Guidance on the Annexes to Decision 97/101/EC on Exchange of Information as revised by Decision 2001/752/EC

for the European Commission, DG Environment
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CONVENTIONS

	Indicates important remarks and/or warnings.
	Indicates information which is mandatory i.e. which must be reported to the Commission.
extract ….. …..	Text extracted from the EoI Decision (in annex 5, text extracted from AQ Directives).

INTRODUCTION

On an urgent demand of the Member States, the Commission of the European Union appointed a working group for the revision of the annexes of the Council Decision 97/101/EC of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States (OJ L 33 – 05.02.1997). Following Art 7 of that decision the group was authorised to revise the annexes with consideration of the collected experiences aiming at simplifying the exchange of air quality data. Target was to achieve -despite limited capacities both in the Member States and at the EEA- that not only a substantially higher proportion of the data and the information available in the Member States is supplied, but also that the transmitted data and information is more useful -due to modified criteria- for the purposes of the political counselling and thus provide a strong basis for the further development of the legal basis to the European air pollution control. The amended annexes were adopted as Commission Decision 2001/752/EC (OJ L 282 – 26.10.2001).
Wherever in the following text a reference to the "Exchange of Information Decision" or in short "EoI" is made this applies to Decision 97/101/EC amended by Decision 2001/752/EC.

It is also pointed out that the annexes of the Council Decision that have been modified during a two-year process must be adapted to data exchange requirements of European Union Directives that entered into force in the meantime. The Commission considers as a substitute a completely revised version of the Decision, in order to accommodate for the modified conditions also in the main part of the Decision. This concerns e.g. the area-referred reporting obligations emerging from the Daughter Directives and the Framework Directive on ambient air quality 96/62/EC (OJ L 296 – 21.11.1996) which is not possible so far in the context of the modified EoI. These Daughter Directives are the Directive 1999/30/EC (OJ L 163 – 29.06.1999) relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in the ambient air, amended by 2001/744/EC (OJ L 278 – 23.10.2001), the Directive 2000/69/EC (OJ L 313 – 13.12.2000) relating to limit values for benzene and carbon monoxide in ambient air and the Directive 2002/3/EC (OJ L 67 – 09.03.2002) relating to ozone in ambient air.

This guidance document intends to support the responsible authorities in Member States in following the requirements of the EoI Decision. It was mainly drafted by the Working Group who felt that it would be useful to make some of their considerations and background information available. This document would as well help to harmonise reporting with regard to meta data and information given. Where appropriate examples are given to clarify the reporting obligations and the calculation of statistics.

As a general rule, provisions of AQ directives supersede EoI provisions unless the latter are more stringent than the former.

CHAPTER 1 LIST OF POLLUTANTS, STATISTICAL PARAMETERS AND UNITS OF MEASUREMENT

1.1. POLLUTANTS LISTED IN ANNEX I OF DIRECTIVE 96/62/EC ON AIR QUALITY

and

1.2. POLLUTANTS NOT LISTED IN ANNEX I OF DIRECTIVE 96/62/EC ON AIR QUALITY

"Pollutants to be reported under Directives other than Directive 96/62/EC are listed in Section 3 under Nos 14 and 15.
Pollutants only to be reported if available are listed under Nos 16 to 63."

Within the selection of the pollutants covered by the EoI Decision, a differentiation between pollutants which are listed in Annex I of the so-called Framework Directive on Air Quality (96/62/EC) and other pollutants is given. This differentiation relates to the provisions of Article 5 (1) of the EoI Decision. Basically, this article specifies that

- both raw data and statistics will be reported for the stations which are used for the implementation of the Framework Directive (and other air quality Directives) on the pollutants covered by it;
- for the other stations, at least statistical data will be transmitted on all pollutants to the extent they are measured (see also footnote 8 of Annex I of Decision 2001/752/EC).

In the context of the EoI, raw data means data corresponding to the averaging times indicated under Annex I.3 (see 1.3.3.).
Both raw and statistical data transmitted to the Commission should have passed the internal national QA/QC procedure and should meet the provisions laid down in the Annexes III and IV of the Decision respectively on "Data Validation Procedure and Quality Assurance" and "Criteria for the Aggregation of Data and the Calculation of Statistical Parameters" (see Chapters 3 and 4).

Although the selection of pollutants is similar to the selection in the 'original' version of the EoI, the following changes were introduced:

- Polyaromatic hydrocarbon (PAH) has been deleted.
  Because PAH is not well defined and comprises several hundreds of different compounds, it is recommended to use Benzo(a)pyrene as a marker for PAH levels and this compound has been added to the list of Annex I.
  Also the European Commission is preparing a legislation for PAH. For that purpose, a working group has produced a position paper on ambient air pollution by PAH in 2001 (http://europa.eu.int/comm/environment/air/pp_pah.pdf). In this position paper it is suggested to measure also Benzo(a)anthracene (BbA), Benzo(b)fluoranthene (BbFA), Benzo(j)fluoranthene (BjFA), Benzo(k)fluoranthene (BkFA), Indeno[1,2,3-cd]pyrene (IP), DBAhA (Dibenz[a,h]anthracene) (DbahA) and Fluoranthene (FA).

Although not included in the list of Annex I provisions are given for these additional pollutants under the footnote 7 of Annex I.3.

