

Annex A. Air quality networks and data flow

A.1. Framework for air quality data exchange

European Union countries have a long tradition for exchanging air quality data. The reciprocal exchange between countries and the European Commission (EC) is based on several Council decisions. The latest decision (97/101/EC establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States — the exchange of information (EoI) decision) was adopted by the Council of Ministers in 1997. The EoI decision obliges Member States to transmit meta-information on networks, stations and measurement configurations. The reporting cycle covering 1997 data was the first cycle of obligatory reporting in the framework of the new decision. A further data exchange cycle is based on the ozone directive and provides data on ambient ozone and its precursor concentrations.

In cooperation with the PTL/AQ, the European Topic Centre on Air Quality (ETC/AQ) has been developing, in close interaction with the countries a European wide air quality monitoring network (Euroairnet) which will consist of a selection of monitoring stations from networks that are already in operation in the European countries. Thus, Euroairnet will not, in general, require the establishment of new monitoring stations. However, if important shortcomings are found, new stations may be recommended. The purpose of Euroairnet is to provide objective, reliable and comparable information on air quality relevant to framing and implementing policy at the European level.

The reporting cycles based on the above-mentioned decision and directive are obligatory for EU Member States. The Phare countries, which also work closely with the European Environment Agency (EEA), agreed to voluntarily participate in the exchange of data from Euroairnet stations.

A.2. Extension of Euroairnet to the Phare countries

A primary task of the PTL/AQ in the field of air quality monitoring is to assist in the extension of Euroairnet into the Phare countries, in order to provide timely, reliable and representative air quality information on European scale. During the initial two-year contract period, representatives of the PTL cooperated intensively with NFPs, NRCs, and national air quality experts in the Phare countries. The Euroairnet sites selected by individual countries were evaluated with regard to the Euroairnet criteria and any shortcomings were addressed to the individual countries for completion. This cooperation culminated with country visits (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia) by PTL/AQ experts where the Euroairnet criteria were elucidated and site selection further discussed. In August 1999, 11 Phare countries had made the selection of monitoring stations for Euroairnet (Bulgaria, the Czech Republic, Estonia, FYROM, Hungary, Latvia, Lithuania, Poland, Romania, the Slovak Republic and Slovenia) (see Table A.1).

All of the above-mentioned countries have selected monitoring stations in cities and agglomerations. A total of 73 cities in the three major Euroairnet population classes have been selected together with 9 towns with a population of 25–50 000 (Class 4). In general, site selection meets the criteria well in most countries but some countries have been asked to extend the number of selected cities and check if all relevant stations have been included.

The total number of stations selected in industrial areas comprises 16 stations located in small towns with population less than 25 000 and six stations located in industrial areas. There are specific reasons why Bulgaria, FYROM and Poland selected stations in small cities. Except for the Czech Republic, none of the countries has provided information on monitoring in

industrial areas. The need for monitoring in industrial areas in other countries should be re-evaluated.

In rural areas, the spatial coverage is not well represented, some improvement is expected by incorporation of all EMEP stations and the inclusion of further rural stations. The present selection includes 43 monitoring stations selected in 31 rural areas in seven Phare countries. All Phare countries have been asked to confirm if the site selection meets the criteria for population and ecosystem exposure.

Table A.1

Overview of Euroairnet selected areas and stations per country

Country		Bulgaria	Czech Republic	Estonia	FYROM	Hungary	Latvia	Lithuania	Poland	Romania	Slovak Republic	Slovenia	Total cities/stations		
Number of cities in each population class ⁽¹⁾	1	1	1	1	1	1	1	1	5 ⁽³⁾	1			13		
	2	2	2						1	4	1	1	11		
	3	15	15		3	5			1	4	4	2	49		
	4	3			5				1				9		
Local pollution stations	Urban areas ⁽²⁾	T		2	1	4	8		2	1		6	1	25	230
		I		1	1	5	1			2	23			33	
		U	60	31	1	21	6	2	1	14	31 ⁽⁴⁾	3	2	172	
	Near city stations								2 ⁽⁵⁾				2	2	
Ind. areas and small towns	Ind. areas		6										6	22	
	Small towns ⁽⁶⁾	14			1				1				16		
Rural areas			18	3			2	1	10		7	2	43	43	
Total stations		74	58	6	31	15	4	4	30	54	16	5		297	

⁽¹⁾ Class 1: >0.5 mill., Class 2: 0.25 — 0.5 mill., Class 3: 0.05 — 0.25 mill., Class 4: 0.025 — 0.05 mill.

