST_CODE_OC_BIO	**Institude code for organic contaminants analysis in biota** (Country code+institute no. given in the MEDPOL Phase III Agreement)	**CHAR (5)**	
CRM_BIO_HH	Name of the certified reference material for halogenated hydrocarbons in biota (will be coded)	CHAR (10)	
CRM_BIO_HH_VALUE	Expected concentration value of HH+ compound in CRM	NUM (7,3)	ug/kg
CRM_BIO_HH_SAMPLE NO	Number of sample (1,...,n**)	NUM (2)	
CRM_BIO_HH_CONC	Concentration of HH+ in each CRM sample (1,….n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_BIO_HH_UNIT	Unit for both expected and measured HH_conc in CRM	CHAR (5)	
ANALY_DATE_HH_BIO	HH+ Analysis Date	DATE	
ANALY_METH_HH_BIO	HH+ Analysis method (MED POL codes)	CHAR (5)	
CRM_BIO_OC_PAH	Name of the certified reference material for PAH in biota (will be coded)	CHAR (10)	
CRM_BIO_PAH_VALUE	Expected concentration value of PAH in CRM	NUM (7,3)	ug/kg
CRM_BIO_PAH_SAMPLE NO	Number of sample (1,...,n**)	NUM (2)	
CRM_BIO_PAH_CONC	Concentration of PAH in each CRM sample (1,….n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_BIO_PAH_UNIT	Unit for both expected and measured PAH_conc in CRM	CHAR (5)	
ANALY_DATE_PAH_BIO	PAH Analysis Date	DATE	
ANALY_METH_PAH_BIO	PAH Analysis method (MED POL codes)	CHAR (5)	
INST_CODE_OC_SED	**Institude code for organic contaminant analysis in sediments** (Country code+institute no. given in the MEDPOL Phase III Agreement)	**CHAR (5)**	
CRM_SED_HH	Name of the certified reference material used for the analysis of halogenated hydrocarbons in sediment (will be coded)	CHAR (10)	
CRM_SED_HH_VALUE	Expected concentration value of HH+ compound in CRM	NUM (7,3)	ug/kg
CRM_SED_HH_SAMPLE NO	Number of sample (1,...,n**)	NUM (2)	
CRM_SED_HH_CONC	Concentration of HH+ of each sample (1,….n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_SED_HH_UNIT	Unit for both expected and measured HH_conc in CRM		
ANALY_DATE_HH_SED	HH+ Analysis Date	DATE	
ANALY_METH_HH_SED	HH+ Analysis method (MED POL codes)	CHAR (5)	
CRM_SED_PAH	Name of the certified reference material used for PAH analysis in sediment (will be coded)	CHAR (10)	
CRM_SED_PAH_VALUE	Expected concentration value of PAH in CRM	NUM (7,3)	ug/kg
CRM_SED_PAH_SAMPLE NO	Number of sample (1,...,n**)	NUM (2)	
CRM_SED_PAH_CONC	Concentration of PAH of each sample (1,….n) * Pls don't submit average values	NUM (7,3)	ug/kg
CRM_SED_PAH_UNIT	Unit for both expected and measured PAH_conc in CRM	CHAR (5)	
ANALY_DATE_PAH_SED	PAH Analysis Date	DATE	
ANALY_METH_PAH_SED	PAH Analysis method (MED POL codes)	CHAR (5)	

** **n:** number of individual runs of CRM during the analysis date of field samples

Table 11

COMPLIANCE MONITORING

Monitoring of bathing waters

Country Code	Area Code	Parameter/ Group	Number of stations monitored	Total Number of measurements	Frequency of measurements	Stations (%) Comply with interim WHO/UNEP criteria	Stations (%) Comply with the National Legislation *	Remarks **

* Specify the national legislation applied as reference

** When appropriate, specify the reasons for non-compliance and the measures taken to ensure compliance

Annex 2. Structure of Database tables.

Abbreviations: **I** – Indexed, **PK** – Primary Key, **R** – Required.