"([7]) For heavy metals and PAH, community legislation is currently under preparation that is expected to result, in particular, in a list of specific PAH substances and proposals for amendments to this Decision as necessary."

- Several VOC species were included.
  This list was taken from Directive 2002/3/EC on ozone in ambient air (OJ L 67 – 09.03.2002). The mentioned VOCs are known to contribute to photochemical ozone formation.

The present list of pollutants identifies 63 substances (see 1.3.1. and 1.3.5.):
- the first 13 pollutants are those covered by the Framework Directive;
- the following 2 pollutants are covered under other air quality Directives;
- the last 48 pollutants are not covered, at the moment, by EU legislation on air quality.

1.3. POLLUTANTS, UNITS OF MEASUREMENT, AVERAGING TIMES

1.3.1. POLLUTANTS

No.	ISO Code	Formula	Name of pollutant	Units of measurement	Average over	Expressed as	Relevant Directives

Each of the 63 pollutants is identified with
- a number which is considered as the EoI code (No);
- its ISO code.
- its formula;
- its name.

For some pollutants, there is no official ISO code (see footnote 9 of Annex I of 2001/752/EC). For these pollutants, the following codes will be used as pseudo ISO codes:

N° EoI code	pseudo ISO code	Formula	Pollutant name
33	**X1**	$(CH_3)_2$-CH-CH_2-CH_2-CH_3	i-hexane
47	**X2**	PM1	suspended particulates (<1 µm)
52	**X3**	CS_2	carbon disulfide

table continued next page

N° EoI code	pseudo ISO code	Formula	Pollutant name
53	**X4**	C_6H_5-CH=CH_2	styrene
54	**X5**	CH_2=CH-CN	acrylonitrile
57	**X6**	CH_2Cl_2	dichloromethane
59	**X7**	VC	vinyl chloride
62	**X8**	N-dep	wet nitrogen deposition
63	**X9**	S-dep.	wet sulphur deposition

Either the name or the code (EoI or pseudo ISO) will allow to identify the pollutants in data transmission: the pseudo ISO codes will be used when transferring data according the ISO format, the EoI code when transferring data according to any other formats (see also [II.1.10] under 2.2.1.)

Example 1.1

Codes to be used when reporting

	PM1	*PM2.5*	*PM10*
using ISO format	*X2*	*39*	*24*
using other formats	*47*	*4*	*3*

1.3.2. UNITS OF MEASUREMENT

No.	ISO Code	Formula	Name of pollutant	**Units of measurement**	Average over	Expressed as	Relevant Directives

The units to be used reflect the usually occurring ambient air concentrations and are in line with the requirements of the air quality Directives.
Results for most of the pollutants will be expressed in µg/m^3. Exceptions are:

- CO (EoI code 9) in mg/m^3 [1];
- Cd, As, Ni, Hg, Cr, Mn and BaP (EoI codes 10, 11, 12, 13, 49, 50, 58) in ng/m^3;
- N and S wet deposition (EoI codes 62 and 63) in mg/m^2.month).

When measurement results for gaseous pollutants are expressed in ppb, conversion between ppb and µg/m^3 should be performed by the Member State. The conversion is temperature-dependent and based on the ideal gas law. The mechanism is given below.

[1] By mistake Decision 2001/752/EC indicates the unit µg/m^3 for CO in the language versions English, Danish, Greek, Portuguese and Swedish. It was corrected to mg/m^3 by OJ L 334, 18.12.2001.

From

$$\frac{p_0 \times V_0}{T_0} = \frac{p_1 \times V_1}{T_1}$$

with *p* for pressure, *V* for volume and *T* for temperature

and

$$p \times V = M_X \times T$$

with M_X for the molecular mass of the substance X

the conversion can be derived like this:

$$X\left[\mu g / m^3\right] = X[ppb] \times \frac{M_X}{V_0} \times \frac{T_0}{T_1} \times \frac{p_1}{p_0}$$

with p_0 = 101,3 kPa
T_0 = 273 K
V_0 = 22,41 l/mol.

For the conversion the pressure shall be p_0=p_1=101,3 kPa:

$$X\left[\mu g / m^3\right] = X[ppb] \times 12{,}1821 \times \frac{M_X}{T_1}$$

Following the EoI Decision (Annex I.4) and the air quality Directives T_1 shall be 293 K.

$$X\left[\mu g / m^3\right] = X[ppb] \times 0{,}041577 \times M_X$$

A table for different pollutants (T_1=293 K) is given below. Factors are given with 4 decimals. The rounding should be done –as usual– at the end of the calculation:

Pollutant	$M_{Pollutant}$ [g/mol]	Factor
NO_2	46	1,9125
NO	30	1,2473
O_3	48	1,9957
SO_2	64	2,6609
CO	28	1,1642
C_6H_6	78	3,2430

The accuracy requested is linked to the level of concentration: as specified in footnote 2 of Section 3, values have to be reported with at least two figures whatever is the measurement unit. It does not mean that values have to be reported with two decimals but that, as minimum accuracy, one decimal has to be indicated if most of the values are between 0 and 10 as shown in example 1.2.

Footnote 2: "Use at least two figures for each value reported, e.g. 1,4 mg/m^3 or 21 µg/m^3."