⁽²⁾ Type of station: T — Traffic, U — Urban, I — Industrial.

⁽³⁾ Including Silesia agglomeration.

⁽⁴⁾ At 7 stations the classification is missing.

⁽⁵⁾ Classified as B/S stations.

⁽⁶⁾ Small towns with population of < 25 000.spa

To date, the emphasis has been on monitoring in urban areas, in total there are 230 stations selected in larger cities. According to the general site classification, there is a dominance of urban background stations, approximately 75 % of the total number of stations. The proportion of traffic stations is about 10 % and industrial stations about 15 %. The site selection in cities differs from country to country. While in Bulgaria, all stations are located in urban background areas, approximately 50 % of stations in Romania are affected by industrial sources. In neither of these two countries have traffic stations been selected. On the other hand, more than 50 % of the total number of stations in the Slovak Republic and Hungary are local traffic stations. To a certain extent, this reflects the differing philosophy of air quality monitoring at the national level. There are also differences between countries in the number of cities selected for each particular class.

However, the present state of site selection and compound coverage provides a good basis for assessment of population exposure, especially in urban areas. As documented in Table A.2, most of the Priority 1 compounds ('Criteria for Euroairnet', 1998) are measured throughout the Phare region. The main pollutants, such as sulphur dioxide, nitrogen dioxide, nitrogen oxides and ozone, are monitored to a considerable extent, while the measurement of lead and PM₁₀ needs to be extended in some countries. Pollutants, such as hydrogen sulphide, phenol, sulphuric acid and some others contribute to the deterioration of air quality, mainly

in Bulgaria and Romania and hence, stations monitoring these pollutants are included in the Euroairnet selection for these countries.

In the process of integration, quality assurance of measurements at monitoring stations included in Euroairnet is of vital importance. Additional information on the level of the QA/QC is still required because not all the countries provided information on QA/QC procedures. Current information on the QA/QC level is summarised in Table A.2, which indicates that high data quality is considered as an important part of most national air quality monitoring system, especially in the Czech Republic, Bulgaria, Estonia and Latvia. In other countries, the data quality may be lower, but at least a minimum documented QA/QC plan is implemented.

Data are available for incorporation into Airbase from most of the countries within six months after the end of the calendar year.

More detailed information on the implementation of Euroairnet in the Phare countries is presented in the 'Euroairnet in the Phare status report'.

More detailed information about Euroairnet is presented in 'Criteria for Euroairnet, the EEA air quality monitoring and information network' (EEA Technical Report No 12) and 'Euroairnet site selection', 1998 (EEA Technical Report No 16).

Table A.2

Pollutant coverage (population exposure), level of QA/QC and data availability by country

Country	Bulgaria	Czech Republic	Estonia	FYROM	Hungary	Latvia	Lithuania	Poland	Romania	Slovak Republic	Slovenia	
Priority 1 ⁽¹⁾	SO ₂	73	45	2	31	15	4	4	13	44	14	3
	NO ₂	70	46	2	4	15	4	4	15	36	14	2
	NO _x	9	46	2	4	15		3	8		9	2
	O ₃	7	19	1	2	7	3	4	9	1	8	5
	PM ₁₀	7	45			5		1	9		3	
	Pb	45	3				2				10	
Priority 2 ⁽²⁾	CO	8	24	1	4	14		3	2	1	5	
	TSP	60	1	1	4	8				26	8	
	BS				27				7			
	Benze- ne						2					
	PAH											
	Cd		3				2				10	
	As	2	3									
	Ni		3								5	
	Hg											
HM ⁽³⁾									5			
Other pollutants ⁽⁴⁾	H ₂ S	62								3		
	Phenol	13								6		
	NH ₃	15					2			46		
	HCl	2								9		
	THC	7										
	H ₂ SO ₄	3								7		
	HCHO									2		
	Toluen						2					
QA/QC ⁽⁵⁾	2a	2a	1	4	—	1, 2a	4	3, 4	—	4	—	
Data availability in months ⁽⁶⁾	6	6/ 12	6	3	4/6	6/ 10	4/6	6	6	6	—	

