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REVIEW OF
MED POL – PHASE III MONITORING ACTIVITIES
(1998 - 2001)

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Review of MED POL Phase III Monitoring Activities (1998-2001)

1. Background and Objectives of MED POL Phase III

The Contracting Parties to the Barcelona Convention (20 Mediterranean Countries and the EU) agreed on the development of Phase III of the MED POL Programme during their eighth ordinary meeting in Antalya (1993). The decision was made in view of the need to refocus MAP activities towards sustainable development and adapt its components accordingly. MED POL Phase III, the scientific and technical component of MAP, had therefore to respond to this new need and provide the scientific basis for decision making related to marine pollution control in the Mediterranean region as part of the process of achieving sustainable development.

The MED POL Phase III Programme was prepared in 1994 and, after being reviewed and approved by experts and MED POL Coordinators, was adopted by Contracting Parties in 1996. The major goal of MED POL Phase III (1996-2005), called the "Programme for the Assessment and Control of Pollution in the Mediterranean Region" was to serve the Contracting Parties to the Barcelona Convention for the long-term assessment, prevention, mitigation and control of pollution in the Mediterranean region.

The specific objectives of MED POL Phase III are:

- *the assessment of all (point and diffuse) sources of pollution, the load of pollution reaching the Mediterranean Sea, and the magnitude of the problems caused by the effect of contaminants on living and non-living resources, including human health, as well as on amenities and uses of the marine and coastal regions;*

- *the formulation and implementation of measures for the prevention and control of pollution, for the mitigation of impacts caused by pollution and for the restoration of systems already damaged by pollution;*

- *the monitoring of the effectiveness of the implementation of the pollution control measures adopted;*

- *the assistance to countries, including capacity building, in the development and implementation of national action plans for the elimination of marine pollution, in particular from land-based activities; and*

- *the assessment of status and trends in the quality of the marine and coastal environment as an early warning system for potential environmental problems caused by pollution.*

All the above mentioned objectives were thoroughly based on the needs of MAP Phase II adopted in 1995. As a result, the monitoring activities in the framework of MED POL Phase III were divided in two basic components (compliance and trend monitoring) to respond to the new needs. Trend Monitoring activities were planned to provide a continuous assessment of quality and quantity of pollution and its temporal trends whereas the Compliance Monitoring would provide the basis for the actual control of pollution.

Trend monitoring is defined as the repeated measurement of concentrations or effects over a period of time to detect possible changes with time. This type of monitoring will provide information which can be used for the assessment of the state of the environment and the

effectiveness of pollution control measures taken. If the effectiveness of measures is deemed inadequate, additional activities may be initiated such as the formulation of new measures or the revision of existing ones, etc.

Trend monitoring is implemented at four levels: trend monitoring of contaminants in coastal zones and reference areas, trend monitoring of pollutants in "hot spots" areas, trend monitoring of loads from point and non-point sources and trend monitoring of biological effects.

Compliance monitoring is defined as the collection of data through surveillance programmes to verify that the regulatory conditions for a given activity are being met e.g. concentration of mercury in effluents. In the case of identifying an instance of non-compliance, appropriate enforcement can be established which can be escalated until compliance is achieved.

Compliance monitoring of health-related conditions (sanitary quality of bathing waters, shellfish-growing waters and seafood), compliance monitoring of effluents and compliance monitoring in "hot spots" areas are the major activities of this component of the MED POL Phase III Programme.

The following chapters present the specific objectives of each component, the progress achieved since the launching of MED POL Phase III and the problems encountered during their implementation. Although the biological effects monitoring should be considered as an element of the assessment component of MED POL and an integral part of the trend monitoring activities, in this document it will be discussed in a separate chapter as it represents a new approach in the MED POL Programme.

2. Trend Monitoring Activities

2.1. Objectives and Programme Design

In general, a trend monitoring programme should allow the detection of specific temporal trends with a given confidence, hence, the programme should be designed in such a way to minimize the variations from other independent biological, environmental and/or methodological variables. Such variables can be summarized in hierarchical order as:

- sample variations within a year and between the years due to biological changes (in physiology and behavior of the organisms) or environmental changes (seasonal and climatic)
- variations in the analytical methods
- variations in sample handling
- variations in data handling

The above variables may be introduced at different levels and can occur both systematically and randomly. Therefore, to ensure a successful design of a trend monitoring programme, appropriate scientific and technical measures have to be taken from the beginning to keep those variables constant or controlled. Once an objective-oriented programme is formulated and its significance is tested, the programme should be rigorously followed during its entire duration.

The programme should be designed on the basis of criteria given for:

- The stations to be monitored

- The contaminants to be measured
- The matrices to be followed
- The species to be utilized
- The tissues for analysis of contaminants to be measured
- The timing and frequency of sampling
- The number of parallel samples to be taken at each trend monitoring station
- The size of specimens to be considered for each sample
- The sampling and analytical methodology

Additionally, quality assurance measures (see Section 2.4) should be performed systematically during the duration of the programme.

Selection of monitoring stations

A number of fixed coastal, reference and "hot spots" stations included in the national monitoring programmes should be selected by each country according to the following criteria:

- The selection of the site(s) would satisfy the managerial objectives of the programme
- the site would allow to detect the trends in contaminants through the selection of realistic number of samples, hence, both the ecological and the temporal dynamics of the site should have been very well known
- the site would allow to sample a sufficient number of biota for the selected species during the duration of the programme
- the site would be suitable for sediment sampling (both surface and core samples)

Selection of contaminants and recommended methodology for the analysis

For trend monitoring, MED POL has recommended (UNEP, 1997a) the following priority contaminants (Table 2.1.1) and the standard methods for the analysis:

- Total mercury in biota and sediment (RM-7, RM-8 , RM-26, RM-63 and RM-57)*
- Total cadmium in biota and sediment (RM-7, RM-11, RM-27, RM-63 and RM-57)*

Additional parameters could include:

- Total arsenic in biota (RM-7, RM-9 and RM-57)*
- Total copper in biota and sediment (RM-7, RM-11, RM-63 and RM-57)*
- Total zinc in biota and sediment (RM-7, RM-11, RM-63 and RM-57)*
- High molecular weight halogenated hydrocarbons in biota, sediment and Polynuclear aromatic hydrocarbons in biota (RM-12, RM-40, RM-20 and RM-57)*

Selection of sampling matrices

Biota and sediments have been selected as the primary matrices for monitoring the trends considering the fact that bioaccumulation by organisms and the preferential association of contaminants to the sediment provide more reliable measurements in analytical terms than trace metal and organic contaminant measurements in sea water.

* The full list of recommended reference methods (RM) is presented in Annex I.

Selection of species and tissue

The criteria for the selection of the monitoring organism (UNEP, 1997a; RM-6) limit the trend monitoring species only to common mussels (*Mytilus galloprovincialis* as priority) and to few demersal fish species (*Mullus barbatus* as priority) for the sites where mussels cannot be sampled.

For the trend monitoring of contaminants in biota, MED POL recommends the whole soft tissue of mollusca, digestive gland of crustaceans and the muscle of fish.

The most critical point is to use the same species within the same size groups and the same selected tissue for the whole period of the monitoring programme for all the stations.

Frequency and timing of sampling

Consistency in sampling frequency and timing determines the success of a trend monitoring programme. **Concerning biota, frequency and timing are once a year and in the pre-spawning period of the selected organism and should be applied at every consecutive year in order to minimize the misleading effects of the physiological and seasonal changes.**

For sediments, annual sampling is recommended and it should be performed during the period of stable hydrographic conditions and preferably every year at the same period.

The number of samples and the size of specimens to be taken for each sample

The number of samples to be taken in a single sampling period (e.g. in a year) and the number of specimens that should be pooled in each sample (when composite sample is necessary) should be determined through statistical power analysis (UNEP, 1997a). As this criteria is directly and firmly related to the total variance in data produced by sampling and analytical variances, power analysis should be based on such statistical information. If such information is not available at the beginning of the programme (e.g. from previous monitoring and analytical studies), a pilot trend monitoring programme should be designed and performed for a period of 3-4 years.

In a pilot trend study, at least 5 parallel samples should be taken at each trend monitoring station and if pooling is necessary (to obtain enough material for analysis), the number of specimens (from the same length group of mussels) should be 15 for each composite sample (see Table 2.1.1). If the selected organism for monitoring is fish and pooling is necessary, the size of the specimens could be set by the investigator and the same number of specimens from the same length class for each of the 5 samples should be used for all the sampling periods (further refer to UNEP, 1997a and the relevant RMs given in Annex I).

Table 2.1.1 also summarizes the monitoring criteria for loads from point and non-point (diffuse) sources. WHO guidelines (WHO/UNEP, 1994) and MAP Technical Series No.120 (UNEP, 1999) provide definitions for loads, sampling strategy and methodology, matrices, selection of parameters and the methods of analysis.

2.2. Summary of the Ongoing Monitoring Programmes

The formulation of MED POL Phase III national monitoring programmes started in 1998, after the adoption of MED POL Phase III and the preparation of the necessary

technical basis. Programmes were first designed in 6 countries through technical visits and group work. Joint work of national scientists from the designated laboratories and MED POL Secretariat under the supervision of statistical experts succeeded in formally finalizing six National Monitoring Programmes in the 1999-2000 period (see Table 2.2.1) in Albania, Croatia, Cyprus, Greece, Slovenia and Turkey. In the same period, programmes were also drafted in Syria, Lebanon and Morocco. In 2001, a programme was finalized in Tunisia and two more programmes were drafted in Algeria and Malta and a first preliminary draft programme was discussed with Monaco.

The total number of Institutes actively participating in the MED POL Phase III trend monitoring programme (not including the biological effects monitoring) is 25 (Table 2.2.1). Most of the Institutes have more than one responsibility area within the programmes. **The Institutes nominated for the different components of the trend monitoring activities are expected to be permanent contact laboratories for MED POL Secretariat.** This is particularly important in order to minimize the misleading effects on the temporal trends of possible analytical and methodological variations.

Tables 2.2.2, 2.2.3 and 2.2.4 provide a summary of the ongoing (those finalized and close to finalization) trend monitoring programmes with reference to the specific objectives and basic programme design criteria. From the tables it appears that, concerning monitoring at coastal and reference areas (Table 2.2.2), the coverage of mandatory monitoring matrices (biota and sediment) and parameters is acceptable (see also Table 2.1.1). The total number of stations covered in coastal and reference areas is 125 (140 with the draft programmes). Figures 2.2.1a-c also refer to the geographical distribution of the coastal and reference stations within the ongoing MED POL monitoring programmes. Trend monitoring of contaminants in biota is being carried out at 45 stations and at 20 of these stations the sampling strategy (number of samples for each station etc.) is in compliance with the pilot trend monitoring objectives (see Section 2.1).

Additional matrices (e.g. sea water, total suspended sediments) and parameters have also been occasionally included in the ongoing programmes depending on the national requirements and local conditions. Among all, the basic oceanographic parameters (BOP are limited to depth, temperature, salinity and dissolved oxygen data) should be provided, as feasible, for all the trend monitoring stations (for biota and sediment).

Table 2.2.3 also shows that the mandatory monitoring matrices and parameters are satisfactorily covered by the trend monitoring programmes in “hot spots”. Total number of “hot spots” stations covered by the ongoing programmes is 116 including the draft programmes. The total number of biota stations is 32 (47 with draft programmes) of which 27 is designed as “pilot trend monitoring” (see Figures 2.2.2a-c for the geographical distribution of the stations).

As part of the Strategic Action Programme (SAP) to Address Pollution from Land-based Activities, 101 priority “hot spots” were identified in the Mediterranean coastal waters (UNEP/WHO, 1999). In relation to this, it can be roughly stated that about the 40 % of the total “101 hot spots” is covered by the ongoing MED POL trend monitoring programmes and 60% of the “hot spots”of participating countries is covered by the ongoing programmes.

The sampling frequencies indicated in the ongoing programmes for trend monitoring in biota at coastal areas and pollution “hot spots” has been fixed as once a year at the pre-spawning period of the selected organism(s). It is assumed that the annual samplings are carried out always at the same period during the whole duration of the programme and there will be no gaps between the years. For few exceptional cases such as semiannual sampling, however, it is strongly recommended to perform one of the sampling at the pre-spawning

period. The sampling frequencies in sea water have been planned to be carried out more frequently so that at least seasonal variability could be covered by the sampling strategy.

The summary of the monitoring programmes for the land-based sources of pollution is given in Table 2.2.4. Point sources of pollution have been included in nine ongoing programmes (finalized and drafted) for a total of 94 stations, 23 of which for rivers (four countries) and 71 for effluents. Regarding the non-point sources, monitoring of atmospheric deposition is included by two of the country programmes with 4 stations for the eastern Mediterranean region. Although this type of monitoring is considered relatively new in the framework of MED POL and it requires special equipment and trained personnel, it is expected that in the future special efforts be made to substantially increase the participation of countries.

To summarize, it can be stated that the presently ongoing MED POL Phase III monitoring programmes generally satisfy the trend monitoring objectives even if the long-term sustainability of such programmes (obviously fundamental in trend monitoring programmes) is still to be assessed.

On the other hand, it should necessarily be emphasized that at the regional level the geographical coverage of the monitoring activities is far from being satisfactory in view of the fact that still a number of countries do not participate in the MED POL monitoring programme. In this context, it should be noted that, in addition to a number of developing countries that are still in need of assistance, the major gap is represented by the lack of participation of France, Italy and Spain in the MED POL monitoring programme. It is known that such countries possess and implement large programmes in the Mediterranean and their involvement would be very beneficial for the over all success of MED POL.