Example 1.2

Most of the observed values are between 0 and 10

Monitored								
0,01	*0,18*	*0,91*	*1,02*	*1,84*	*7,85*	*9,61*	*10,1*	*12,73*
Below requirement								
0	*0*	*1*	*1*	*2*	*8*	*10*	*10*	*13*
Minimum requirement								
0,0	*0,2*	*0,9*	*1,0*	*1,8*	*7,9*	*9,6*	*10,1*	*12,7*
Above requirement								
0,01	*0,18*	*0,91*	*1,02*	*1,84*	*7,85*	*9,61*	*10,1*	*12,73*

Whatever the accuracy with which data are reported, it should be kept in mind that rounding may result in small but systematic errors when calculating statistics (see Chapter 4.1. on Annex IV for details).

The level of accuracy requested in the EoI is a minimum requirement. In practice the accuracy will be related to the measurement technique and in all cases in line with the specific requirements of the air quality Directives (see 1.3.5.).

1.3.3. AVERAGING TIMES

No.	ISO Code	Formula	Name of pollutant	Units of measurement	**Average over**	Expressed as	Relevant Directives

Under the column heading '***Average over***', default or recommended averaging times are given. These are:

- averaging time 1 hour (hourly data) for the pollutants SO_2, NO_2, O_3, CO, NO_X, HCHO, CS_2 and PAN (EoI codes 1, 2, 7, 9, 15, 44, 52, 60);
- averaging time 24 hours (daily data) for most of the pollutants;
- total monthly deposition (exposure time 1 month) for N and S wet deposition (EoI codes 62 and 63).

These time scales are in line with the provisions of the air quality Directives. The only exception is SO_2 for which the Directive 1999/30/EC foresees "*to record data on concentrations averaged over ten minutes for certain measuring stations*". This case however is specific and needs to be dealt with separately and outside the frame of the EoI Decision. It is pointed out again that the requirements of specific EU directives supersede those of the EoI.

To get the values for these recommended averaging times, it might be necessary to aggregate data as presented in example 1.3. In that case, the criteria on data capture described in Annex IV of Decision 2001/752/EC have to be fulfilled (see 4.1.1. and 4.1.2.).

Example 1.3

Some countries record raw data obtained by automatic monitors as half hour mean values. These data have to be used to calculate one hour mean values before transmitting them.

In the case of PM_{10}, 24 hour mean values are obtained if the gravimetric reference method described in EN12341 is used. These data can be transmitted. However, if automatic monitors (beta-absorption, TEOM) are used, raw data with a resolution of 30 minutes or one hour are usually available. These data can be aggregated to 24 hour mean values. If such monitors are used for measurements to check compliance with the limit values specified in 1999/30/EC, the correction factor described in Annex IX of the mentioned Directive should be applied to the 24 hour mean values before transferring the data. This factor ensures that results are equivalent to those that would have been achieved by using the reference method.

In footnote 3 of Section 3 of Annex I, 2001/752/EC, it is specified that values corresponding to other averaging times can also be transmitted.

Footnote 3: "Some measurement techniques involve sampling times from a few minutes up to several weeks. In such a case values with different averaging times differing from those listed in this column can be reported indicating the actual averaging period."

However, as a general rule, it is strongly recommended not to use averaging times other than those recommended unless there is no other possibility as in the case presented in example 1.4.

Example 1.4

Benzene is frequently measured using passive sampling. Diffusion samplers can be exposed over a period of one to several weeks. In such a case, all results of individual measurements shall be transmitted, indicating the sampling time.

In practice, averaging times below the recommended one should be avoided as far as possible as they would increase tremendously the amount of data to be transmitted with all the resulting consequences in terms of risks of incoherence and other problems.

1.3.4. EXPRESSED AS

No.	ISO Code	Formula	Name of pollutant	Units of measurement	Average over	**Expressed as**	Relevant Directives

- NO_X (code 15) is given as the sum of nitric oxide and nitrogen dioxide added as parts per billion and expressed as nitrogen dioxide in µg/m^3 as follows.

  NO [ppb] + NO_2 [ppb] → NO_X (as NO_2) [ppb] → NO_X (as NO_2) [µg/m³]

  The first step is the simple addition of NO and NO_2 in ppb. If the data is stored in µg/m³ the conversion to ppb has to be done beforehand (see 1.3.2.).

- The THC (NM) (code 45) concentration is given in C equivalents in µg/m^3.

- Strong Acidity (code 46) will be expressed as SO_2 equivalent.

- N and S deposition (codes 62 and 63) will be given as respectively N and S equivalent.

1.3.5. RELEVANT DIRECTIVES

No.	ISO Code	Formula	Name of pollutant	Units of measurement	Average over	Expressed as	**Relevant Directives**

Reference to the air quality Directives covering the pollutants are given under the heading '*Relevant Directives'.*
These Directives are:

- 80/779/EEC on air quality limit values and guide values for sulphur dioxide and suspended particulates
- 82/884/EEC on a limit value for lead in the air
- 85/203/EEC on air quality standards for nitrogen dioxide
- 89/427/EEC amending Directive 80/779/EEC
- 92/72/EEC on air pollution by ozone
- 96/62/EC on ambient air quality assessment and management (so-called framework Directive or FWD)
- 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in the ambient air (so-called first Daughter Directive or 1st DD)
- 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air (so-called second Daughter Directive or 2nd DD)

No reference is made to the third Daughter Directive relating to ozone in ambient air (2002/3/EC) as this Directive was still in the process of adoption at the time of the adoption of the EoI Decision. Adopted since then, it will become a routine part of the data delivery.