⁽¹⁾ Number of stations which measure particular pollutants listed in Priority 1 group.

⁽²⁾ Number of stations which measure particular pollutants listed in Priority 2 group.

⁽³⁾ Heavy metals.

⁽⁴⁾ Number of stations which measure various pollutants not listed in any of Priority groups.

⁽⁵⁾ QA/QC level codes:

level 1:

Stations belonging to a national air quality monitoring network, operating a QC plan implemented on a national level, operated by a central accredited laboratory, providing comparability on a national level.

level 2a:

Stations belonging to national air quality monitoring network, operating a QC plan implemented on a national level, operated by a central laboratory (no accredited), but still providing comparability on a national level.

level 3:

Stations belonging to local air quality monitoring network, operating a QC plan implemented on a local level, not operated by an accredited laboratory.

level 4:

Individually operated networks or stations implementing a minimum QC plan.

— = No information available.

⁽⁶⁾ Number of month into the new year when quality controlled data files are available to transfer to Airbase.

A.3. Air quality network meta-information

The European Commission has asked the EEA to facilitate the operation and practical implementation of a Europe-wide air quality information system. The ETC/AQ, under contract to EEA, is managing the European air quality database system, Airbase, in which the information submitted by collaborating countries is stored and also made available to the public by world wide web access. A special software tool — data exchange module (DEM) — was made available to all data suppliers by ETC/AQ, to improve the process of data collection, management and information exchange.

The main task of the PTL/AQ in the field of exchange of information was to facilitate data flow from the Phare countries. PTL/AQ experts worked with national air quality data experts to prepare the information and air quality data requested. The Phare countries submitted meta-information about their air quality networks and stations and air quality data to Airbase, with the assistance of the PTL/AQ.

The DEM software was transmitted to the Phare AQ data experts at the end of summer 1998. A training session on air quality data exchange and use of the DEM software, for Phare data suppliers, was organised by the PTL/AQ in Prague, the Czech Republic, on 16 and 17 November 1998. Experts from all Phare countries participated in this training. The DEM was then used for both meta-information and air quality data transmission to Airbase. Some of the Phare countries had used the Airbadm software to submit meta-information previously (1997, Bulgaria, the Czech Republic, Poland). These countries changed to DEM for meta-information update and completion. A large number of questions concerning the use of DEM and data preparation were discussed between PTL/AQ experts and Phare air quality data experts, by e-mail and also during country visits.

All Phare countries, except for Albania, transmitted meta-information about networks and stations (Table A.3). A summary of the available information is shown in Table A.4 and Figure A.1, including the division of stations by type. Some of the countries reported many local networks with a small number of stations, while others reported all stations in one countrywide network. Most stations were classified as background (sub)urban.