Table 2.1.1 Criteria set for trend monitoring in MED POL Phase III (see Annex II for the abbreviations)

	COASTAL and REFERENCE		**HOT SPOTS**		**LOADS (Point and Diffuse Sources)**		**BIOLOGICAL EFFECTS**
	Priority	Additional	Priority	Additional	Priority	Additional	
Parameters (1)	Total Hg, Cd	Total As Zn, Cu HH+ PAH+	Total Hg, Cd	Total As Zn, Cu HH+ PAH+	Flow rate, pH, T, Total Hg, Cd, TSS, BOD, COD, TP, TN, HH, FC	Total Cr,.. PHC, detergents phenols	DNAx EROD MT LMS
Sampling Frequency	Annually (2)		Annually (2)		Monthly (or) Seasonally (and) Weekly for AIR		Quaterly (or) Semi Annually
Sampling Matrices	BIOta and SEDiments		BIO and SED		WAT, EFF (and) AIR		BIO
Species	MG if not avaliable ME or PP or DT MB if not avaliable MS or UM		MG if not available ME or PP or DT MB if not avaliable MS or UM				(refer to Table 3.1.1)
Tissue	WST for mollusca DG for crustaceans FI for fish		WST for mollusca DG for crustaceans FI for fish				(refer to Table 3.1.1)
Number of samples (3)	5		5				
Number of specimens (4)	15		15				

(1) It may vary according to national legislation, local conditions and analytical capabilities
(2) It should be carried out during the pre-spawning period and every year at the same time
(3) Criteria set for a pilot programme. In general, power analysis is performed to decide on the number of samples.
(4) Recommended size of specimens for a composite sample

Table 2.2.1 Participation in MED POL Phase III trend monitoring programme (by country and laboratory)

COUNTRY	Status of Monitoring Programme		Participating Institutes				
	Drafted	Finalized	TM in BIO, SED	OC in BIO, SED	Sea Water	Loads	Total Number of Institutes
Albania	1998	1999	1	1			2*
Algeria	2001	----	3	1		10	13
Croatia	1998	2000	1	1		2	4*
Cyprus	1998	1999	1	1		2	2*
Egypt	----	----					
France	----	----					
Greece	1999	2000	10	10	10	10	12*
Israel	----	----					
Italy	----	----					
Lebanon	2000	----	1	1	1	1	1
Libya	----	----					
Malta	2001	----	1	1	2	1	4
Monaco	2001	----					
Morocco	1999	----					
Spain	----	----					
Slovenia	1998	1999	2	2	2	1	2*
Syria	2000	----					
Tunisia	2001	2001	1	1	1	1	2*
Turkey	1999	2000	1	1	1	1	1*
Number of institutes			22	20	17	29	43

* number of institutes actually implementing trend monitoring activities

Table 2.2.2 Sampling at **coastal and reference** areas for trend monitoring (see Annex II for abbreviations)

COUNTRY	MATRIX	SPECIES *	Total # of STATIONS	PARAMETERS	SAMPLING FREQ/YEAR	DATA TRANSMITTED
Albania	Coastal and Reference Areas are not included in the programme					
Croatia	Coastal and Reference Areas are not included in the programme					
Cyprus	**Biota** Sea Water (Beach)	**MB**, SAU	11[2] *Total : 29*	**TM** (**Hg,Cd**, etc.) OC (HH) Pelagic tar Litter	**1** 2,4	YES (1999)
Greece	**Biota** **Sediment** Sea water	**MG, MB**,BB	22[7] *Total: 67*	**TM** (**Hg,Cd**, etc) OC (HH,PAH) " BOP, NUT, Chl-a	**1** 2,4	YES (1999)
Slovenia	**Biota** **Sediment** Sea water	**MG**	2 [2] *Total: 15*	**TM** (**Hg, Cd**) OC (ALI, PAH) " BOP, NUT, TRIX	**1** 4, 12	YES (1999-2000)
Tunisia	**Biota** **Sediment** Sea water	TD**, MB**	6 [5] *Total : 6*	**TM** (**Hg, Cd**, etc.) OC (HH) " BOP, NUT, Chl-a	**1**	
Turkey	**Biota** **Sediment** TSS Sea water	**MB**	4 [4] *Total : 8*	**TM** (**Hg,Cd**, etc.) OC (HH) " " BOP	**1**	YES (1999-2000)
Algeria	**Biota** **Sediment** Sea water	**MB**, MS	6 [?] *Total: 6*	**TM** (**Hg,Cd**, etc) OC (PAH, HH) " BOP	**1**	
Lebanon	**Biota** **Sediment**	**MB**, BB	2[2] *Total : 3*	**TM** (**Hg, Cd,** etc.) "	**1**	
Malta	**Biota** **Sediment** Sea water	**MB**, MS	1 [1] *Total : 1* ?	**TM** (?),OC (PAH) " BOP, NUT	2 (?) 4	
Syria	**Biota** **Sediment** (Beach)	??	4 [?] *Total: 6*	**TM** (??), OC (HH) " Tar, litter	**1**	

Bold recalls the mandatory criteria of the MED POL trend monitoring programme

[ ] stations for biota with specific sampling objectives
(e.g. pilot studies with MG : 5 samples at each station and 15 specimens for each sample)

* Once the programme is launched the species selected for a specific station should be monitored for the whole duration of the trend programme

Table 2.2.3 Sampling at **hot spots** areas for trend monitoring (see Annex II for abbreviations)

COUNTRY	MATRIX	SPECIES*	Total # of STATIONS	PARAMETERS	SAMPLING FREQ / YEAR	DATA TRANSMITTED
Albania	**Biota**	**MG**	2 [2] *Total : 2*	**TM** (**Hg,Cd**,etc.) OC (HH+)	2	YES (2001)
Croatia	**Biota** **Sediment**	**MG**	20 [?] *Total : 20*	**TM** (**Hg,Cd**,etc.) OC (PAH, HH) "	**1**	YES (1999-2000)
Cyprus	Sea Water		*Total: 27*	NUT	2	YES (1999)
Greece	**Biota** **Sediment** Sea Water	**MG**	8 [1] *Total : 37*	**TM** (**Hg,Cd**,etc.) OC (HH,PAH, ALI) " BOP,NUT,Chl-a,	**1**	YES (1999)
Slovenia	Sea Water		*Total : 6*	BOP, NUT,Chl-a	4	YES (1999-2000)
Tunisia	**Biota** **Sediment** Sea Water	**MG**	1 [1] *Total : 3*	**TM** (**Hg,Cd**,etc) OC (HH) " BOP, NUT	**1** 4	
Turkey	**Biota** **Sediment** TSS Sea Water	**MG**	1 [1] *Total : 7*	**TM** (**Hg,Cd**,etc) OC (PAH, HH) " " BOP	**1**	YES (1999-2000)
Algeria	**Biota** **Sediment** Sea Water	**MG**,MP	7 [?] *Total : 7*	**TM** (**Hg,Cd**, etc) OC (HH) " BOP	**1**	
Lebanon	**Biota**	PS	1[1] *Total : 1*	**TM** (**Cd**)	**1**	
Malta	**Biota** **Sediment** Sea water	**MB**,MS	5 [?] *Total : 5*	**TM** (??), OC (PAH) " BOP, NUT	2 3	
Syria	**Biota** **Sediment**	??	2 [2] *Total: 2*	TM (??) OC (HH) "	**1**	

Bold recalls the mandatory criteria of the MED POL trend monitoring programme

[ ] stations for biota with specific sampling objectives (e.g. pilot studies with MG : 5 samples at each station and 15 specimens for each sample)

* Once the programme is launched the species selected for a specific station should be monitored for the whole duration of the trend programme

Table 2.2.4 Sampling at **loads (point and non-point sources)** for trend monitoring

COUNTRY & *SOURCE*	**MATRIX**	**Total # of STATIONS**	**PARAMETERS**	**SAMPLING FREQ/YEAR**	**DATA TRANSMITTED**
Albania	Trend monitoring of loads is not included in the programme				
Croatia *Point*	RIV	8	Q, T, pH, BOD, COD, TSS, DIN, TN, PO_4, TP, DET, FC, TM	12 4 (TM)	
Cyprus *Non-point*	AIR (Beach)	1 3	TM, PM Litter, tar	Parameter dependent	YES (1999)
Greece *Point* *Non-point*	RIV EFF AIR	11 13 3	Q, T, pH, BOD, COD, TSS, FC, HM, OC, DIN, PO_4 Major ions, TM, O_3	4 param. dep.	
Slovenia *Point*	EFF	4	Q, T, pH, BOD, COD, TSS, DIN, TN, PO_4, TP, DET, FC, TM	4 2 (TM)	YES (1999-2000)
Tunisia *Point*	EFF	36	Q, COD, BOD, TSS, P, N, TM		
Turkey *Point*	EFF RIV	5 3	TSS, BOD, COD, pH FC	4	YES (2000)
Algeria *Point*	EFF	10	Q, T, COD, BOD, TSS, P, N, TM	4	
Lebanon *Point*	EFF	1	Cd, pH, turbidity	2	
Malta *Point*	EFF ?	??	??	??	
Syria *Point*	EFF RIV	2? 1?	TSS, BOD, COD, BAC, NUT	2	

Figure 2.2.1.a Stations de surveillance continue des tendances de contaminants chimiques dans des zones côtières et des zones de référence - MED POL-Phase III

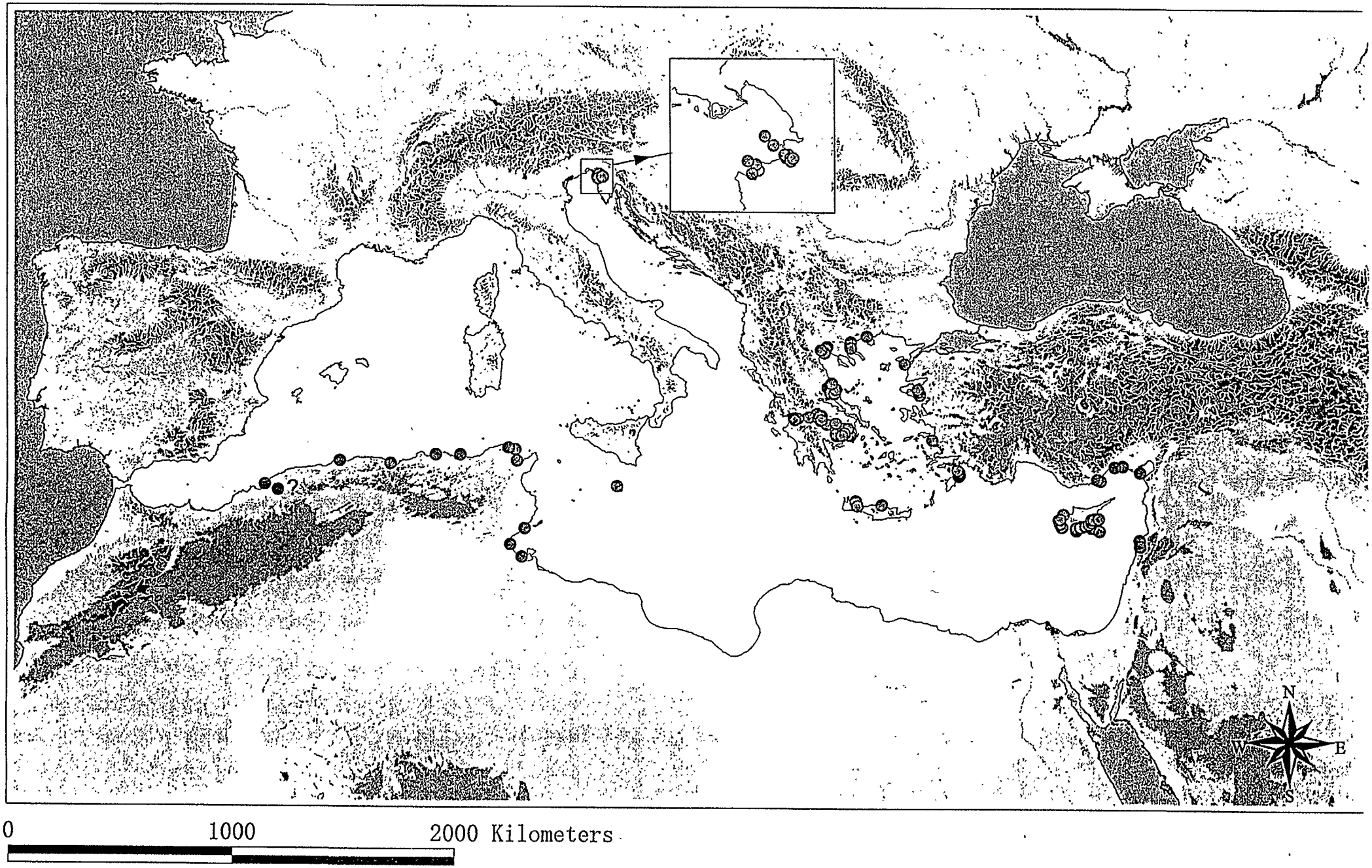


Figure 2.2.1.b Stations de surveillance continue des tendances de contaminants chimiques dans les biotes – zones côtières et zones de référence - MED POL – Phase III