Also the fourth Daughter Directive on heavy metals (As, Cd, Ni and Hg) and PAH (with BaP as marker) is presently under preparation (see http://europa.eu.int/comm/environment/air).

1.4. DATA, CALCULATED OVER THE CALENDAR YEAR, TO BE TRANSMITTED TO THE COMMISSION

1.4.1. RAW DATA AND STATISTICS

"Member States shall send raw data or shall send raw data and statistics."

The Member States are free to send

- either raw data only corresponding to the recommended averaging time (see 1.3.3. above) and to the quality objectives (see Chapter 3 on Annex III). The statistics will then (on request of the Member State) be computed by the Commission in accordance with the criteria laid down in Annex IV of Decision 2001/752/EC (see 4.2.) and/or respectively those laid down in the relevant Directives.
- or to send both data and statistics calculated by the Member State.

The transmission of raw data is sufficient. In this case, the statistics will be computed by the Commission.

"For those Member States who transfer raw data and statistics the following statistics are required.

- For pollutants 1 to 61: the arithmetic mean, the median, the percentiles 98 (and 99,9 which may be transmitted on a voluntary basis for pollutants for which the mean is calculated over one hour) and the maximum calculated from raw data corresponding to the recommended averaging times …
- for pollutants 62 and 63: total monthly deposition, calculated from raw data corresponding to the recommended averaging times …"

The arithmetic mean is computed by dividing the sum of the individual measurement values by the number of values.

$$\overline{X} = \frac{\sum X_i}{n}$$

with X_i = the individual values (for recommended hourly or daily averaging times).
n = the total number of individual values.

The maximum is the highest value observed in the data series.

A percentile y basically says that for that percentage y of values, the data points are below

or equal to the resulting value. So if we calculate a percentile 50, 50 % of the data points are below or equal to that resulting value and 50 % are above that value. Similarly a percentile 98 says that 98 % of the data points are below or equal to that value and 2 % are above that value and the percentile 99,9 says that 99,9 % of the data points are below or equal to that value and 0,1 % are above that value.
The percentile 50 is also called the median.

The methodology to calculate a percentile y (50, 98 or 99,9) is given below:

All the values are listed in increasing order:

$$X_1 \leq X_2 \leq X_3 ..... \leq X_k \leq ..... \leq X_{N-1} \leq X_N$$

The y^{th} percentile is the concentration X_k, where the value of k is calculated by:

$$k = (q * N)$$

with *q* equal to *y*/100
N the number of values
the value of *(q * N)* being rounded off to the nearest whole number (,5 being rounded up - to the next superior unit).

Example 1.5

For daily data over one year (365 or 366 days), for the percentile 50 (or median) and the percentile 98

Number of valid data	*median*		*percentile 98*	
N	*q * N*	*k*	*q * N*	*k*
350	*175,0*	*175*	*343,00*	*343*
355	*177,5*	*178*	*347,90*	*348*
360	*180,0*	*180*	*352,80*	*353*
363	*181,5*	*182*	*355,74*	*356*
364	*182,0*	*182*	*356,72*	*357*
365	*182,5*	*183*	*357,70*	*358*
366	*183,0*	*183*	*358,68*	*359*

For hourly data over one year (8760 or 8784 hours), for the percentile 50 (or median), and the percentile 98 and the percentile 99,9

Number of valid data	*median*		*percentile 98*		*percentile 99,9*	
N	*q * N*	*k*	*q * N*	*k*	*q * N*	*k*
8500	*4250,0*	*4250*	*8330,00*	*8330*	*8491,50*	*8492*
8750	*4375,0*	*4375*	*8575,00*	*8575*	*8741,25*	*8741*
8759	*4379,5*	*4380*	*8583,82*	*8584*	*8750,24*	*8750*
8760	*4380,0*	*4380*	*8584,80*	*8585*	*8751,24*	*8751*
8772	*4386,0*	*4386*	*8596,56*	*8597*	*8763,23*	*8763*
8781	*4390,5*	*4391*	*8605,38*	*8605*	*8772,22*	*8772*
8784	*4392,0*	*4392*	*8608,32*	*8608*	*8775,22*	*8775*

In the Annex I.4 of Decision 2001/752/EC, it is specified that the statistics should be computed from values actually measured. However to be in line with the provisions of Annex III of the Decision, it is suggested to perform data treatment on data which are considered as valid according to the QA/QC procedures followed in the Member State (see Chapter 3.1.).

Criteria on data availability required for computing the statistics are expressed in Annex IV of the Decision (see Chapter 4.2.).

1.4.2. STANDARDISATION OF VOLUME

"All the results should be expressed at the following conditions of temperature and pressure: 293 K and 101,3 kPa, except for pollutants 62 and 63. For particle bound components, data for the year 2001 and onwards should be reported at ambient conditions."

The volume must be standardised for all gaseous pollutants to 293 K and 101,3 kPa. However, in contrast to the original version of the EoI (97/101/EC), data from particle bound pollutants should be reported at ambient conditions. This corresponds to the provisions of Directive 1999/30/EC. In order to avoid inconsistencies with the data transmitted to the Commission as part of the reporting requirements of the Directives 96/62/EC and 1999/30/EC, it is mandatory to follow that procedure for all data measured after 2000.