(State and) Trend Monitoring Data

Table 1
Stations

Field	Data Type	PK	R	I	Description
Station ID	Long Integer	√	√	√	Table internal ID, participates in relationships (links) with ***Samples*** table
Country Code	Text (3)				Reference to record in ***Countries*** table
Area ID	Long Integer			√	Reference to record in ***Areas*** table
Station Name	Text (20)				
Station Type	Text (1)				Reference to record ***Station Types*** table
Latitude	Double				Negative (-) for Southern Hemisphere
Longitude	Double				Negative (-) for Western Hemisphere
Bottom Depth	Single				For coastal and sea stations only
Distance to shore	Single				
Height	Single				Height from the ground (for atmospheric stations only)
Altitude	Single				Altitude/elevation above sea level (for atmospheric stations only)
Meteo-distance	Single				Distance to nearest meteorological station (for atmospheric stations only)

Table 2
Samples

Field	Data Type	PK	R	I	Description
Sample ID	Long Integer	√	√	√	Table internal ID, participates in relationships (links) with ***Analyses*** and ***Sample Header*** tables
Station ID	Long Integer				Reference to record in ***Stations*** table
Year	Integer				
Laboratory Sample ID	Long Integer			√	Sample reference code given by the laboratory
Matrix Code	Text (3)			√	Reference to record in ***Matrix Codes*** table
Species Code	Text(3)				Reference to record in ***Individual Species*** table (**only for Biota Matrix** samples)
Tissue Code	Text(3)				Reference to record in ***Tissue Types*** table (**only for Biota Matrix** samples)
Start Date	Date/Time				
Start Time	Date/Time				
End Date	Date/Time				For most samples (except atmospheric) it is the same as Start Date
End Time	Date/Time				For most samples (except atmospheric) it is the same as Start Time

Table 3
Analyses

Field	Data Type	PK	R	I	Description
Analysis ID	Long Integer	√	√	√	Table internal ID, participates in relationship (link) with ***Data*** table
Sample ID	Long Integer			√	Reference to record in ***Samples*** table
Analysis Institute ID	Long Integer			√	Reference to record in ***Institutes*** table
Analysis Method Code	Text (5)			√	Reference to record in ***Analysis Methods*** table
Analysis Date	Date/Time				

Table 4
Data

Field	Data Type	PK	R	I	Description
Analysis ID	Long Integer	√	√	√	Reference to record in ***Analyses*** table
Parameter Code	Text (5)			√	Reference to record in ***Pollution parameters*** table
Parameter Value	Double				
QC	Integer				Parameter Quality Code
BDL	Yes/No				Indicate **Yes** if parameter concentration is below of detection level
DL	Double				Detection level (limit) value

Table 5
Sample Header Data

Field	Data Type	PK	R	I	Description
Sample ID	Long Integer			√	Reference to record in ***Samples*** table
Header Parameter ID	Long Integer			√	Reference to record in ***Header Parameters*** table
Value	Single				Sample Parameter Value

Compliance Monitoring Reports

Table 6
Compliance Monitoring Reports

Field	Data Type	PK	R	I	Description
Country Code	Text (3)			√	Reference to record in ***Countries*** table
Area ID	Long Integer			√	Reference to record in ***Areas*** table
Parameter Code	Text (5)			√	Reference to record in ***Pollution Parameters*** table
Number of Stations	Integer				
Number of Samples	Integer				
Frequency Code	Text (1)			√	Reference to record in ***Frequences*** table
International Compliance	Single				% of stations comply with interim WHO/UNEP criteria
National Compliance	Single				% of stations comply with national legislation
Remarks	Memo				

Quality Assurance Data

Table 7
Laboratory Certification

Field	Data Type	PK	R	I	Description
Institute ID	Long Integer			√	Reference to record in ***Institutes*** table
Certification Date	Date/Time				
Certification Code	Text (10)			√	International certification code