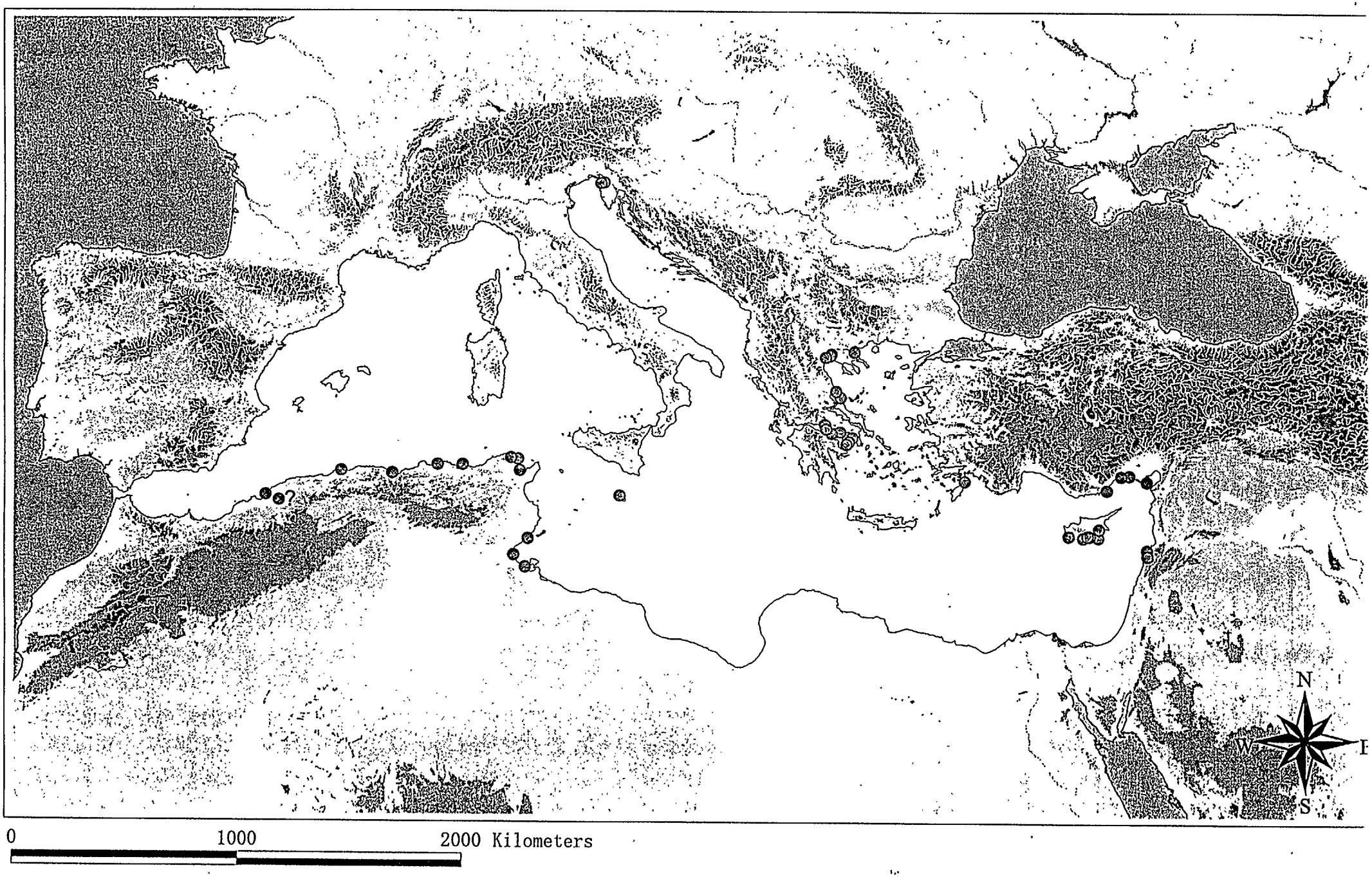


Figure 2.2.1.c Stations de surveillance continue des tendances de contaminants chimiques dans les sédiments – zones côtières et zones de référence- MED POL –Phase III

Figure 2.2.2.a Stations de surveillance continue des tendances de contaminants chimiques aux «points chauds » – MEDPOL- Phase III

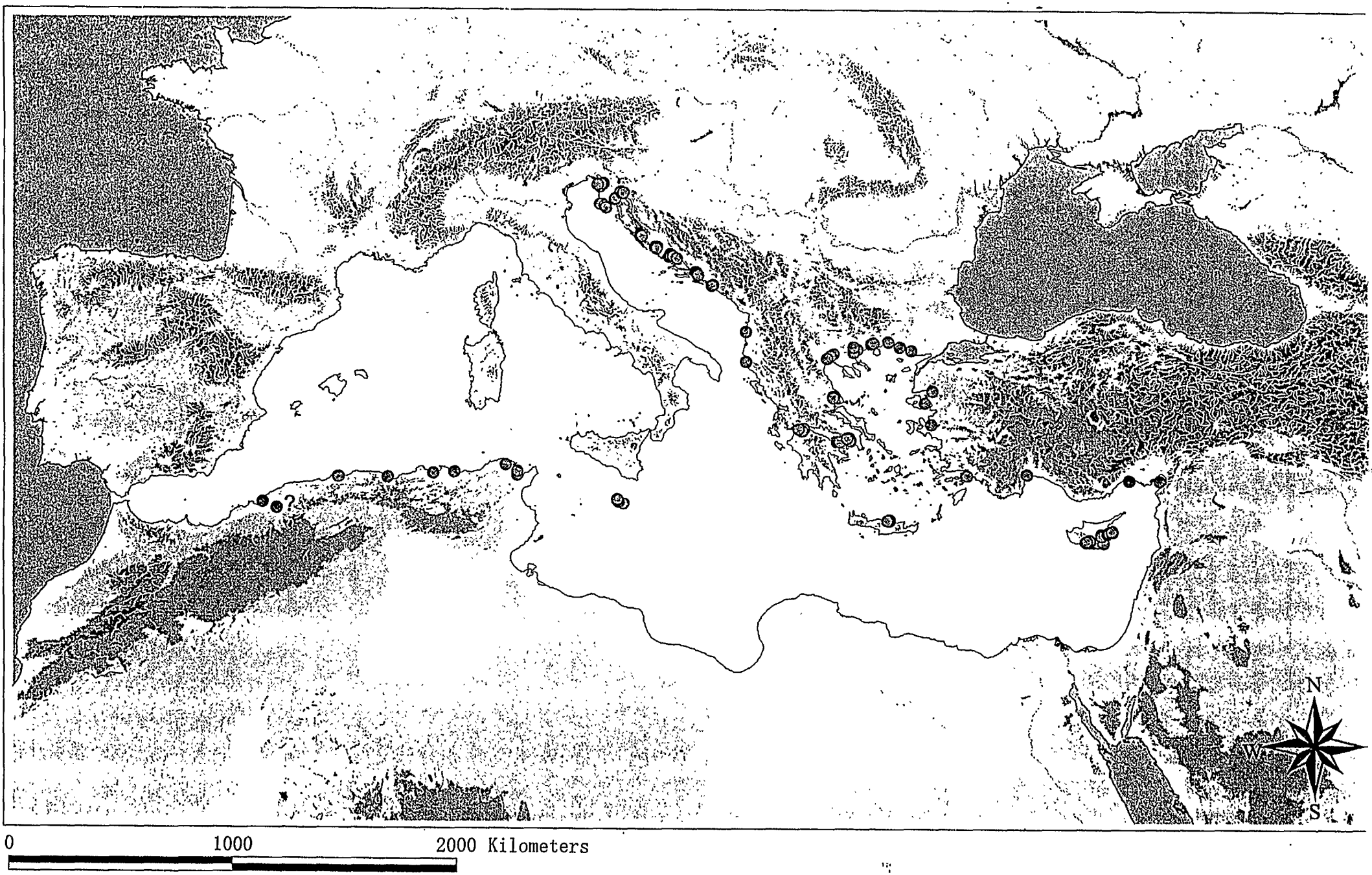


Figure 2.2.2.b Stations de surveillance continue des tendances de contaminants chimiques dans les biotes – «Points chauds»

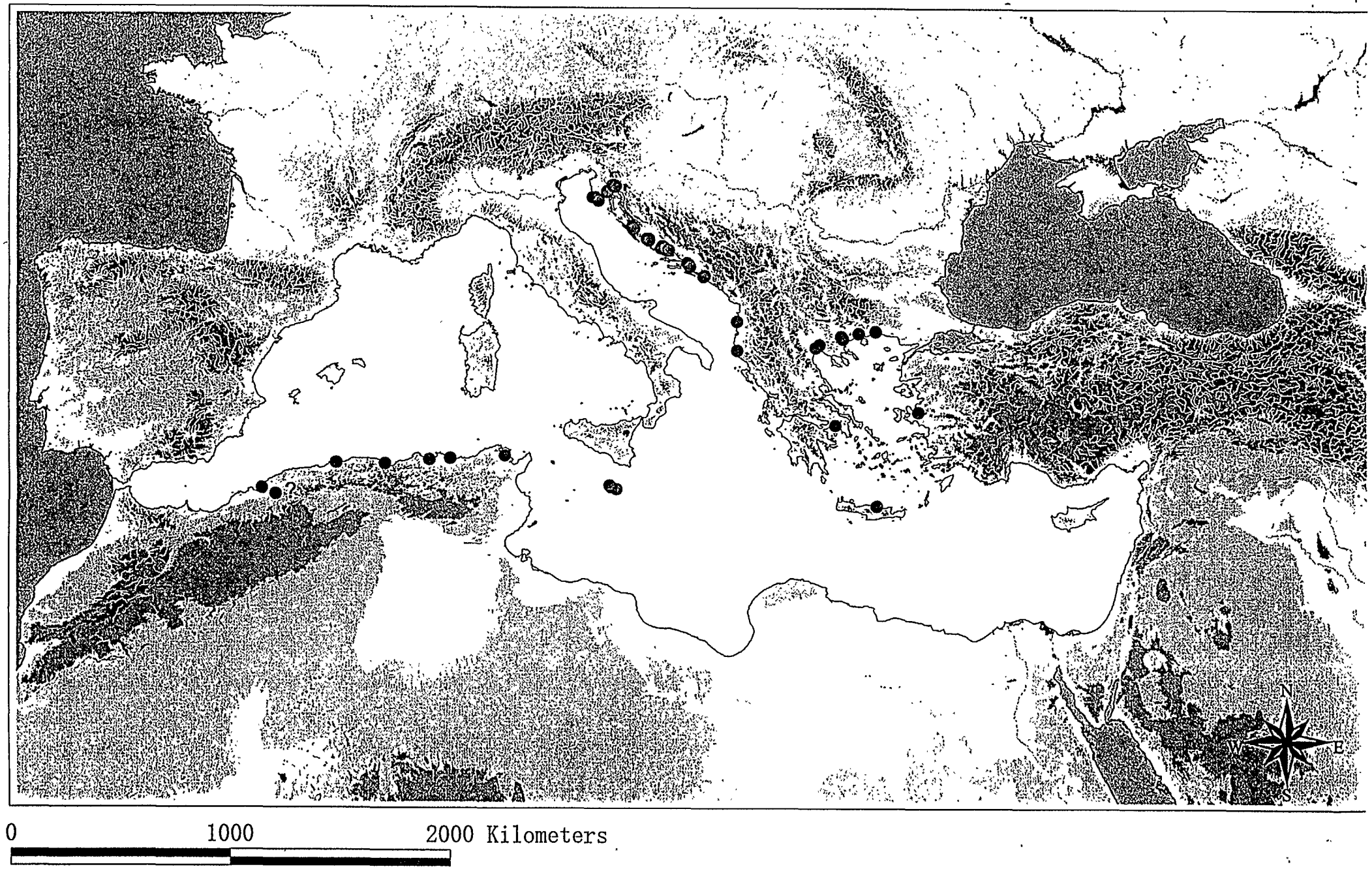
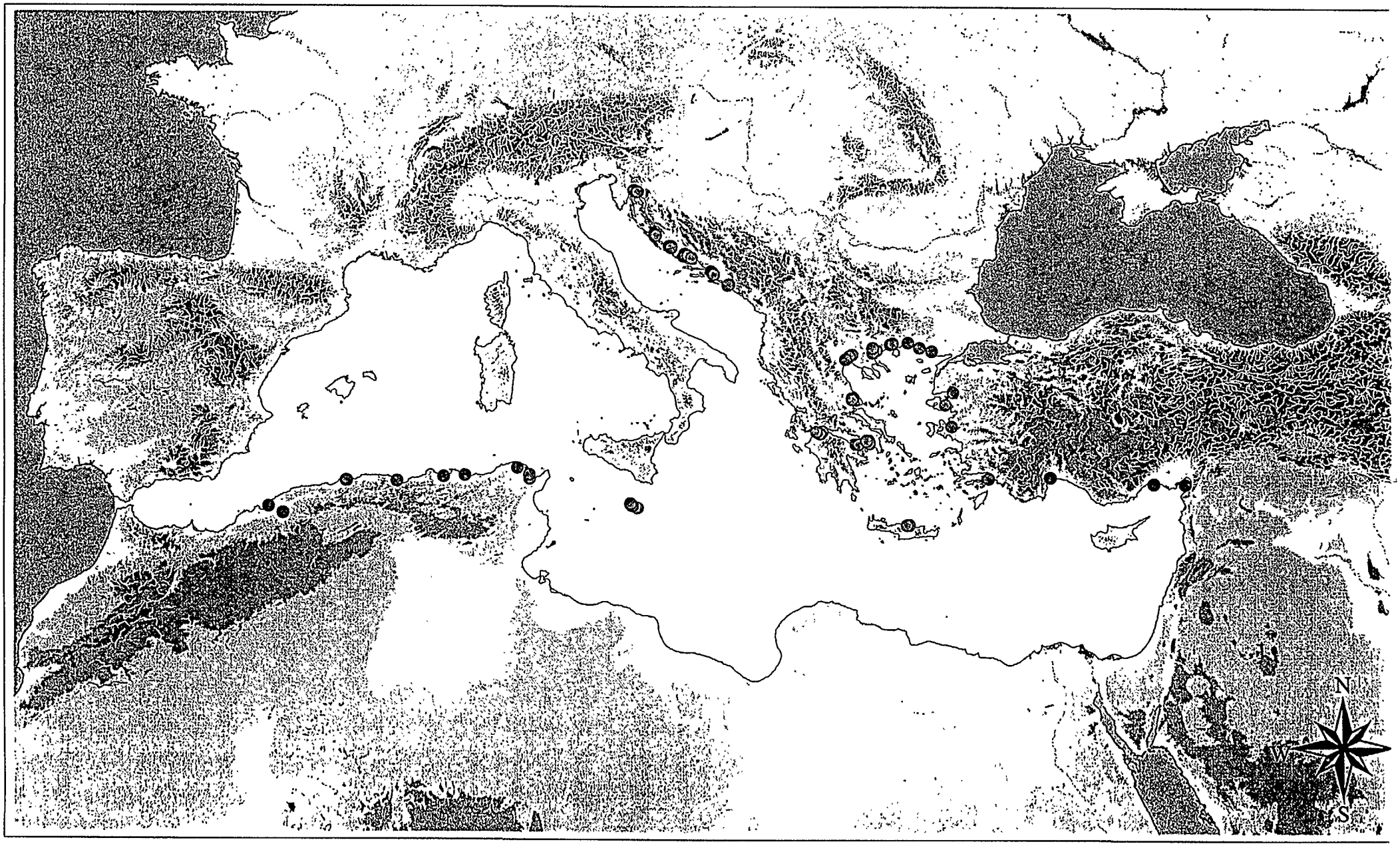


Figure 2.2.2.c Stations de surveillance continue de contaminants chimiques dans les sédiments – «Points chauds»



2.3. Preliminary Evaluation of First Data Sets

MED POL has received from a number of countries the first data sets related to trend monitoring activities at the end of the year 2000 and in early 2001. The second consecutive submission of data is expected at the end of 2001. The following section will discuss the data received to-date and its compatibility with the MED POL monitoring criteria.