1.5. DATA TRANSMISSION TO THE COMMISSION

In order to keep the huge amount of data manageable, only certain data formats may be used for the transmission of data. These formats include:
- ISO 7168 version 2 - extended format,
- NASA-AMES 1001/1010 formats,
- DEM (Data Exchange Module) compatible format

The data can also be transferred as a database by using DEM provided on behalf of the Commission.

Each supplier of data is free to choose one of the mentioned formats or to use DEM.

More details on and examples of ISO 7168 and DEM compatible files for both measurement data and meta-information on the stations are given in annexes 1 and 2 of the present document.
Information on the NASA-AMES format can be found in the web site
http://www.nilu.no/projects/ccc/submission.html

About the use of DEM database we refer the reader to the website
http://etc-acc.eionet.eu.int/databases/dem.html

When suitable, these formats can also be used to submit the specific data required under the air quality Directives.

- Data will be officially submitted to the Commission in electronic files according to the administrative rules and procedures by October 1 of the following year at the latest. These files may also be transmitted in parallel to the European Topic Centre designated by the Commission for the task of collecting air quality data. Data not officially submitted to the Commission will not be taken into consideration.

- In order to insure that no data are 'lost' during transmission, the Commission will confirm receipt of the data and the number of stations and pollutants, as soon as possible after receiving them.

CHAPTER 2 INFORMATION CONCERNING NETWORKS, STATIONS AND MEASUREMENT TECHNIQUES

Annex II of Decision 2001/752/EC is divided into 3 parts (sections 1**,** 2**,** and 3 below), on information concerning:

- Networks;
- Stations;
- Measurement configurations.

"Member States shall report on the following points: I.1, I.4.1 to I.4.4, I.5, II.1.1, II.1.4, II.1.8, II.1.10, II.1.11 and II.2.1. To the extent possible, as much information as feasible should be supplied on the other points:"

In total, there are 31 items of information to be given. Of these, the following 12 items, particularly important for identifying the data series and also easily available, are compulsory:

I.1	Name of network
I.4.1	Name of body responsible for the management of the network
I.4.2	Name of person responsible
I.4.3	Address of responsible body
I.4.4	Telephone and fax number
I.5	Time reference basis of the data series
II.1.1	Name of the station
II.1.4	Station code under the present Decision
II.1.8	Geographical coordinates of the station
II.1.10	List of pollutants measured
II.1.11	List of meteorological parameters measured
II.2.1	Type of area where the station is located

- As much as possible of the remaining information items listed in Annex II should be reported. Guidance on the reporting of these items is also given below.
- Information can be reported in the national language as far as it does meet the rules of the transmission standard and format used in particular with respect to accentuated and other special characters.
- When pre-defined lists are established, information can be transmitted either by definition text(s) or by associated code(s). Some of the associated codes -those that are a power of 2- can be summed up in order to report more than one item. See Annex 1 and 2 for more details.
- For transmission formats, refer to 2.4 as well as to annexes 1 and 2 of the present document.

In the following text, the figures between square brackets [ ] refer to the number indicated in Annex II of Decision 2001/752/EC.

2.1. [I] INFORMATION CONCERNING NETWORKS

2.1.1 [I.1] NAME OF THE NETWORK

Mandatory

The official, commonly used and unambiguous name of the network. Ideally it is expected to remain consistent in the future.

Example 2.1

The Federal Land Northrhine-Westfalia is one of the Länder in Germany which operates a monitoring network. The name of this network is the name of the Land i.e. 'Northrhine-Westfalia'.

The association AERFOM is one the associations operating a monitoring network in France. The administrative coverage of this association is the region Lorraine, departments of Meurthe-et-Moselle and Moselle and the communes of Longwy, Metz, Pont-à-Mousson and Thionville. The name of the network is 'association–AERFOM'.

2.1.2. [I.2] ABBREVIATION

The official, commonly used, unambiguous abbreviation or code of the network if any. Ideally it is expected to remain consistent in the future.

Example 2.2

For Germany the abbreviation 'NW' of the Federal Land Northrhine-Westfalia is used as abbreviation/code for the network.

In France, the abbreviation and the name of the association are identical. The abbreviation for the network operated by the association AERFOM is then 'AERFOM'.

Although [I.2] is not compulsory, it is strongly suggested to also indicate the abbreviation or the code of the network in order to avoid any confusion which may arise from using the name of the network only.

2.1.3. [I.3] TYPE OF NETWORK

The network should be classified according to its geographical extent and its organization. Levels to be considered are:

Associated code	Field value	Description of level
1	Local	designed/organised for the observation of single emission sources
2	Urban	designed/organised at the level of a town, city, agglomeration and/or conurbation (see 2.2.1.)
3	Regional	designed/organised at the level of an administrative subdivision of a Member State (province, county, department …)
4	National	designed/organised at the level of the whole Member State

The various types of networks may include various types of stations located in different types of areas (see [II.2.1] and [II.2.2] under 2.2.2.).

Stations belonging to one network can also be part of other networks (for example, international networks).

Example 2.3

In Germany

NW network	*regional level*
Berlin network	*urban level*
Network of the Federal Environmental Agency	*national level*

In France

AIRPARIF (Paris Ile de France)	*regional level*
AERFOM	*regional level*

2.1.4. [I.4] BODY RESPONSIBLE FOR NETWORK MANAGEMENT

[I.4.1] Name

Mandatory

The official and complete name of the body (institution, company …) in charge of managing the network. If no difference is made between the network and the body managing it, the reported name will be the same as the one reported under 2.1.1.