Phare data transmission of meta-information and 1997 air quality data status (31.8.1999)

Table A.3

Country	Ozone data 1997 based on the ozone directive ⁽¹⁾	Meta-information	Air quality 1997 data based on the EoI decision
Albania	—	—	1.2.1999 ⁽²⁾
Bosnia and Herzegovina	—	25.3.1999	—
Bulgaria	—	17.2.1999	Yes ⁽³⁾
Czech Republic	Yes	18.1.1999	Yes
Estonia	—	16.6.1999	Yes ⁽⁴⁾
FYROM	—	29.1.1999	Yes
Hungary	—	1.2.1999	Yes
Latvia	Yes	25.1.1999	Yes
Lithuania	—	10.1.1999	Yes
Poland	Yes	15.6.1999 ⁽⁵⁾	Yes ⁽⁵⁾
Romania	—	2.4.1999	—
Slovak Republic	Yes	19.1.1999	Yes
Slovenia	—	23.12.1998	Yes

⁽¹⁾ In EEA Topic Report No 3/1999, 'Air pollution by ozone in Europe in 1997 and summer 1998'.

⁽²⁾ Only raw air quality data in text format without meta-information was transmitted therefore no data were incorporated into Airbase and air quality data were used only for purposes of this report.

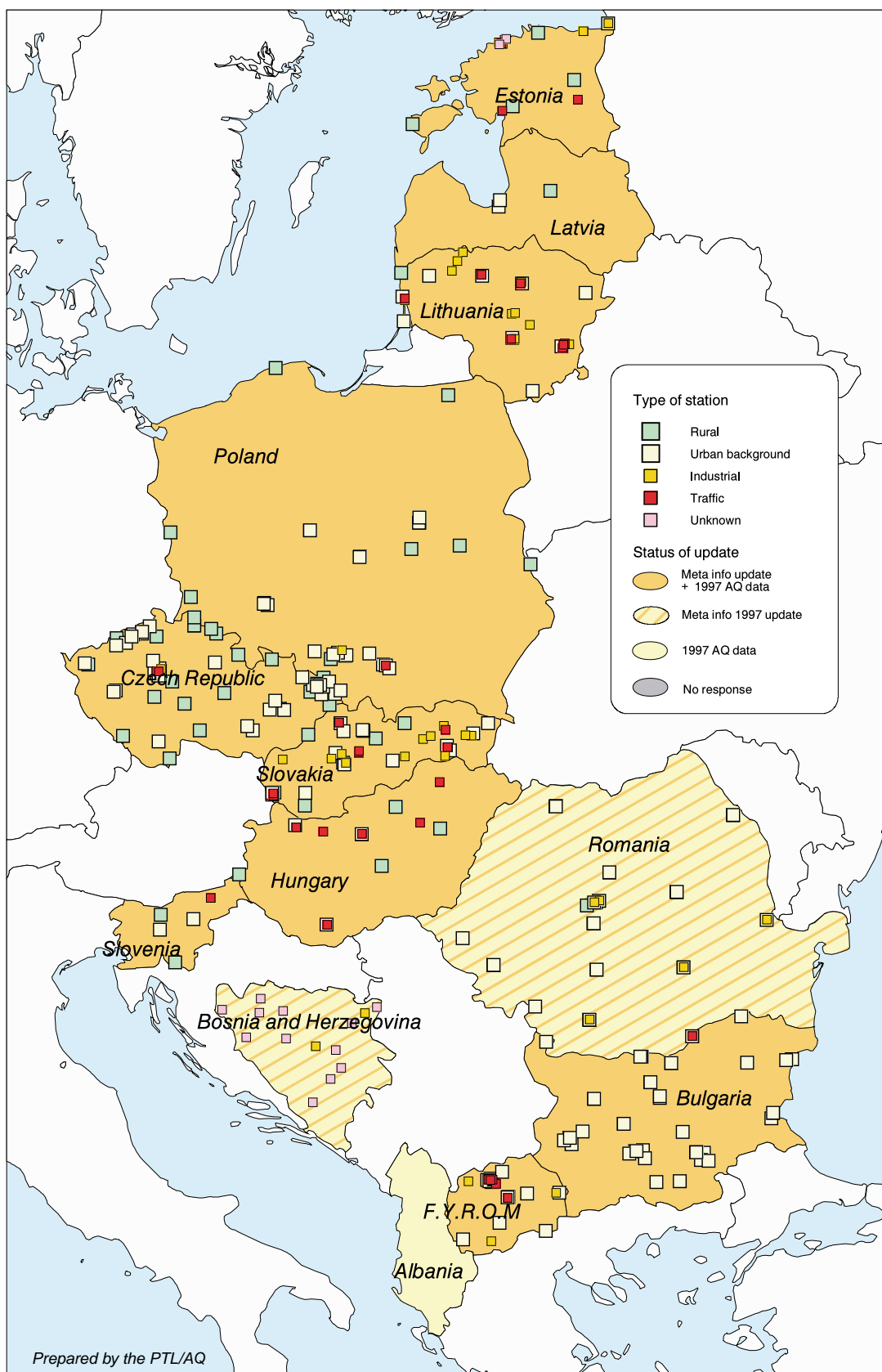
⁽³⁾ Only for automatic stations.