Tables 2.2.2 – 2.2.4 provide summary information on the data transmitted in the framework of the ongoing trend monitoring activities. The objectives of each programme are defined in the country agreements, summarized in Table 2.1.1. Although the data received still do not totally correspond to those expected according to the national monitoring programmes, at least some core data related to the first sampling period of the pilot trend monitoring has been obtained.

In order to be able to present an understandable and as much as possible detailed inventory of the data obtained and to discuss the specific problems encountered, each component of the trend monitoring is presented separately in the following paragraphs.

Trend monitoring in coastal and reference areas and pollution "hot spots"

◆ *Monitoring Stations*

The total number of coastal and reference stations for which first year trend monitoring data was submitted is 51. This provides 43% coverage of the stations identified and fixed by the finalized monitoring programmes (Cyprus, Greece, Slovenia and Turkey). Concerning pilot trend biota stations, 53% (8 stations) of the data expected was provided. The remaining 47% of the data (7 stations) is expected from Greece. Albania and Croatia have not included coastal and reference stations in their programmes and data from Tunisia is expected at the beginning of the next year.

Data was provided for 67% of all the fixed "hot spots" stations selected by Albania, Croatia, Cyprus, Greece, Slovenia and Turkey. The coverage of the biota stations is around 87%. However, how many of the total biota stations fixed in the monitoring programme (20 stations) of Croatia correspond to actual pilot trend monitoring still needs to be verified.

Remarks

In general terms, when the number of trend monitoring stations is small, it is easier to obtain data and results. However, when the number of stations is large, the spatial coverage of the programme is more satisfactory, especially in case when a longer coastline has to be monitored.

➢ In the specific case of MED POL, it is recommended to fix a rather limited number of stations from the very beginning of the programme (which is expected to have a long duration) in order to avoid an unsustainable mass of work and exceed the capacity of laboratories which could cause delays in data submission or, even worse, data gaps between the years.

➢ An other critical point is that the monitoring sites should be chosen with great care especially if only a limited number of stations is planned; it should be recalled that the same stations (with the same coordinates) must be monitored for the whole duration of the programme.

◆ *Parameters and Matrices*

Concerning matrices and parameters, the data provided by the six above mentioned countries shows a satisfactory coverage of the MED POL criteria (see Table 2.1.1).

Data related to additional matrices and parameters (e.g. nutrients in sea water, trace metals in TSS) has also been submitted to the secretariat. However, data on the basic oceanographic parameters (BOP: Depth information, temperature, salinity and dissolved oxygen), has not been regularly provided by the laboratories although this data provides basic supplementary information for all marine monitoring and research programmes.

Remarks

➢ Whenever possible, data on supplementary parameters should also be systematically reported together with the mandatory data.
➢ It should be noted that, since the matrices and parameters selected should be strictly followed by the laboratories, any problems faced during the implementation of the programme should be immediately (before the submission of the results and the data) reported to the Secretariat.

◆ *Sampling period and the frequencies*

The mandatory sampling period for trend monitoring in biota and sediments seems to have been applied by all the data submitting countries during the first sampling period. However, there are still some inconsistencies in the sampling frequencies that must be avoided. In one case, for example, biota were sampled both in March (likely the pre-spawning period) and June during the year 2000 but individual contacts with the scientists have revealed that, during 2001, the sampling was held again in June.

Similarly, an other institute had difficulties to catch the selected biota during the trend monitoring sampling period as conflicting with intense fishing activities in the selected areas. It is obvious that, in order to secure the success of the trend monitoring activities, those and other similar problems should necessarily be solved at the initial phase of the programme.

Remarks

➢ There should be a better coordination at the national level between all monitoring actors, in particular between those designing the programme and those implementing it, to avoid misunderstandings and negative consequences on the field work.

◆ *Monitoring species and tissue*

Mytilus galloprovincialis and/or *Mullus barbatus* were commonly used by the countries as trend monitoring organisms. Although the size groups sampled by the laboratories appear to be different, the critical point is rather to achieve a consistent sampling with respect to the size classes and the sex of the organisms within each trend monitoring programme.

◆ *Number of samples and size of specimens*

As mentioned in previous sections and in the provided supplementary documents, in a trend monitoring programme designed to determine contaminants in organisms, the number of parallel samples should be at least 5 for each station. If the sample is to be a composite one, an adequate number of organisms (e.g. 15 for mussels) should be pooled in each sample.

In this context, only three countries (Cyprus, Slovenia and Turkey) have submitted data in line with the above criteria. Figures 2.3.1.a, b show the sample variance achieved by the laboratories of the above countries for total mercury in MG and MB. As can be seen from the figures, relatively higher variability was obtained by Institute II for both MG and MB which could depend on both sampling and/or analytical factors. Institutes I (in particular St. 2, see Fig. 2.3.1.a) and IV (see Fig. 2.3.1.b), on the other hand, have shown less variability in their data.

It is obviously impossible to detect the variance terms for single measurements as in the case of Institute III (see Fig.2.3.1.a).

Remarks

- The sampling should be performed as defined in the trend monitoring criteria and as set in the pilot trend monitoring objectives. Performing parallel samplings at each trend monitoring station increase the volume of the work, but decreasing the number of stations and fixing them to certain geo-referenced points helps overcome this difficulty. As an example, if you select 20 stations for biota in your programme, only some of them may be fixed specifically for trend monitoring while most of them could be left for state monitoring.
- A reason observed for the non observance of sampling criteria for trend monitoring is still the lack of knowledge of the necessary details of the MED POL trend monitoring programme. The investigators in the laboratories should be properly informed about the details of the programme by the national authorities or by the Secretariat.

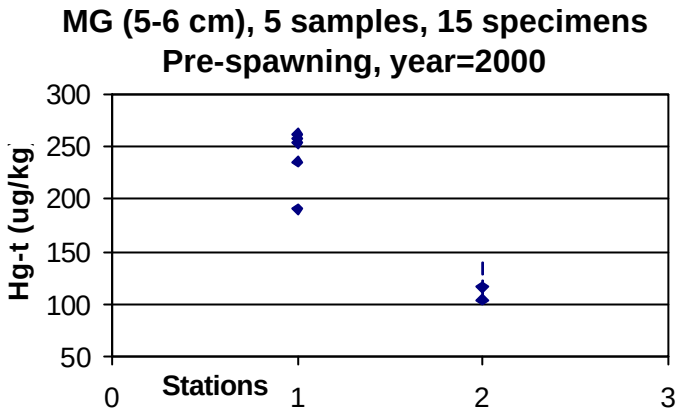
◆ *Analytical measures*

The standard techniques and methods have usually been applied by the laboratories for sample collection, preservation, preparation and analysis. In some exceptional cases, training opportunities have been provided to overcome possible difficulties (see Section 2.4 for data quality assurance measures).

One important point that should be noted by all participating laboratories is that the dry weight/fresh weight (or wet weight) ratio for the biota samples (or the sediment samples) should always be provided together with the data as well as the basis for the calculation of the concentrations; as can be seen from the Figures 2.3.1.a, b the missing information make the comparisons between concentrations impossible.

Remarks

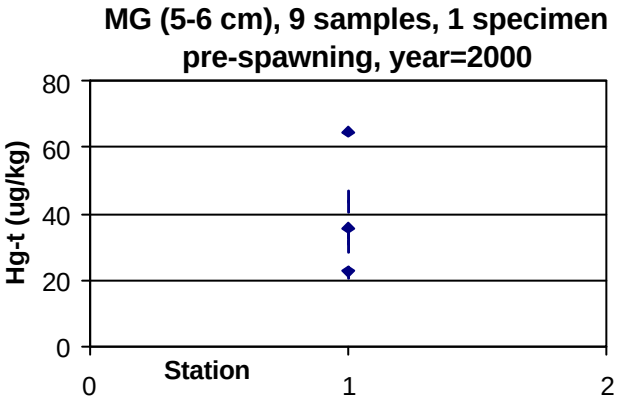
- It should be emphasized that the recommended standard methodologies should be used by the laboratories (see Annex I and reference documents). In case of use of other standard methods, the methodology used by the laboratory should be explained in detail and referenced in the annual reports.



Concentrations are given in dry weight basis

sample variance= 0.0173 (St.1)
= 0.0082 (St.2)

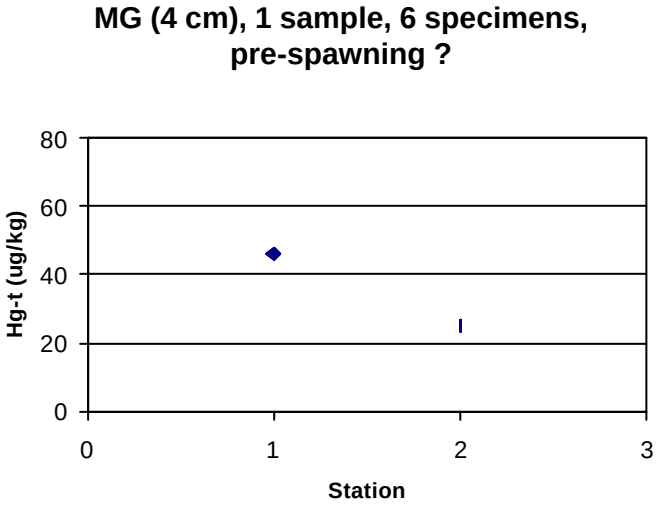
INSTITUTE I



Concentrations are given in fresh weight basis ??
DW/FW = ?

sample variance= 0.1131 (St.1)

INSTITUTE II

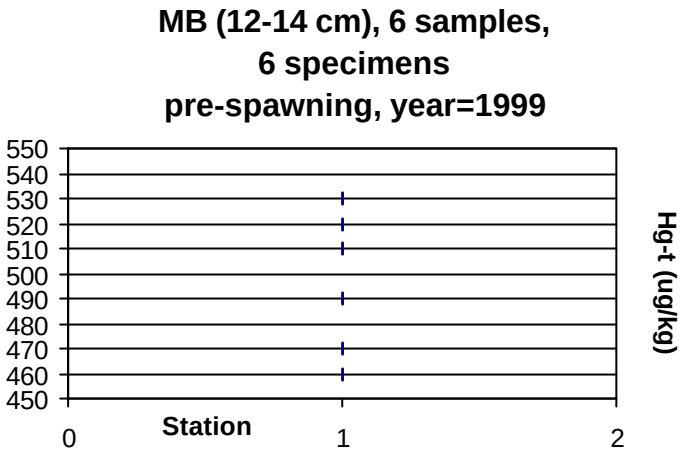


Concentrations are given in fresh weight basis. DW/FW = 0.19

Variance can not be calculated

INSTITUTE III

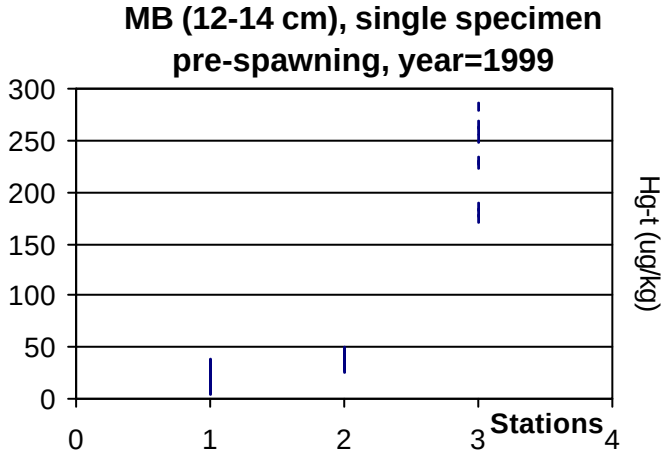
Figure 2.3.1.a Examples on the Variability of the 1st Year Trend Monitoring Data: Biota-MG



Concentrations are given in dry weight basis

Sample variance = 0.0032 (St.1)

INSTITUTE IV



Concentrations are given in fresh weight basis ??
DW/FW = ?

Sample variance = 0.1921 (St.1, n=20)
= 0.0253 (St.2, n=10)
= 0.0327 (St.3, n=9)

INSTITUTE II

Figure 2.3.1.b Examples on the Variability of the 1st Year Trend Monitoring Data: Biota-MB

Trend Monitoring of Loads from land-based sources

As can be seen in Table 2.2.4, three countries have submitted data on point and non-point sources.

On the basis of the data received, a major gap is the lack of flow rate (Q, m^3/day) data. Only one of the countries was able to submit average values of the flow rate at point sources.

Remarks

➢ The Secretariat is of the opinion that the sampling methodology related to this component of the trend monitoring needs to be further explained and discussed. For example, measurements made at the river mouth can not be used for the estimation of loads but instead can only provide some scientific information on the status of estuarine waters. Similarly, if the sampling points at the waste water outlets are not taken well before the end of the pipe, the dilution with sea water will mislead the load estimates of the effluents.