[I.4.2] Name of person responsible

Mandatory

Under this heading, the name of the person who in the organisational chart of the body is in charge for the monitoring (head of monitoring department) should be reported. It should not be confused with the person in charge for data delivery.

In any case, the institution providing the European Commission with data will be contacted first in case of further questions arising. In a federal Member State like Germany or Austria, the Environmental Agency UBA, its National Reference Centre, would be contacted.

[I.4.3] Address

Mandatory

Unambiguous and complete address including ZIP code.

[I.4.4] Telephone and fax numbers

Mandatory

Complete numbers including country and area codes.

[I.4.5] E-mail address

E-mail address of the person responsible for the management of the network or at least the e-mail address of the body itself.

It is recommended to use a generic and not personalised e-mail address to which relevant persons have access, e.g. airquality@xyz.ab.

[I.4.6] Web site address

2.1.5. [I.5] TIME REFERENCE BASIS (UTC, LOCAL)

Mandatory

Indicate the type of time reference basis:

Associated code	Definition text
1	UTC
2	local

UTC or Coordinated Universal Time is the international time standard. It is the current term for what was commonly referred to as Greenwich Meridian Time (GMT). Zero hours UTC is midnight in Greenwich England (zero longitudinal meridian).

The local time, expressed as UTC +/– x hour(s), is defined by national rules and can vary also between the seasons (winter and summer time).

It is strongly recommended not to use the daylight saving time for the summer months.

2.2. [II] INFORMATION CONCERNING STATIONS

2.2.1. [II.1] GENERAL INFORMATION

[II.1.1] Name of the station

Mandatory

Under this heading it is asked to identify the station. As far as possible this identification should be unambiguous and remain unchanged over time.
This can be achieved by using names, nicknames, location and/or address.

Example 2.4

inadequate	*adequate*
Centre	*Norwich, Centre*
A3 Roadside	*London, A3 Roadside*
Mitte	*Bremen, Mitte*
1° étage	*Tour Eiffel, 1°étage, Paris*
16ème	*Paris 16ème*

[II.1.2] Name of the town/city/agglomeration or other location name

Under this heading it is asked to give more information on the location of the station at an upper consistent geographical level: town, city, agglomeration and other location name.

In the case of rural stations (see [II.2.1] under 2.2.2.), the name of the area that the station is representing in terms of air quality should be indicated.

As far as urban and suburban stations (see [II.2.1] under 2.2.2.) are concerned, some general definitions and considerations are given in the following box.

Definitions

- *a town is defined as a compactly settled area as distinguished from surrounding rural territory; it is usually larger than a village but smaller than a city.*
- *a city is an inhabited place of greater size, population, or importance than a town or a village; it is characterized in some countries by a status of episcopal see.*
- *an agglomeration comprises a city or town proper and the suburban fringe or thickly settled territory lying outside, but adjacent to, its boundaries. A single large urban agglomeration may comprise several cities or towns and their suburban. There is no standard and commonly accepted criteria (spatial, functional and/or demographic) which allow to geographically define the territory and the limits/borders of an agglomeration.*
- *the definition of agglomeration given in the framework Directive on air quality (96/62/EC) is not incompatible with the definition given above. As it is understandable in the frame of such a Directive, the definition insists on the demographic aspect. For memory this last definition is: "'agglomeration' shall mean a zone with a population concentration of 250 000 inhabitants or, where the population concentration is of 250 000 inhabitants or less, a population density per km^2 which for the Member States justifies the need for ambient air quality to be assessed and managed."*
- *the term conurbation is close to the idea of agglomeration: it is defined as an aggregation or continuous network of urban communities. Here however, the original cities or towns were located rather far from each other. They have aggregated or agglomerated under the pressure of their own development mainly along the main access roads linking them. A typical example is the conurbation of Lille-Roubaix-Tourcoing.*

For stations in agglomerations indicate if applicable, both the name of the town/city and the agglomeration/conurbation to which the stations belong. Please note that, in this case, there is no reference to the representativeness of the station in terms of air quality.

At the moment, no reference to the zones as defined for the implementation of the framework Directive has to be made. Details on the zones as defined under the framework Directive can be found in the "Guideline referring to Commission Decision 2001/839/EC laying down a questionnaire to be used for annual reporting on ambient air quality under Directives 96/62/EC and 1999/30/EC" (http://europa.eu.int/comm/environment/air/guideline_on_questionnaire.pdf).

Example 2.5

inadequate	*adequate*
Chelsea	*Chelsea, Greater London*
Uccle	*Uccle, Bruxelles*
Montreuil	*Montreuil, Ile-de-France*

[II.1.3] National and/or local reference number or code

The number or code of the station used by the **national** authorities. The code could be a

nationally based code or it could be a locally based code (for example used within the network) depending on the status of the station. It must be clear however that in both cases the number or code must be unambiguous even in the future.

Although [II.1.3] is not compulsory, it is strongly suggested to also report this code in order to avoid any confusion that may arise from using the name of the station only.