⁽⁴⁾ Only raw air quality data in text format were transmitted. Therefore these data were not incorporated into Airbase but was used only for purposes of this report.

⁽⁵⁾ Only for part of final planned number of stations.

Figure A.1

Euroairnet and other AQ monitoring stations involved in AQ data exchange in the Phare countries



A.4. Air quality data collection overview

Air quality data for the year 1997 from at least one station are available from all Phare countries, except Bosnia and Herzegovina and Romania (Tables A.3–A.6).

Table A.5 presents the number of stations per pollutant for which data were transmitted and the averaging time of the raw data. Data were mainly transmitted for the basic pollutants such as SO₂, NO_x/NO₂ and particles, although O₃ and CO were included in many cases. However, few data were submitted for other pollutants. The data averaging times mostly followed the EoI decision requirements.

Table A.6 presents the average percentage of valid 1997 data including range (minimum — maximum) per pollutant, which is good for most pollutants and countries. The measurements with a low average of valid data were not included in the evaluation of air quality concentrations in the next chapter. Data set completeness is shown, per pollutant, in Figure A.2. Data set completeness for ozone is presented in Figure 4.5. The Czech Republic, Latvia, Poland and the Slovak Republic also participated in the 1997 ozone data exchange based on the ozone directive. These data were included in EEA Topic Report No 3/1999 ‘Air pollution by ozone in Europe in 1997 and summer 1998’.

Data, which were incorporated into Airbase, will be included in report ‘European air quality and monitoring information in 1997’ which is being prepared by the ETC/AQ.