2.4. Data Quality Assurance activities performed and participation by the laboratories

In any monitoring programme, the implementation of a Data Quality Assurance Programme (DQA) becomes an indispensable component if valid and accurate data are to be obtained. A DQA Programme should include standard sampling and measurement procedures (selection of species, sample handling, necessary biological measurements, chemical analysis etc.), data handling procedures, regular analysis of certified reference materials (CRMs), mandatory participation of laboratories at intercomparison exercises, regular training programmes and regular calibration, servicing and maintenance of all the analytical equipment.

Most of the above activities have been implemented in the framework of the MED POL Programme through formal cooperation with the Marine Environmental Studies Laboratory (MESL) of IAEA-MEL in Monaco. In particular, the key DQA activities organized and implemented by MESL have included:

- Analytical intercomparison exercises to assist national laboratories to improve the accuracy of analytical results
- Preparation and distribution of marine Reference Materials and analytical standards to assist laboratories to ensure the quality of monitoring data
- Organization of training courses on the applications of the standard measurement techniques for inorganic and organic contaminants
- Provision of technical assistance to national laboratories through Quality Assurance visits, split sample analyses and collaborative research
- Supervision of research contracts and technical co-operation projects.
- Participation at relevant scientific, regional and co-ordination meetings

In the framework of the above, five new intercomparison exercises (IAEA-405, IAEA-407, MA-MED POL-6/TM for trace metals and IAEA-406, IAEA-417 for organic contaminants) have been organized or finalized during the last biennium (2000-2001) and samples were prepared and distributed to the MED POL participating countries . Three of them have been finalized and the relevant reports have been distributed to National Coordinators and the participating laboratories.

Four training courses (2 for trace metals, 2 for organics) have been organized during the same period by MESL. In addition, three quality assurance/training missions were performed to three countries by MESL staff.

The participation of the MED POL designated laboratories at the intercomparison exercises is summarized in Table 2.4.1 and Table 2.4.2, respectively, for trace metals and organic contaminants in different matrices. The tables cover the time period since 1994 and provide information only on the participation of the laboratories responsible from the MED POL Phase III trend monitoring programme.

From the tables it appears that although the participation of the MED POL Phase III laboratories to the intercomparison exercises is generally good, only few of them have been able to regularly submit data for each organized exercise. On the other hand, the participation of few of the laboratories is quite poor and participation should be strongly encouraged.

Remarks

- The mandatory nature of the participation of the MED POL participating laboratories in the intercomparison exercises should be strongly emphasized.
- Besides the external quality checks (intercomparison exercises), the internal quality control measures, like the routine run of the certified reference materials, should be ensured by all MED POL participating laboratories and the results be transmitted to the MED POL Secretariat together with the field data.

2.5. Reporting of data and results

Concerning the implementation of trend monitoring programmes, the countries have to transmit annual reports to the Secretariat. The reports should include raw data and a report on the implementation of the activities .

The data reporting formats for the raw data have been standardized using the EXCEL plane worksheets which define the fields for mandatory and supplementary data (see Chapter 5). The new formats have already been provided to the participating laboratories to allow them to transmit data on the trend monitoring performed.

The expected reports should clearly stress on the pre-defined objectives of the trend monitoring programme and the results should be presented referring to those objectives. Possible gaps and problems in the implementation of the activities of the Programme should be clearly stated and explained as well as the measures taken for their solution. Information on the methodologies used for sampling, sample preparation and analysis should be given in detail. A brief evaluation of the results would be also very helpful for future assessments. If available, the scientific background and data and results from previous work carried out could also be presented in the annual reports.

Table 2.4.1 Participation of MED POL Phase III Laboratories in the intercalibration exercises for **trace metals**

A. Countries implementing MED POL monitoring programmes

MED POL Phase III LABS	MA-MED POL-6/TM (shellfish) distributed in 2001	IAEA-407 (fish) distributed in 2000	IAEA-405 (Est. sed.) distributed in 1998	IAEA-140 (fucus) distributed in 1996	SD-MED POL-1/TM (sediment) distributed in 1994	MA-MED POL-1/TM (fish homog.) distributed in 1994
Albania	D	Y	Y	Y	Y	Y
Croatia	D	Y	N	N	Y	Y
Cyprus	D	Y	Y	Y	Y	Y
Greece 1	D	N	Y	N	N	N
2	D	N	Y	Y	Y	Y
3	D	N	Y	N	N	N
4	D	N	Y	N	Y	N
5	D	N	N	Y	N	N
6	D	N	N	N	Y	N
Slovenia						
1	D	Y	Y	Y	Y	Y
2	D	N	N	Y	Y	Y
Tunisia						
1	D	N	Y	Y	Y	Y
2	D	N				
Turkey	D	Y	N	Y	Y	Y

B. Countries with draft programmes

MED POL Phase III LABS	MA-MED POL-6/TM (shellfish) distributed in 2001	IAEA-407 (fish) distributed in 2000	IAEA-405 (Est. sed.) distributed in 1998	IAEA-140 (fucus) distributed in 1996	SD-MED POL-1/TM (sediment) distributed in 1994	MA-MED POL-1/TM (fish homog.) distributed in 1994
Algeria	D	N	Y	N	N	N
Lebanon	D	Y	N	Y	N	N
Malta 1	D	N	N	N	N	N
2	D	N	N	N	N	N
Syria 1		N	Y		Y	Y
2			Y	Y	Y	Y
3	D					

D: Distributed
Y: Yes for participation (results transmitted)
N: No for non participation

Table 2.4.2 Participation of MED POL Phase III Laboratories in the intercalibration exercises for **organic contaminants**

A. Countries implementing MED POL monitoring programmes

MED POL Phase III LABS	IAEA-417 (sediment) 2001	IAEA-406 (fish) 2000	IAEA-408 (sediment) 1998-1999	IAEA-383 (sediment) 1997	IAEA-140 (fucus) 1996	IAEA-142 (mussel) 1995
Albania	D	Y	Y	Y	Y	Y
Croatia	D	N	Y	N	N	Y
Cyprus	D	Y	Y	Y	Y	Y
Greece	D	N	N	N	N	N
Slovenia 1	D	N	Y	Y	Y	Y
2	D	Y	N	N	Y	N
Tunisia 1	D	N	N	N	N	N
2	D	Y	N	N	N	N
Turkey	D	Y	N	N	N	Y

B. Countries with draft programmes

MED POL Phase III LABS	IAEA-417 (sediment) 2001	IAEA-406 (fish) 2000	IAEA-408 (sediment) 1998-1999	IAEA-383 (sediment) 1997	IAEA-140 (fucus) 1996	IAEA-142 (mussel) 1995
Algeria	D	N	N	N	N	N
Malta	D	N	N	N	N	N
Syria	D	Y	Y	Y	N	N

D: Distributed
Y: Yes for participation (Results transmitted)
N: No for non participation

3. Biological Effects Monitoring

3.1. Planned and performed activities

A new component has been recently introduced in the MED POL Phase III monitoring, which is the monitoring of biological effects of pollutants on marine organisms through the application of a set of biological parameters known as “biomarkers” or “stress indices”. The integration of this activity with the classical chemical contaminant monitoring of biota is expected to provide a complete assessment of the actual effects of pollution on coastal marine life.

The first pilot programme for biological effects monitoring was organized in 1996 with the participation of 8 Mediterranean states. In the meantime, a data quality assurance programme was organized with the assistance of the University of Genoa in order to ensure good quality of data and improve and enlarge the participation of the countries. As a result, intercomparison exercises were organized for three different biomarkers. The criteria of MED POL biological effects monitoring (UNEP, 1997b-e) are summarized in Table 3.1.1. The methodology of the application of the recommended biomarkers (two general stress indices-lysosomal membrane stability and DNA alteration- and two specific stress indices-metallothioneins and EROD) was standardized and a manual was published (UNEP/RAMOGE, 1999). Accordingly, two basic level group training programmes were organized in 2000 and 2001 and individual trainings were also performed when needed. An intercomparison exercise was organized by the end of 2000 and another one is under preparation for the year 2002. All these activities were performed under the supervision and coordination of the University of Genoa, formally subcontracted for that purpose.

3.2. Summary of the national ongoing bio-monitoring programmes

Since the beginning of the MED POL Phase III Programme, five biological effects programmes are at present ongoing, two programmes were drafted, another one is being considered as a pilot study. In addition, the RAMOGE countries (France, Monaco and Italy) have contributed to the development of the programme and have also provided technical and scientific support. Altogether, eleven countries have participated in the MED POL biological effects monitoring programme (see Table 3.2.1).

The total number of stations covered by all the programmes is 78 (see Figure 3.2.1 for the geographical distribution of the stations). Approximately, 73% of these stations belong to the countries having MED POL Phase III monitoring programmes (including the draft programmes) and 18 % of the stations belong to RAMOGE countries. The rest 9% of the stations will be integrated soon into a National MED POL Monitoring Programme (the case of Israel). All the programmes cover most of the mandatory criteria (see Tables 2.1.1 and 3.1.1 to be compared with Table 3.2.1). Some additional biomarkers (e.g. stress on stress) have also been utilized by some countries; like Greece, France, Italy and Monaco.

Table 3.1.1 Criteria set for biological effects monitoring in MED POL Phase III

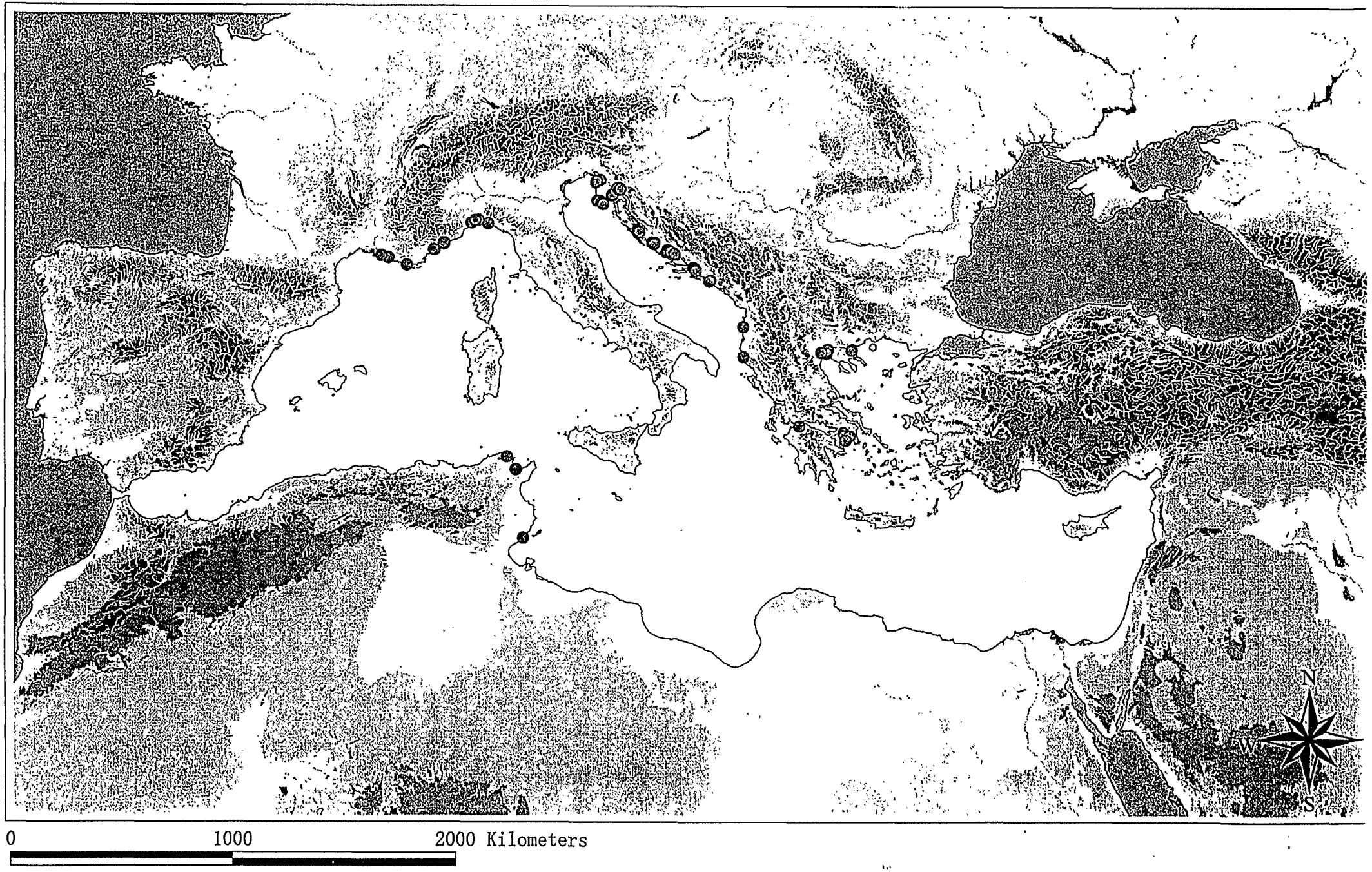
	Biomarker	Recommended species	Tissue
Specific Stress	EROD	Mullus barbatus if not available Mugil sp. (Dicentrarchus labrax for caging)	Liver
	Metallothioneins	Mullus barbatus if not available Mugil sp. (Dicentrarchus labrax for caging)	Liver
		Mytilus sp. if not available Patella sp.	Digestive gland (for mussels) Hepatopancreas (for limpets)
General Stress	Lysosomal membrane stability	Mullus barbatus if not available Mugil sp. (Dicentrarchus labrax for caging)	Liver
		Mytilus sp. if not available Patella sp.	Digestive gland (for mussels) Hepatopancreas (for limpets)
	DNA alteration	Mullus barbatus if not available Mugil sp. (Dicentrarchus labrax for caging)	Liver
		Mytilus sp. if not available Patella sp.	Digestive gland (for mussels) Hepatopancreas (for limpets)

Table 3.2.1 Summary of ongoing biological effects monitoring programmes

COUNTRY	BIOMARKERS	SPECIES	# STATIONS	# SAMPLES /YEAR	TRANSMITTED DATA
Albania (1)	EROD, MT	MG	2	2	
Algeria (1)	will be determined		5		
Croatia (1)	DNA, LMS, EROD, MT, others.	MG	28	4	YES (1999-2000)
France (2)	DNA, LMS, MT, stress on stress	MG	5	2	YES (1998-1999)
Greece (1)	DNA, LMS, MT, stress on stress	MG	10	2-4	YES (2000)
Israel (3)	DNA, LMS, EROD, MT	PC	7	2	YES (1999-2000)
Italy (2)	DNA, LMS, MT, stress on stress	MG	4	2	YES (1998-1999)
Malta (1)	will be determined		5		
Monaco (2)	DNA, LMS, MT, stress on stress	MG	5	2	YES (1998-1999)
Slovenia (1)	DNA, MT	MG	3	2	YES (1999-2000)
Tunisia (2)	DNA, LMS, EROD, MT	MG, TD	4	2-4	

(1) Countries participating in the framework of MEDPOL Phase III
(2) Countries participating through RAMOGE activities
(3) Countries participating with a pilot programme

Figure 3.2.1 Stations de surveillance continue des effets biologiques – MEDPOL- Phase III



3.3. Evaluation of the programmes and of the first data sets

Data sets were received from 7 participating countries. In most cases the data were obtained in the context of the MED POL biological effects monitoring programme. Data is also expected from 3 more countries by next year. Some of the countries have reported difficulties in the application of some biomarkers. The problems encountered were tackled during 2001 through the organization of individual and group trainings.