[II.1.4] Station code to be used under the present Decision

Mandatory

The Commission provides a coding system within which all stations reported under the present Decision has to be given a unique code. It consists of 7 figures: 2 for the Member State and 5 for the national coding (see also the "Guideline referring to Commission Decision 2001/839/EC laying down a questionnaire to be used for annual reporting on ambient air quality under Directives 96/62/EC and 1999/30/EC" http://europa.eu.int/comm/environment/air/guideline_on_questionnaire.pdf).

Example 2.6

Germany: DEHH007 = DE for Germany, HH for Hamburg, 007 as unique code of the station.

This code will be used as unambiguous identifier of the station. As this code shall be used to guarantee data series continuity, the network/station owner should consider the station characteristics and their possible modification over time, and, based upon its own expertise, change the code of the station to a new one, when it is clear that the modification is large enough that the station does not represent the same environment anymore and thus that the time series is broken. The Commission must be informed when a station is given a new code for such reasons.

[II.1.5] Name of the technical body responsible for the station

Official name of the body which owns the station. This name has to be given if it is different from the body responsible for the network (see [I.4.1] under 2.1.4.).

[II.1.6] Bodies or programmes to which data are reported

All the bodies to which data from the station are transmitted should be indicated, from the local level and up to national and international level (e.g. European Commission, EEA, EMEP, OECD, GEMS, WHO,....). This information might be used by the Commission in the future to transfer the data to the concerned international bodies so discharging the Member States of doing it.

[II.1.7] Monitoring objectives

The monitoring objectives have to be indicated. To this end, refer to one or more of the objectives presented in the following table:

Associated value	Definition text	Description
1	EU	compliance monitoring for EU Directives including assessment of on-going abatement programmes and/or for the prediction of planned abatement actions
2	national	compliance monitoring for national legislation (in case that a Member State decides not to use all monitoring sites for EU compliance monitoring)
4	exposure	exposure assessment (population and/or ecosystems and/or materials)
8	specific	monitoring specific industries/power plants
16	trend	trend analysis
32	research	research
64	international	international programmes (EMEP, GAW …)
128	other	other (to be specified in comment field)

In case a monitoring station is used for compliance and/or exposure assessment, indication should also be given on the target (human health, ecosystem/vegetation, materials) in comment field.

[II.1.8] Geographical coordinates

Mandatory

Geographical coordinates will be reported in line with ISO 6709: geographical longitude and latitude, and geodesic altitude.
The longitude and latitude will be expressed in degree, minute, second and second decimals.

No other projection or coordinate system will be accepted.

Example 2.7

The coordinates of the station Montreuil (France) are 48°51'43'' North and 02°26'49'' East.

[II.1.9] NUTS level IV

At least the NUTS IV code of the area where the station is located will be reported. If the NUTS code IV does not exist, the NUTS V will be given instead. If none of NUTS IV and V exists, NUTS III will be given.
Refer to EUROSTAT for more details.
http://europa.eu.int/comm/eurostat/ramon/nuts/home_regions_en.html

[II.1.10] Pollutants measured

Mandatory

Indicate the pollutants measured at the station using the names and/or the codes (EoI or ISO/pseudo ISO) (see 1.3.1.).

[II.1.11] Meteorological parameters measured

Mandatory

Indicate the name and/or the code (pseudo EoI -as there is no official code in the EoI- or ISO) of the meteorological parameters that are measured.

pseudo EoI code	ISO code	meteorological parameter	pseudo EoI code	ISO code	meteorological parameter
1055	55	absolute humidity	1052	52	wind direction
1056	56	mixing height	1051	51	wind velocity
1060	60	precipitation	1059	59	duration of sunlight
1053	53	pressure	1079	71	direct solar IR radiation
1058	58	relative humidity	1072	72	direct solar UV radiation
1054	54	temperature	1077	77	direct solar visible radiation
1064	64	volume of air	1073	73	direct solar radiation
1062	62	wind component west-east	1074	74	global radiation
1061	61	wind component south-north	1075	75	diffused radiation
1063	63	wind component vertical	1076	76	reflected radiation
		other			**other**
1049	49	conductivity	1050	50	pH

Example 2.8

Precipitation can be reported with either the ISO code '60' or the pseudo EoI code '1060' depending on the format used for transferring information.

[II.1.12] Other relevant information

Example 2.9

-prevailing wind direction.
-ratio between distance from and height of closest obstacles.
-organisation of measurement campaign.
-station has moved from … to … on <DDMMYYYY> for the following reason …. Data series considered as continuous/discontinuous.
-pollutants/meteorological parameters measured at the station other than those referred to in [II.1.10] and [II.1.11] are …
- …

Under this heading it is also suggested to describe geographically the monitoring site by giving one or more of the following characteristics:

Associated code	Definition text
1	mountain
2	valley
4	seaside
8	lakeside
16	plain
32	hilly terrain

2.2.2. [II.2] CLASSIFICATION OF STATIONS

Stations should be classified according to the area type where they are located, and according to what type of sources dominates the air pollution levels at the station (see flowcharts in annex 3).

The classification scheme has three levels which are not hierarchically subordinated:

Level 1 Types of areas.
Level 2 Types of stations (based on pollutant sources).
Level 3 Additional meta-data.
This level is not for classification of stations *per se*, but should include data and information which can be used when making comparisons between stations, and assessments of air quality based upon the data from the stations.