Table 8
CRM* Analysis

Field	Data Type	PK	R	I	Description
Sample ID	Long Integer	√	√	√	Table internal ID
Laboratory Sample ID	Text (50)			√	Sample reference code given by the laboratory
Institute ID	Long Integer			√	Reference to record in ***Institutes*** table
CRM Code	Text (50)			√	Reference to record in ***CRM Codes*** table
Analysis Method Code	Text (5)				Reference to record in ***Analysis Methods*** table
Analysis Date	Date/Time				
Parameter Code	Text (5)			√	Reference to record in ***Pollution Parameters*** table
Expected Value	Double				
Measured Value	Double				

* CRM – certified reference material

Monitoring Programme

Table 9
Areas

Field	Data Type	PK	R	I	Description
Area ID	Long Integer	√	√	√	Table internal ID, participates in relationships (links) with ***Stations***, ***Compliance Monitoring***, and ***Programme Stations*** tables
Country	Text (3)				Reference to record in ***Countries*** table
Area Code	Text (10)			√	Area code given in Monitoring Programme
Area Name	Text (50)				Area name given in Monitoring Programme
Descriprion	Text (250)				
CompMonLD-Nst	Integer				Number of stations for Compliance Monitoring (Loads)
CompMonHS-Nst	Integer				Number of stations for Compliance Monitoring (Hot Spots)
CompMonBW-Nst	Integer				Number of stations for Compliance Monitoring (Bathing Waters)
CompMonO-Nst	Integer				Number of stations for Compliance Monitoring (Other)
TrendMonR-Nst	Integer				Number of stations for State and Trend Monitoring (Coastal Zone and Reference)
TrendMonHS-Nst	Integer				Number of stations for State and Trend Monitoring (Hot Spots)
TrendMonL-Nst	Integer				Number of stations for State and Trend Monitoring (Loads)
TrendMonBE-Nst	Integer				Number of stations for State and Trend Monitoring (Biological Effects)
Start Date	Date/Time				
End Date	Date/Time				

Table 10
Programme Stations

Field	Data Type	PK	R	I	Description
Station ID	Long Integer	√	√	√	Table internal ID, participates in relationship (link) with ***Station Parameters*** table
Station Name	Text (20)			√	
Area ID	Long Integer			√	Reference to record in ***Areas*** table
Latitude	Double				Negative (-) for Southern Hemisphere
Longitude	Double				Negative (-) for Western Hemisphere
Station Type	Text (1)				Reference to record in ***Station Types*** table
Bottom Depth	Single				
Distance from Shore	Single				
Description	Text (250)				

Table 11
Station Parameters

Field	Data Type	PK	R	I	Description
Station ID	Long Integer			√	Reference to record in ***Programme Stations*** table
Parameter Code	Text (5)			√	Reference to record in ***Pollution parameters*** table
Matrix Code	Text (3)				Reference to record in ***Matrix Codes*** table
Sampling Frequency Code	Text (1)				Reference to record in ***Frequencies*** table
Sampling Depth	Single				
Institute ID	Long Integer			√	Reference to record in ***Institutes*** table

Dictionaries

Table 12
Countries

Field	Data Type	PK	R	I	Description
Country Code	Text (5)	√	√	√	**MED POL** code, participates in relationships (links) with ***Stations***, ***Areas*** and ***Institutes*** tables
Country Name	Text (40)			√	

Table 13
Matrix Codes

Field	Data Type	PK	R	I	Description
Matrix Code	Text (3)	√	√	√	**MED POL** code, participates in relationships (links) with ***Samples*** and ***Programme Stations*** tables
Description	Text (30)			√	

Table 14
Station Types

Field	Data Type	PK	R	I	Description
Type Code	Text (1)	√	√	√	**MED POL** code, participates in relationships (links) with ***Stations*** and ***Programme Stations*** tables
Description	Text (30)			√	