As a result of the evaluation of the data received, the following can be stated :

- The programmes are generally well organized and promising in view of the further development of the bio-monitoring activities in the Mediterranean.

- The selection of the "biomarker" and of the monitoring organism should be made accurately. For example, utilisation of EROD as an exposure biomarker in mussels should be avoided: usually this enzyme activity is considered to be too low in mussels. On the contrary, it is a very sensitive and specific biomarker in fish. On the other hand, use of a single biomarker of exposure i.e. metallothionein concentration is not enough to evaluate the stress syndrome of the mussels.

- The BOP parameters (sampling depth, temperature, salinity and dissolved oxygen) should also be reported as well as the details on mussel transport and storage (temperature, time etc.).

- Data from at least one unpolluted site should be included in the programmes to obtain a correct interpretation of results.

- The selected animals should be of homogeneous size (5-6 cm) and at least five samples should be collected at every station in order to perform a statistical evaluation.

- Raw data from the biological effects monitoring should be reported in a standard way by using the formats presented in Chapter 5.

- The expected annual reports should also include the results of intercalibration exercises. Any additional detail regarding the application of biomarker techniques or problems encountered should also be clearly stated and reported.

3.4. Data quality assurance activities

Intercalibration exercises have been planned and organized by University of Genova on behalf of MED POL as one of the major data quality assurance activity. In the first exercise (see UNEP, 1997c-d and Viarengo et al., 2000) the work on three biomarkers (Lysosomal Membrane Stability (LMS) and metallothionein (MT) levels in mussels and EROD activity in fish) was intercalibrated. Four laboratories participated in the LMS exercise whereas the participation in the MT and EROD exercise was higher (eight labs for MT and eleven labs for EROD). All the laboratories were able to differentiate (between the control and the treated samples for each biomarker. An other intercalibration exercise was organized in 2000 for all the biomarkers mentioned in Table 3.1.1. Eleven laboratories from seven countries have participated in the exercise; the report of this exercise is under preparation and will be soon made available to the laboratories. Another intercalibration exercise has also been planned for 2002.

Individual training and group training courses (five) have been organized from the initial phases of the programme. The courses were organized at the basic level for the application of the standardized techniques of four selected biomarkers. In total, 27 trainees

from fifteen different countries have participated in the training programmes during 2000 and 2001.

Another training workshop will be organized in 2002 and specific technical visits will be made to the laboratories which need to increase the number of biomarkers utilized in order to obtain a better picture of the effect of pollutants.

4. Compliance Monitoring

4.1. Definition and objectives

Compliance monitoring is defined as the collection of data through surveillance programmes to verify that the regulatory conditions for a given activity are being met e.g. concentration of mercury in effluents. In the case of identifying an instance of non-compliance, appropriate enforcement can be established which can be escalated until compliance is achieved.

There are three different types of compliance monitoring:

- **Compliance monitoring of health-related conditions** (eg. Sanitary quality of bathing areas and waters used for aquaculture, quality of seafood). This type of monitoring has a national significance, but data may also be used for regional assessments. A comprehensive approach on microbiological and health related monitoring of recreational and shell-fish, growing areas is given to an extensive detail in documents, WHO/UNEP (1994) and (1996).

- **Compliance monitoring of effluents** to determine whether the adopted common measures and/or national standards concerning concentrations of contaminants in effluents (e.g. mercury, cadmium) are complied with; and

- **Compliance monitoring in "hot spot" areas** to determine whether the environmental quality objectives or limit values set are complied with (e.g. DDT in water).

The specific objectives of compliance monitoring element shall be:

(a) to monitor, on a continuous basis, the implementation and to assess the effectiveness of the implementation of action plans, programmes and measures for the control of pollution adopted or recommended by the Contracting Parties;

(b) to identify problems experienced by the Contracting Parties in the implementation of the action plans, programmes and measures, and formulated proposals that may assist in overcoming those problems, and

(c) to keep the Contracting Parties regularly informed about the status of the implementation of the adopted action plans, programmes and measures.

4.2. A summary of the on-going monitoring programmes

The compliance monitoring criteria that are used for the national monitoring programmes carried out by the countries in the context of the MED POL Programme Phase III are shown in the following table:

Table 4.2.1 Compliance Monitoring Criteria in MED POL Phase III

	BATHING WATERS	SHELLFISH WATERS	EFFLUENTS	HOT SPOTS
Parameters(1)	MB (TC, FC, FS)	MB (TC, FC, FS)	BOD, COD, TSS, Nutrients (TP,TN) Heavy Metals (Hg, Cd, Pb, Cr, Zn etc.), Polyaromatic Hydrocarbons (PAH+), Halogenated Hydrocarbons (HH+)	Nutrients (TP, TN), TSS, HH+, PAH+
Sampling Frequency	Fortnightly (Spring-summer)	Monthly (or) Seasonally	(2)	(2)
Sampling Matrix	WAT	WAT	EFF	WAT

(1) depends on national legislation requirements and analytical capabilities
(2) according to the existing national legislation

Several Mediterranean countries have participated in the monitoring activities by preparing, signing and implementing national monitoring programmes which included as well that part of monitoring related to compliance. The following table refers to the on-going monitoring programmes.

Table 4.2.2 Compliance monitoring of Bathing Waters

COUNTRY	Total # of STATIONS	PARAMETERS	SAMPLING FREQ/YEAR	DATA SUBMISSION
Albania	Compliance monitoring of bathing waters is not included in the programme			
Croatia	803	TC, FC, FS	Fortnightly (May-September)	YES (raw data and compliance report)
Cyprus	159	FC, FS	Fortnightly (April-January)	YES (compliance report)
Greece	139	TC, FC, FS, EC	Fortnightly (May-October)	YES (raw data)
Slovenia	32	TC, FC, FS, BOP	Weekly (May-October)	YES (raw data)
Tunisia	555	TC, FC, FS	Fortnightly (May-September) monthly (October-April)	
Turkey	Compliance monitoring of bathing waters is not included in the programme			
Algeria	263	FC, FS	Fortnightly (May-September)	Draft
Lebanon	19	FC, FS	Fortnightly (June-August) monthly (September-May)	Draft
Malta	82	FC, FS	Weekly (May-October)	Draft
Syria	Compliance monitoring of bathing waters is not included in the programme-Draft			
No. of stations	**2052**			

Table 4.2.3 Compliance monitoring in Shellfish/Aquaculture waters

COUNTRY	Total # of STATIONS	PARAMETERS	SAMPLING FREQ/YEAR	DATA SUBMISSION
Albania	Compliance monitoring of shellfish/aquaculture waters is not included in the programme			
Croatia	6	NUT, BAC, BOP, phytop., Chl-a	4	YES (only for BAC parameters as compliance report)
Cyprus	6	NUT, TSS, BAC, BOP	2	YES (Raw data)
Greece	5	pH, TSS, FC, PAH+ HH+, HM+	4 2	YES (Raw data)
Slovenia	3	NUT, BOP, Chl-a Toxic phytoplankton	Monthly (May-October) Forthightly (June)	YES (Raw data)
Tunisia	5	Toxic phytoplankton	12	
Turkey	Compliance monitoring of shellfish/aquaculture waters is not included in the programme			
Algeria	2	FC, FS	4	Draft
Lebanon	Compliance monitoring of shellfish/aquaculture waters is not included in the programme			
Malta	14	NUT, BAC, BOP	4	Draft
Syria	Compliance monitoring of shellfish/aquaculture waters is not included in the programme			
No. of stations	**41**			

Table 4.2.4 Compliance monitoring of effluents

COUNTRY	**Total # of STATIONS**	PARAMETERS	**SAMPLING FREQ/YEAR**	**DATA SUBMISSION**
Albania	Compliance monitoring of effluents is not included in the programme			
Croatia	85	pH, BOD, COD, NUT, TSS, BAC, HM, HH, PAH, DET, PHE, others.	Change with parameter	
Cyprus	13	BOD, COD, NUT, BAC, TSSS	2	YES (Raw data)
Greece	24	pH, BOD, COD, TSS, NUT, PAH+, HM	4	YES (Raw data)
Slovenia	Compliance monitoring of effluents is not included in the programme			
Tunisia	10	BOD, COD, TSS BAC, HM	12 4	
Turkey	8	BOD, COD, BAC, TSS	4	YES (Raw data)
Algeria	14	pH, BOD, COD, NUT, BAC, HM, DET, PHE	4	
Lebanon	Compliance monitoring of effluents is not included in the programme			
Malta	11	??	12	
Syria	3	NUT, TSS, BOD, COD,BAC,HM(Pb)	2	
No. of stations	**168**			

Table 4.2.5 Compliance monitoring in "Hot Spots"

COUNTRY	Total # of STATIONS	PARAMETERS	DATA SUBMISSION
Albania	Compliance monitoring at "hot spots" is not included in the programme		
Croatia	Compliance monitoring at "hot spots" is not included in the programme		
Cyprus	Compliance monitoring at "hot spots" is not included in the programme		
Greece	29	HM, HH+	?????
Slovenia	Compliance monitoring at "hot spots" is not included in the programme		
Tunisia	Compliance monitoring at "hot spots" is not included in the programme		
Turkey	3	BOD, TSS, HM	?????
Algeria	Compliance monitoring at "hot spots" is not included in the programme		
Lebanon	Compliance monitoring at "hot spots" is not included in the programme		
Malta	Draft and has got confusion		
Syria	Compliance monitoring at "hot spots" is not included in the programme		

The status of participation to MED POL Phase III compliance monitoring programme by country and by laboratory is shown in the following table:

Table 4.2.6 Participation in MED POL Phase III compliance monitoring programme (by country and by laboratory)

COUNTRY	Status of Compliance Monitoring Programmes		Participation by Institutes and their responsibilities				
	Drafted	Finalized	Bathing Waters	Shellfish waters	Effluents	Hot Spots	Total Number of Institutes
Albania	----	----					
Algeria	2001	----	15	2	8		15
Croatia	1998	2000	7	2	6		9*
Cyprus	1998	1999	2	2	2		3*
Egypt	----	----					
France	----	----					
Greece	1999	2000	2	2	6	7	14*
Israel	----	----					
Italy	----	----					
Lebanon	2000	----	1				1
Libya	----	----					
Malta	2001	----	4	2	4		6
Monaco	2000	----					
Morocco	----	----					
Spain	----	----					
Slovenia	1998	1999	1	1			2*
Syria	2000	----			?		?
Tunisia	2001	2001	2	1	2		5*
Turkey	1999	2000			1	1	1*
Number of Institutes			34	12	29	8	56

* number of institutes actually implementing compliance monitoring activities

4.3. Data Quality Assurance activities

Following the design of compliance monitoring activities, a Data Quality Assurance (DQA) programme is required to ensure data reliability. The required quality assurance must address all aspects of the programme, including:

- trained staff;
- appropriate facilities, sampling and measurement equipment and other consumables;
- regular calibration, maintenance, and servicing of the equipment;
- sampling that conforms to sampling design;
- sample handling procedures, including, for example, transportation, preservation, storage, homogenisation, sub-sampling (sub-sampling includes all steps up to the measurements);
- regular checks of accuracy and precision of routine measurements, by analyses of appropriate reference materials (when available) and the documentation of the results on control charts;
- external quality assessment (e.g. participation in intercomparison exercises);
- standard operating procedures (written protocols with precise descriptions of all elements of the measurements and quality control procedures);
- record of all calculations such as data translation and transcriptions prior to final documentation (record books and/or computers);
- data evaluation procedures (e.g. converting data into a report).

The results obtained by sampling, measurement and observation must be of adequate quality not only analytical (accuracy and precision) but also meet the requirements of the objectives and be comparable on a Mediterranean-wide basis.

In order to ensure comparable results, WHO, on the behalf of MED POL has been responsible for the organization of the DQA Programme for this component. During the present biennium, WHO organized a course on microbiological methodology in collaboration with the Department of Microbiology of the National School of Public Health in Athens (26-29 September 2001). Eighteen microbiologists from sixteen laboratories in Mediterranean countries attended.

The objectives of the intercalibration exercise included the following:

- to promote microbiological laboratory personnel from Mediterranean Institutions participating in the MED POL Phase III programme, through familiarization with jointly agreed-upon methodologies for determination of the main bacterial parameters in seawater;
- to promote contacts between scientists from different laboratories, through discussion on mutual problems in the application of the relevant microbiological techniques;

- to improve comparability of results obtained in the microbiological component of the MED POL Phase III programme, through intercalibration of data;

- to make appropriate recommendations for future meetings and exercises.