Available meta-information from the Phare countries before 31 July 1999

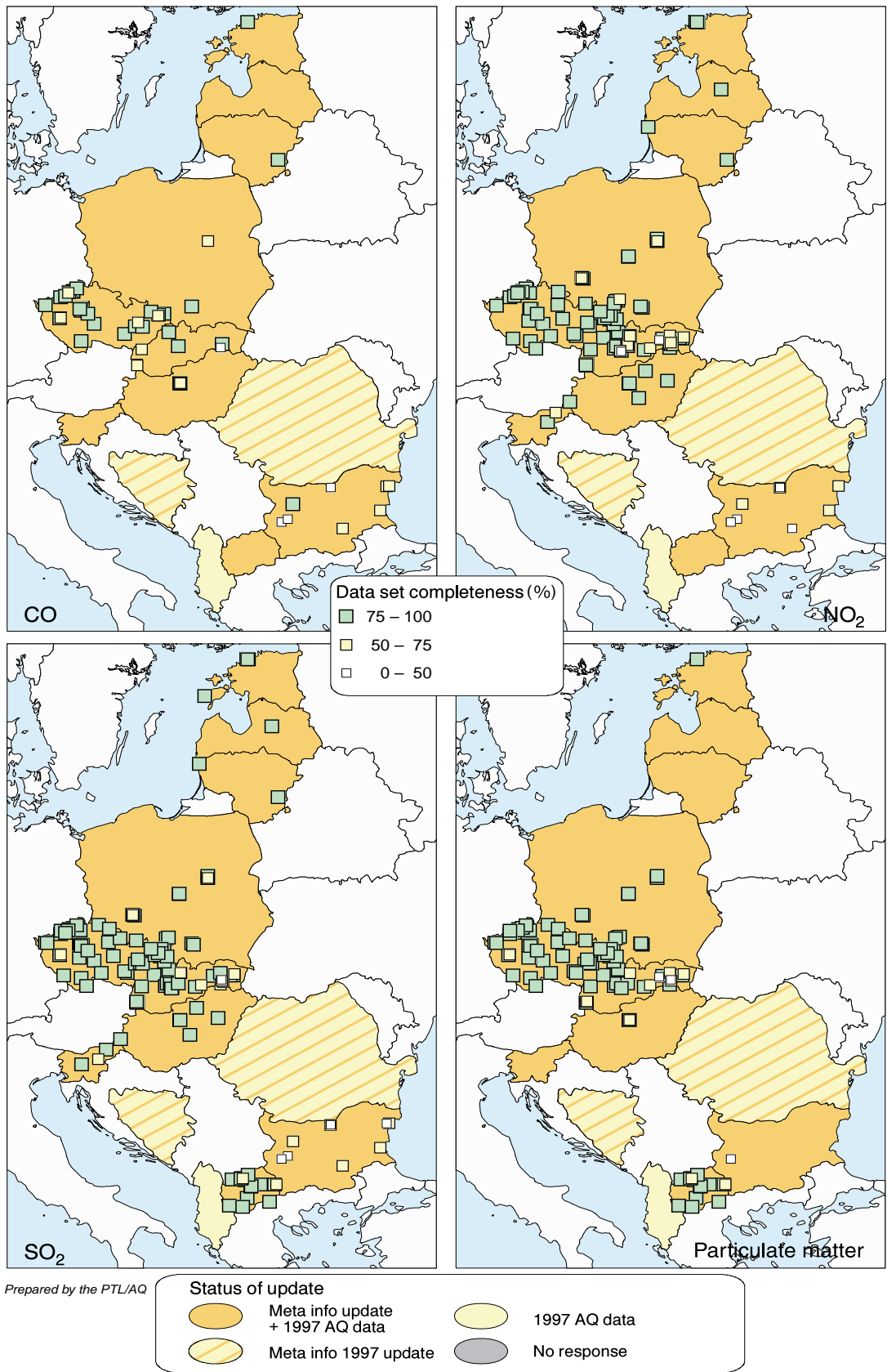
Table A.4

Country	Number of networks defined in DEM	Number of stations defined in DEM	Manual stations	Automatic stations	Number of traffic stations	Number of industrial stations	Number of background (sub)urban stations	Number of background rural stations	Number of unknown stations
Albania	1	1	—	Yes	—	—	—	—	1
Bosnia and Herzegovina	13	14 (1 x 2. 12 x 1)	Yes	—	—	2	—	—	12
Bulgaria	1	52	Yes	Yes	—	—	52	—	—
Czech Republic	1	63	—	Yes	2	1	38	22	—
Estonia	5	17 (4. 2. 7. 3. 1)	Yes	Yes	3	8	1	4	—
FYROM	3	27 (7. 2. 18)	Yes	—	8	4	15	—	—
Hungary	3	19 (8. 7. 4)	—	Yes	9	1	5	4	—
Latvia	2	4 (2. 2)	Yes	Yes	—	—	2	2	—
Lithuania	2	28 (24. 4)	Yes	Yes	8	11	5	4	—
Poland	1	31	Yes	Yes	1	1	19	10	—
Romania	13	56 (3. 8. 11. 2 x 1.2.4. 4 x 5)	Yes	—	1	7	46	2	—
Slovak Republic	1	39	—	Yes	8	11	16	3	—
Slovenia	1	5	—	Yes	1	—	2	2	—

Note: Type of station as filled in Airbase data exchange module (DEM), only for stations active in 1997.