Table 15
Pollution Parameters

Field	Data Type	PK	R	I	Description
Parameter Code	Text (5)	√	√	√	**MED POL** code, participates in relationships (links) with ***Data*** and ***Station Parameters*** tables
Group Code	Text(5)			√	Reference to record in ***Parameter Groups*** table
Description	Text (60)			√	
Air units	Text (10)				
Biota units	Text (10)				
Effluent units	Text (10)				
Plankton units	Text (10)				
Precipitation units	Text (10)				
Seashore units	Text (10)				
Sediment units	Text (10)				
Suspended matter units	Text (10)				
Sea water units	Text (10)				

Table 16
Parameter Groups

Field	Data Type	PK	R	I	Description
Group Code	Text (5)	√	√	√	Table Internal ID, participates in relationship (link) with ***Pollution Parameters*** tables
Description	Text (40)			√	

Table 17
Analysis Methods

Field	Data Type	PK	R	I	Description
Method Code	Text (5)	√	√	√	**MED POL** code, participates in relationships (links) with ***Analyses*** and ***CRM Analysis*** tables
Description	Text (200)			√	

Table 18
CRM Codes

Field	Data Type	PK	R	I	Description
CRM Code	Text (5)	√	√	√	**MED POL** code, participates in relationship (link) with ***CRM Analysis*** table
Information	Text (250)				

Table 19
Header Parameters

Field	Data Type	PK	R	I	Description
Parameter ID	Long Integer	√	√	√	**MED POL** code, participates in relationship (link) with ***Sample Header*** table
Parameter Name	Text (50)				
Description	Text (250)				

Table 20
Individual Species

Field	Data Type	PK	R	I	Description
Species Code	Text (3)	√	√	√	**MED POL** code, participates in relationship (link) with ***Samples*** table
Latin Name	Text (100)			√	
Information	Text (100)				

Table 21
Institutions

Field	Data Type	PK	R	I	Description
Institute ID	Long Integer	√	√	√	Table Internal ID, participates in relationships (links) with ***Samples***, ***Analyses***, ***CRM Analysis***, and ***Station Parameters*** tables
Country Code	Text (3)			√	Reference to record in ***Countries*** table
Institute Code	Text (5)			√	**MED POL** code
Institute Name	Text (100)				
Address	Text (100)				
Responsible investigator	Text (50)				
Main Monitoring Activity	Text (250)				
Higher Body	Text (50)				
Comments	Text (250)				

Table 22
Monitoring Frequencies

Field	Data Type	PK	R	I	Description
Frequency Code	Text (1)	√	√	√	**MED POL** code, participates in relationships (links) with ***Compliance Monitoring*** and ***Station Parameters*** tables
Number of Samplings per year	Long Integer			√	
Description	Text (40)			√	

Table 23
Quality Flags

Field	Data Type	PK	R	I	Description
Flag Code	Integer	√	√	√	Participates in relationship (link) with ***Data*** table
Description	Text (50)			√	

Table 24
Tissue Types

Field	Data Type	PK	R	I	Description
Type Code	Text ()	√	√	√	**MED POL** code, participates in relationship (link) with ***Samples*** table
Description	Text (50)			√	

Table 25
Pollution Criteria

Field	Data Type	PK	R	I	Description
Criteria ID	Long Integer	√	√	√	Table Internal ID, participates in relationships (links) with ***Criteria Definition*** table
Criteria Name	Text (255)			√	Official criteria name
Description	MEMO			√	

Table 26
Criteria Definition

Field	Data Type	PK	R	I	Description
Criteria ID	Long Integer	√	√	√	Reference to record in ***Pollution Criteria*** table
Parameter Code	Text (5)			√	Reference to record in ***Pollution parameters*** table
Critical value	Double			√	Legitimate value of pollution parameter according to criteria

Table 27
Experts

Field	Data Type	PK	R	I	Description
Expert ID	Long Integer	√	√	√	Table Internal ID
Name	Text (25)			√	Expert Name
Affiliation	Text (25)			√	
Address	Text (25)				
City	Text (25)				
Country	Text (3)				Reference to record in ***Countries*** table
Post Code	Text (10)				
Telephone No	Text (15)				
Fax No	Text (15)				
E-mail	Text (30)				

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