The laboratory session of the course included microbiological tests for the detection of bacterial indicators of fecal pollution and some pathogens. The samples were prepared by natural seawater sprinkled with standard bacterial strains. The participants made determinations of the concentrations of the bacterial indicators, total coliforms, *E-colli*, faecal streptococci and salmonella. The membrane filtration culture (MF) method was employed in these determinations and the use of microplates for the detection of *E. colli* and faecal streptococci was demonstrated. A demonstration of the use of microplates for the detection of *E. colli* and faecal streptococci was also performed.

Both as an essential part of the theoretical microbiological component of the training course, and to provide participants with a better knowledge of the broader framework within which their laboratory work was being carried out, a number of lectures were delivered, covering the following subjects:

(a) New WHO Guidelines for monitoring Bathing Waters and the proposal of a new EU Directive linked with the above guidelines; (b) Quality control in the Microbiological laboratory; (c) viruses and microphages in seawater; (d) use of reference materials.

Results obtained were satisfactorily comparable, both between the various groups of participants, and between the same microbiological parameter. The difference in individual experience in the utilisation of one or the other method was offset to the extent possible through the mode of setting up the various groups, which ensured the presence of adequate expertise in each.

4.4. Progress and Problems

A number of countries (58%) have formulated national compliance monitoring programmes, while some of the remaining countries (15%) belonging to the EU assumingly possess such programmes but they have not present them in the framework of MED POL.

Bathing waters monitoring was included only in the 40% of the national programmes. It is known that due to tourism, Mediterranean countries pay a lot of attention to the quality of their bathing waters, by carrying out monitoring programmes or by participating to special programmes aiming at the improvement of the bathing waters quality. However, no reports were sent to the Secretariat. It should be recalled that, as a part of the compliance monitoring of MED POL Phase III, the only requirement is to provide the evaluation of the analyses (which is the outcome of the elaboration of the raw data) and to show which stations comply or not with the standards (compliance report).

The same occurs for shellfish waters monitoring, i.e. the EU countries do not provide information to MED POL.

The compliance monitoring of the effluents follows the same pattern as the previous ones. For hot spots in particular, the situation is disappointing. Only two countries out of twenty have agreed to perform compliance monitoring on pollution hot spot areas.

The compliance report for the monitoring of bathing waters is given in Annex III (pg. 16) and similar reports should be prepared for compliance monitoring of shellfish waters, effluents and hot spots.

4.5. New trends in coastal recreational waters monitoring

Two new approaches have been developed in recent years based on the accumulated knowledge on monitoring. The Annapolis Protocol (WHO), and the EU vulnerability profile which aims to reduce health risk to bathers by management initiatives. Both approaches include a sanitary inspection for a characterisation of the bathing areas in relation to the risk of receiving pollution.

Management initiatives would include preventive measures, defining sites at risk and public announcements, reducing risk as soon as possible by intervention (fencing etc.) while longer term remedial action is planned and prepared.

The main idea is to avoid any health risk by bathing in areas with well-known and visible sources of pollution (river mouth, direct outfall). Bathing would be discouraged by fencing or delimiting and signposts would be erected indicating such risk. Similar warnings are required for uncontrollable pollution events, such as rainfall, one important source of microbial pollution in the Mediterranean region. Drainage sites for rainwater are well-known and signs indicating that the quality f water may pose a threat to public health are warranted. This latter approach has been applied successfully in the USA.

As indicated in the Annapolis Protocol, the classification scheme proposed would be of value if it accomplishes one or more of the following:

(i) Contributes to informed personal choice
(ii) Contributes to local risk management
(iii) Assists in making maximum use of the minimum necessary monitoring effort
(iv) Assists local decision-making regarding safety management
(v) Encourages incremental improvement and prioritises effects in the areas of greatest risk.

The aim of these approaches is not to increment the cost of monitoring but to invest it better, with the idea that only a minor monitoring regime needs to be maintained for confirmation at excellent water quality bathing areas, with increased monitoring at bathing areas of variable water quality where the cause remains unknown.

The essential factor for the viability of both approaches is the perfect interaction between the stockholders involved. From the beginning of the design of any new approach, all competent authorities involved have to participate in each step, i.e. designation of bathing sites; selection of sampling points; types of analyses to be carried out; information derived from microbiological results; management interaction between competent authorities so that prompt decisions can be taken.

Standards as a value alone have very limited importance. The message of the new draft Directive in the EU is that emphasis will change from “non compliance” with the Directive to “inaction in the face of non compliance”. This seems a reasonable measure tat may stimulate action for improvement.

Up to now, bathing areas have been classified as pass or fail as well using WHO/UNEP (1985) criteria or EU criteria. It is clear now that this is a poor diagnosis because it is not known how good a pass or how bad a fail is. In addition, the advantage of the new classification schemes as opposed to the pass/fail approach lies in its flexibility.

The microbiological parameters of choice in the EU, *E. coli* and faecal enterococci (now named intestinal enterococci), more or less coincide with those of the Annapolis Protocol. The numerical standards in both approaches are again similar and in agreement

with WHO guidelines. A final decision has not yet been taken at the EU. However, while both parameters will have to be analysed in freshwater or marine water in the EU, faecal enterococci alone is the indicator for temperate marine and freshwaters in the Annapolis Protocol, while *E. coli* is used for temperate freshwater and sulphite reducing clostridia (*Clostridium perfringens*) for tropical marine and freshwaters.

A percentile value (95%) is elected in both approaches as the way of evaluating compliance, because the entire probability density distribution of data is inherently included in its calculation and, as such, more accurately describes indicator-organism densities at a particular location. In the EU this may still be changed.

The EU proposal and the Annapolis Protocol coincide again in defining several categories of bathing areas with the aim of stimulating improvement. Up to 5 categories have been proposed in the Annapolis Protocol:

- **Excellent**
- **Good**
- **Fair** (with defined area of contamination, increased contamination occurring only under certain conditions)
- **Poor** (area of periodic poor quality where bathing is discouraged at certain locations and/or times)
- **Very poor** (not affected by local management. Area polluted from a defined type or source, which may be unpleasant for bather sand present some risk to human health)

While in the EU proposal, 4 categories have been defined:

- **Good**
- **Intermediate with tendency to good**
- **Intermediate with tendency to bad**
- **Bad**

Since the work on the new EU Directive is not finished, there may still be some changes.

Frequency of sampling is not constant in either of the two approaches but directly related to the categorisation of the bathing area.

5. Establishment and Management of MEDPOL Database

5.1 Status of data stored in MED POL during Phases I and II

The available MED POL marine pollution data of Phases I and II covers, respectively, the periods 1975-1982 and 1983-1996. Although the data from Phase I is limited if compared to that of Phase II, when both are considered as a single entity, the maximum number of records belong to Trace Metal (TM) measurements in biota (around 35,000) whereas the records for Chlorinated Hydrocarbons (CH) in biota are around 15,000. In addition, the MED POL data base also includes data on microbial pollution and contaminants in sediments.

MED POL Phase I and II data was transmitted by participating laboratories to the Secretariat either as hardcopy or on diskette; the data was accordingly computerized. The work of MED POL staff and consultants for the analysis of the data has often revealed rather

difficult because of a number of causes, such as missing basic information in data forms submitted by the laboratories, lack of systematic validation of data, lack of comprehensive feedbacks etc. Already in the past, the project "Enhancement of Data Processing Facilities for Environmental Data at the Coordinating Unit for MAP" (implemented as part of MED POL during the period July 1994-January 1996 with funds from the Italian Government) had attempted to overcome these difficulties. The undeniable necessity of uniform data reporting formats and codes was stressed by the project and the necessary guidelines for data submission were provided among the outputs of the project.

At present, the data of TM and CH in biota of Phase I and II is being reviewed in its entirety and the reliable data is being selected by an expert in consultation with the Secretariat and the data originators. A CD ROM including the reliable data of Phase I and II, the list of participating institutes, the description of the parameters and a short report has been prepared and will soon be made available (a presentation of the content of the CD ROM will be made during the present meeting).

5.2 The activities related to MED POL Phase III data management

The main aim of MED POL Phase III is to provide valid data and information on pollution trends of contaminants and loads, biological effects of pollutants and compliance to existing legislation for the management of Mediterranean coastal waters and hot spots. These different objective-oriented aspects of MED POL Phase III impose the collation of high quality data and a proper and timely processing and analysis of the data. Therefore, as a first step, the data flow from the participating laboratories should be rapid and achieved through the use of **uniform data reporting formats** which allow quick access to data for analysis and evaluation, mainly in relation to trend and biological effects monitoring. As a second step, the **proper storage and management of the data in an appropriate database structure** is 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 and preparation of reports and reformulation of the trend objectives of the pilot programmes as needed.

During 2001, several meetings were held among MED POL staff and external experts were contacted to review and revise the existing data reporting formats and the present structure of the MEDPOL database aiming at the simplification and re-organization of the reporting formats and, accordingly, the restructuration of the database for the specific purposes of MED POL Phase III. A one-day informal expert meeting was also organized in 2001 to discuss these issues.

As a first step, MEDPOL Phase III data reporting formats were completed and standardized in EXCEL worksheets after the approval of the reviewed and proposed formats by MEDPOL National Coordinators (May, 2001) and then they were distributed to the data providing countries (see Section 2.2) by October 2001. In the meantime, some supplementary information for the utilization of tables were also provided. It was requested from the data providers to use these formats (see Annex III) for data transmission in 2001. The reporting table for compliance monitoring of bathing waters was also included in the distributed diskette.

After the data is submitted by the participating laboratories in diskettes by using the new formats in EXCEL (attached to the annual reports of the monitoring activities), it will then be integrated into the MED POL database. The first validation of MEDPOL Phase III data would be made by the laboratories (data providers); however, internal and external quality assurance information (see Section 2.4) of the laboratories would also be kept within the database and the data will be periodically validated by the experts.

After discussions and joint work with experts, the conceptual design of the database has been completed and will be used as the basis for the development of the database. For the development and the management of the database, the it has been recommended to use one of the widespread DBMS. The architectural model of the proposed system is given in the Figure 5.2.1. In this model, the Database will be accessible through the local network of MAP/MEDPOL by the local users (MED POL officers and experts). Since during loading and updating the data and the records the Database could contain raw or incomplete data, at that time access to the Database should be restricted to Internet users by creating and publishing of Database Snapshots on the Web Server. Database Snapshot is a copy of Database done at the moment when Database contains only verified data.

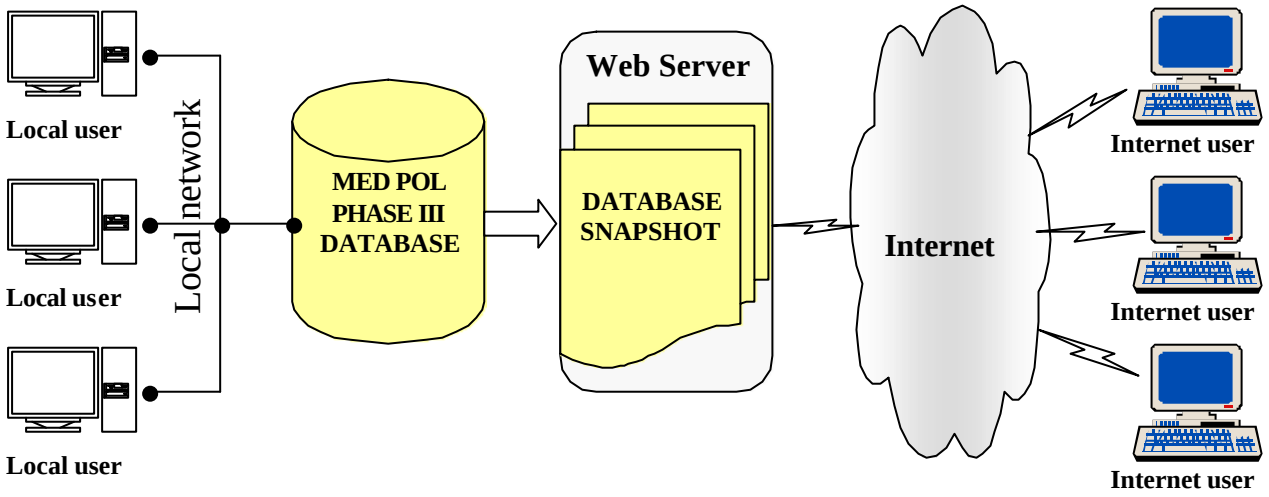


Figure 5.2.1 Architectural Model of the Proposed DBMS for MEDPOL Phase III: general view

The database will include three main types of data (see Figure 5.2.2) :

- Monitoring data
- Supplementary data
- Dictionaries

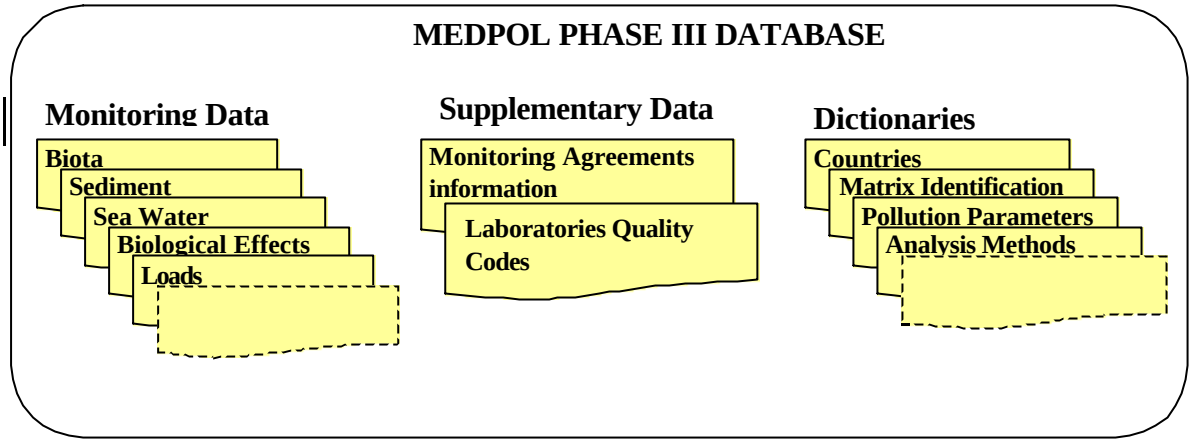


Figure 5.2.2 Database Contents

Monitoring data consist of trend monitoring data on the following matrices and objectives:

- Biota (data on inorganic and organic pollutants)
- Biological Effects Monitoring (data on specific biomarkers)
- Sea Water (data on BOP, nutrients etc.)
- Sediments (data on inorganic and organic pollutants)
- Loads (data on point and non-point sources of pollution)

Supplementary data consists of:

- Monitoring Agreements Information
- Mandatory Monitoring Criteria
- Certified Material Analysis Data
- Laboratories Quality Codes – performance evaluations in intercalibration exercises
- Other information (will be defined during exploitation of the Database)

Dictionaries include set of tables with MED POL computerization codes for :

- Matrix Identification
- Station Types
- Pollution Parameters
- Biota Groups
- Analysis Methods
- etc.