Figure A.2

Data set completeness



Number of stations and averaging time per pollutant for which the Phare countries transmitted 1997 air quality data

Table A.5

Country	SO ₂	Black smoke	TSP	PM ₁₀	NO	NO ₂	NO _x	O ₃	CO	Other
Albania	1	—	—	—	1	1	—	1	1	—
Bosnia and Herzegovina	—	—	—	—	—	—	—	—	—	—
Bulgaria	9 1/3h	—	1	—	—	8 1/3h	—	8	8	H ₂ S: 6. 1/ 3h NH ₃ : 5
Czech Republic	56/day	—	—	56/day	—	42	56	31	25	—
Estonia	4/day	—	1/day	—	—	1 2/day	1	4	1	—
FYROM	24/day	27/day	—	—	—	—	—	—	—	—
Hungary	8 4/day	—	8	—	8	8 4/day	—	5	8	—
Latvia	2/day	—	—	—	—	2/day	—	1	—	—
Lithuania	1	—	—	—	1	1	1	5	1	—
Poland	12/day	6/day	—	8/day	—	2 13/day	—	16	2	—
Romania	—	—	—	—	—	—	—	—	—	—
Slovak Republic	31/day	—	25/day	—	—	31	31	17	7	H ₂ S: 6/day
Slovenia	3	—	—	—	—	2	2	5	—	—

Note: Number of stations without specification is for 1-h averaging time. Other averaging times are given behind the slash following the number of (additional) stations with this averaging.

Table A.6

Average percentage of valid data including range and averaging time per pollutant for which the Phare countries transmitted 1997 air quality data

Country	SO ₂	Black smoke	TSP	PM ₁₀	NO	NO ₂	NO _x	O ₃	CO	Other
Albania	25.8 (-)	—	—	—	25.3 (-)	26.0 (-)	—	26.0 (-)	26.0 (-)	—
Bosnia and Herzegovina	—	—	—	—	—	—	—	—	—	—
Bulgaria	43.4 (8–74) 56.7 (-)/3h	—	46.4 (-)	—	—	37.8 (8–68) 58.8 (-) /3h	—	48.2 (7–74)	55.0 (15–77)	H ₂ S: 33.8 (0–64). 36.3 (-)/3h NH ₃ : 43.6 (1–73)
Czech Republic	96.0 (67–100) /day	—	—	94.6 (65–100) /day	—	94.6 (80–100)	94.1 (65–100)	94.0 (66–100)	90.4 (64–99)	—
Estonia	97.7 (91–100) /day	—	94.8 (-) /day	—	—	91.8 (-) 97.1 (97–97) /day	92.6 (-)	59.2 (1–98)	99.7 (-)	—
FYROM	91.6 (59–99) /day	92.2 (63–99) /day	—	—	—	—	—	—	—	—
Hungary	95.4 (87–100) 94.0 (87–98) /day	—	80.6 (59–97)	—	94.2 (83–100)	93.5 (79–99) 91.8 (89–93) /day	—	92.4 (83–97)	87.4 (63–100)	—
Latvia	91.4 (87–96) /day	—	—	—	—	91.6 (88–95) /day	—	64.5 (-)	—	—
Lithuania	92.1 (-)	—	—	—	95.2 (-)	95.1 (-)	95.2 (-)	82.7 (70–93)	95.4 (-)	—
Poland	90.3 (75–100) /day	90.5 (85–99) /day	—	89.2 (61–100) /day	—	75.9 (59–93) 86.7 (58–100) /day	—	89.6 (63–99)	85.5 (74–97)	—
Romania	—	—	—	—	—	—	—	—	—	—
Slovak Republic	85.1 (45–100) /day	—	77.5 (5–100) /day	—	—	78.3 (16–99)	78.4 (16–99)	81.2 (56–97)	71.0 (11–96)	H ₂ S: 78.5 (56–97) /day
Slovenia	81.5 (71–90)	—	—	—	—	69.9 (59–81)	72.8 (65–81)	81.6 (70–92)	—	—

Note: Number without specification is for 1-h averaging time; (—) denotes the cases in which the range is not relevant.