Database functionality

Standard database functionality is usually provided by DBMS. This functionality gives possibility for:

- Basic data loading.
- Data querying.
- Data reporting.

The specific requirements to ensure the proper functioning of the database include:

1) Easy and convenient loading of data in standardized formats.
2) Convenient selection of data on different criteria
3) Access to database from Internet.
4) The possibility to draw "Basic Map" of Mediterranean with monitoring station positions. The Basic Map of Mediterranean should contain contours of coastline, isobaths, political boundaries, and main rivers**.**
5) Preparation of specific reports
6) Specific data import/export facilities

The format used in the database will be CSV (Comma Separated Values) which is prevalent and supported by most of the software packages (e.g. MS Excel). The use of this format also ensure an easy data export.

The basic reports created by the DBMS will be Tables for Sampling Stations, Matrix Parameters (including the values), Parameter time series etc. and Plots for maps and time series.

The possible establishment of similar and compatible database(s) in pilot countries might be considered in the future . This process could in fact ensure on the long-term a rapid and error-free way of for receiving, exchanging, storing and processing the MED POL monitoring data.

5. Conclusions

MED POL Phase III has been in operation since 1996 with its three major components; trend monitoring of contaminants in biota and sediment, monitoring of biological effects of contaminants on marine organisms and monitoring of compliance of specific activities to regulatory conditions.

All the above components have their own specific objectives and targets, hence, each programme should be precisely formulated from the beginning and implemented basically unchanged throughout an adequate period of time. MED POL Phase III had been so structured on the basis of the experience gained from the previous Phases of MED POL, i.e. to serve as an integrated, objective-oriented scientific and technical tool for MAP-Phase II. The Programme (MED POL Phase III) should be implemented in the Mediterranean by all the countries with the same strategy.

Seven Country Programmes have been initiated and are being implemented since MED POL Phase III was launched. Although all these programmes cover the basic criteria of MEDPOL Phase III, some of them need to be completed especially to include biological effects monitoring and compliance monitoring. The revision of these programmes should be performed as soon as possible. Contacts have already been made to revise the programmes. Six more countries have presented draft programmes. Some of these draft programmes are nearly ready to finalize but for a number of them special efforts have to be performed.

As to the ongoing programmes, trend monitoring activities of the ongoing programmes have been performed in coastal and reference waters, hot spots and land-

based inputs by utilizing the mandatory criteria. The programmes were also supported by some additional monitoring activities.

Monitoring of biological effects has been introduced in MED POL Phase III to serve as an early warning tool to monitor the cellular alterations and physiological changes occurring in the organisms on exposure to pollutants. In order to implement this specific activity, four “biomarkers” have been selected and the techniques for measuring them have been standardized and are being applied by the MEDPOL participating laboratories.

Compliance monitoring activities of MED POL Phase III have been carried out for health-related conditions in bathing waters and shellfish/aquaculture waters, for effluents and hot spots. All of these activities have not been satisfactorily implemented within the ongoing MED POL Programmes; however, it is believed that they will be soon completed.

As stated in previous chapters, during the period of 2000-2001, data sets have been received from the ongoing MED POL Phase III programmes. The preliminary evaluation of data has been completed and the problems encountered have also been identified.

As a follow-up to the ongoing programmes, first, the comparability of the obtained data was verified against the criteria set within the national Monitoring Programmes, especially for trend monitoring and biological effects monitoring. Although, it appeared that the relevant data has generally been comparable with the major criteria of MED POL Phase III, some points like sampling time and frequency, number of samples and specimens should be more precisely handled. It should be mentioned that the supplementary information (e.g. BOP, the fresh/dry weight ratio, discharge rate for point sources etc.) is extremely important for performing the appropriate calculations and comparisons.

When data was available (n=5 or more), sample variance was calculated for some of the laboratories for biota (MG, MB) and some relative values have been obtained showing that in some cases variance was higher. The reasons for this should be discussed and clarified. However, in order to obtain a more clear picture, the analytical variances of the laboratories should also be calculated and could be obtained from the results of the parallel runs of CRMs during the analysis. However, this kind of data have not been transmitted to MED POL yet.

The Data Quality Assurance programmes for each component of MED POL Phase III have been carried out by experienced organizations and institutions. All the DQA activities are organized by groups of experts of the relevant organizations in close cooperation with MED POL and all the outputs (reports of intercomparison exercises etc.) of these activities are provided to MED POL to be evaluated.

In order to be able obtain a timely data evaluation the basic elements of data management are being improved. As a first step, the data transmission formats have been standardized and distributed to the data providers. The formats include both mandatory and supplementary information and will be loaded to the database soon after the transmission. The Database itself will be reorganized and the accession to the database via the Internet will be established.

6. References

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WHO/UNEP, 1994. Guidelines for monitoring land-based sources of marine pollution, EUR/ICP/CEH 041(1).

WHO/UNEP, 1994 ????????

WHO/UNEP, 1996 ????????

Annex I: List of reference methods (RM) used in the document

RM	Details
6	UNEP/FAO/IOC/IAEA, 1993. Guidelines for monitoring chemical contaminants in marine organisms
7	UNEP/FAO/IOC/IAEA (Rev.2), 1984. Sampling of selected marine organisms and sample preparation for trace metal analysis
8	UNEP/FAO/IOC/IAEA, (Rev.1), 1984. Determination of total mercury in selected marine organisms by cold vapour atomic absorption spectrophotometry
9	UNEP/FAO/IOC/IAEA, 1985. Determination of total arsenic in selected marine organisms by hydride generation atomic absorption
11	UNEP/FAO/IOC/IAEA (Rev.1), 1984. Determination of total cadmium, zinc, lead and copper in selected marine organisms by flameless atomic absorption spectrophometry
12	UNEP/FAO/IAEA (Rev.1), 1984. Sampling of selected marine organisms and sample preparation for the analysis of chlorinated hydrocarbons
20	UNEP/IOC/IAEA, 1992. Monitoring of petroleum hydrocarbons in sediments
26	UNEP/IAEA, 1985. Determination of total mercury in marine sediments and suspended solids by cold vapour atomic absorption spectrophotometry
27	UNEP/IAEA, 1985. Determination of total cadmium in marine sediments by flameless atomic absorption spectrophotometry
40	UNEP/IOC/IAEA, 1988. Determination of DDTs and PCBs in selected marine organisms by capillary column gas chromatography
57	UNEP/IOC/IAEA, 1990. Contaminant monitoring programmes using marine organisms: Quality Assurance and Good Laboratory Practice
63	UNEP/IOC/IAEA, 1995. Manual for the geochemical analysis of marine sediments and suspended particulate matter

Annex II: Abbreviations

ALI : Aliphatics
BAC Bacteriological Parameters
BIO: Biota
BOD : 5-Day Biochemical Oxygen Demand
BOP: Basic Oceanographic Parameters (depth, temperature, salinity, dissolved oxygen)
COD : Chemical Oxygen Demand
DBMS: DataBase Management System
DET : Detergents
DG: Digestive Gland
DIN: Dissolved Inorganic Nitrogen (NO3+NO2+NH4)
EEA : European Environment Agency
EFF : Effluents
EROD:Ethoxyresorufin O-deethylase
EU : European Union
FC: Fecal Coliforms
FI: Fillet of fish
FS: Fecal Streptococci
HH: Halogenated Hydrocarbons
LMS : Lysosomal Membrane Stability
MAP : Mediterranean Action Plan
MC : Microbiological
MT : Metallothionein
NUT : Nutrients
OC : Organic Contaminants
PAH : Polyaromatic Hydrocarbons
PHC : Petroleum Hydrocarbons
PHE : Phenols
PM: Particulate Matter
Q : Discharge
RIV : River
RM : Reference Methods
SAP : Strategic Action Programme
SED : Sediments
T : Temperature
TC : Total Coliform
TM : Trace Metals
TN: Total Nitrogen
TP: Total Phosphorus
TRIX : Trix index
TSS : Total Suspended Sediments
UNEP : United Nations Environment Programme
WAT : Water (for sea water and river water)
WHO : World Health Organization
WST: Whole Soft Tissue

Biological Species

BB : *Boops boops*
DT : *Donax trunculus*
MB : *Mullus Barbatus*
ME : *Mytilus edulis*
MG : *Mytilus galloprovincialis*

MS : *Mullus surmuletus*
PP : *Perna perna*
PS : *Pomatomus saltator*
SAU : *Sparus auratus*
TD: *Tapes decussatus*
UM : *Upeneus moluccensis*

Annex III: Data reporting tables for MED POL Phase III

10/10/2001

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,...) (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
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
EOM	Additional	Extractable Organic Matter	NUM (5,2)	mg/g
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)	
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)	

Fields	Requisite	Description	Format	Units
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)**	
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)	
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)	
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)	
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)	
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)	
Other Trace Metals	Additional	to be included by the laboratories depending on the country agreements		

10/10/2001

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,...) (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
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
EOM	Mandatory	Extractable Organic Matter	NUM (5,2)	mg/g
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	DÁÖÅ	
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)	
ANALY_DATE_HH	Additional	Analysis Date	DÁÖÅ	
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)	
Other Organics	Additional	to be included by the laboratories depending on the country agreements		

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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
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)	
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)**	
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)	
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)	
HGT_CONC	Mandatory	**Total Hg concentration**	**NUM (7,3)**	**ug/kg**

Fields	Requisite	Description	Format	Units
HGT_BDL	**Mandatory**	**enter BL if HgT conc. is below detection limit or level of determination**	**CHAR (2)**	
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)	
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)	
Other Trace Metals	Additional	to be included by the countries depending on their parameter settings		

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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
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)	
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
HH_BDL	Additional	Enter BL if HH+ conc. is below detection limit or level of determination	CHAR (2)	
Other Organics	Additional	to be included by the countries depending on their parameter settings		

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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)	%

Fields	Description	Format	Units
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
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

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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	
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
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		Enter ' BL ' if Cd concentration is below the detection limit or level of determination		
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		
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		
HG_CONC	**Mandatory**	**Total mercury concentration**	**NUM (7,3)**	**ug/L**
HG_BL		Enter ' BL ' if Hg concentration is below the detection limit or level of determination		
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		

Fields	Requisite	Description	Format	Units
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		
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		
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
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
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
TP_CONC	Additional	Total Phosphorus concentration	NUM (7,3)	mg/L
NH3-N_CONC	Optional	NH3-N concentration	NUM (7,4)	mg/L
NH4-N_CONC	Optional	NH4-N concentration	NUM (7,4)	mg/L
NO2-N_CONC	Optional	NO2-N concentration	NUM (7,4)	mg/L
NO3-N_CONC	Optional	NO3-N concentration	NUM (7,4)	mg/L
TN_CONC	Additional	Total Nitrogen concentration	NUM (7,2)	mg/L
SIO4_CONC	Additional	Silicic acid concentration	NUM (7,2)	mg/L
TSS_CONC	Additional	TSS concentration	NUM(7,2)	mg/L
BOD_CONC	Additional	BOD concentration	NUM(7,2)	mg/L
COD_CONC	Additional	COD concentration	NUM(7,2)	mg/L
FC	Additional	Number of Fecal Coliforms		no/ 100 ml

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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	
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
TP_CONC	Optional	Total Phosphorus concentration	NUM (6,2)	µmol/L
NH4-N_CONC	Additional	NH4-N concentration	NUM (6,2)	µmol/L
NO2-N_CONC	Additional	NO2-N concentration	NUM (6,2)	µmol/L
NO3-N_CONC	Additional	NO3-N concentration	NUM (6,2)	µmol/L
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
SIO4_CONC	Additional	Silicic acid concentration	NUM (6,2)	µmol/L
CHL-A_CONC	Additional	Chlorophyll-a concentration	NUM (6,2)	ug/L
TRIX	Additional	Trophic Index	NUM (5,2)	
Others		Other parameters could be included depending on the country aggrements.		

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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 ( )	
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)	
Other Trace Metals	As specified in the programme			
Organic contaminants	As specified in the programme			

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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		Average cadmium concentration	NUM (7,3)	ug/kg
CD_BDL		enter BL if Cd conc. is below detection limit or level of determination	CHAR(2)	
Other Trace Metals				
Other fields		organic contaminants		

10/10/2001

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

Fields	Description	Format	Units
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	NUM (7,3)	ug/kg
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 of each sample	NUM (7,3)	ug/kg
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 of each sample	NUM (7,3)	ug/kg
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 of each sample	NUM (7,3)	ug/kg
ANALY_DATE_HGT_SED	Hgt Analysis Date	DATE	

Fields	Description	Format	Units
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+ of each sample	NUM (7,3)	ug/kg
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 of each sample	NUM (7,3)	ug/kg
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	NUM (7,3)	ug/kg
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	NUM (7,3)	ug/kg
ANALY_DATE_PAH_SED	PAH Analysis Date	DATE	
ANALY_METH_PAH_SED	PAH Analysis method (MED POL codes)	CHAR (5)	

COMPLIANCE REPORT

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