[II.2.1] Type of area

Mandatory

The following types of area have been defined for the purpose of the EoI Decision, the 'rural' area type being further sub-classified ([II.2.3.5]):

Associated code		Definition text		Definition code
1		urban		U
2		suburban		S
3		rural		R
	31		Near-city area	R NCA
	32		Regional area	R REG
	33		Remote area	R REM

The box below gives elements to define the area types.

Definitions

Urban area (U)
Continuously built-up urban area meaning complete (or at least highly predominant) building-up of the street front side by buildings with at least two floors or large detached buildings with at least two floors.
With the exception of city parks, the built-up area is not mixed with non-urbanised areas.

Suburban area (S)
Largely built-up urban area. 'Largely built-up' means contiguous settlement of detached buildings of any size with a building density less than for 'continuously built-up' area.
The built-up area is mixed with non-urbanised areas (e.g. agricultural, lakes, woods).
It must also be noted that 'suburban' as defined here has a different meaning than in every day English i.e. 'an outlying part of a city or town' suggesting that a suburban area is always associated to an urban area. In our context, a suburban area can be suburban on its own without any urban part.

Rural area (R)
All areas that do not fulfil the criteria for urban or suburban areas, are defined as rural areas.

Rural areas can be subdivided further, based upon the distance to major sources or source areas:
- *Near-city area (R NCA): area within 10 km from the border of an urban or suburban area.*
- *Regional area (R REG): 10-50 km from major sources/source areas*
- *Remote area (R REM): > 50 km from major sources/source areas.*

The distances given here are only indicative. Border in this case should be understood as the factual delimitation of the built-up area, not the administrative border.

These definitions are based on the distribution/density of buildings. However other elements such as population density, size of the area and land-use information can be taken into consideration when classifying the area in particular for 'limit' cases.

The different area types are mutually exclusive. An area can not be of two or more types.

Example 2.10

See annex 4 (maps)

[II.2.2] Type of station in relation to dominant emission sources

The station type is defined in relation to the dominant emission sources influencing the air pollutant concentrations at the station. The following types of stations have been defined for the purpose of the EoI Decision:

Associated code	Definition text	Definition code
1	traffic	T
2	industrial	I
3	background	B

The box below gives basic elements to define the station type.

Definitions

Traffic station (T)
Located such that its pollution level is determined predominantly by the emissions from nearby traffic (roads, motorways, highways).

Industrial station (I)
Located such that its pollution level is influenced predominantly by emissions from nearby single industrial sources or industrial areas with many sources. Industry source is here taken in its wide meaning including sources like power generation, incinerators and waste treatment plants.

Background station (B)
Located such that its pollution level is not influenced significantly by any single source or street, but rather by the integrated contribution from all sources upwind of the station (e.g. by all traffic, combustion sources etc. upwind of the station in a city, or by all upwind source areas (cities, industrial areas) in a rural area).

It must be kept in mind that a station can be classified differently for different pollutants: one could end up with a station classified as 1/2/3 or TIB when considering the different pollutants - although this would be suspicious. As far as possible and in addition to the general type applying to the station as a whole, it is asked to classify the station as 1 (T), 2 (I) or 3 (B) for each of the different pollutants that are measured at the station (at least for the pollutants covered by air quality Directives).
Further details on location criteria can be found in the air quality Directives. Also refer to the Technical Report n° 12 of the European Environment Agency "Criteria for EUROAIRNET - The EEA Air Quality Monitoring and Information Network" (June 1999 - http://reports.eea.eu.int/TEC12/en/tech12.pdf).

The different station types are mutually exclusive as they reflect the influence of the predominant or prevailing emissions.

In principle, any of the 3 station types T/I/B can be located in any of the area types defined in [II.2.1] (Urban, Suburban, Rural with its subclasses). In particular, a "background" station can be located in an urban area ("urban background"), or in a suburban or rural (near-city, regional, or remote) area. However, some combinations are less probable, such as an industrial or traffic station in a remote area.

[II.2.3] Additional information about the stations

For all stations

- [II.2.3.1] Representativeness expressed by
  - [II.2.3.1.1] the length (in km) of the street/road that the station represents (in case of traffic station). Representativeness will be reported according to the following classes:

Associated code	Definition text
1	< 1 km
2	1 – 10 km
3	> 10 km

or

  - [II.2.3.1.2] the radius (in km) of the area that the station represents (for all other station types). Representativeness will be reported according to the following classes:

Associated code	Definition text
1	< 1 km
2	1 – 10 km
3	10 – 50 km
4	> 50 km

- [II.2.3.2] Population of the town/city in thousand inhabitants (not applicable for rural stations).

For traffic stations [II.2.3.3]
- [II.2.3.3.1] the assessed traffic volume expressed by the annual average daily traffic (in thousand vehicles per day).
- [II.2.3.3.2] the distance from kerb (in meters),
- [II.2.3.3.3] the heavy-duty fraction of traffic expressed in percentage of the average daily traffic,
- [II.2.3.3.4] the average traffic speed (in km per hour),
- [II.2.3.3.5] the distance between and the height of building facades in case of canyon streets expressed as a ratio.
- [II.2.3.3.6] the width (in meters) of the street/road in case of non canyon street.

For industrial stations [II.2.3.4]
[II.2.3.4.1] identification of the type of industry(ies) using the nomenclature of air pollution-generating activities.
The CORINAIR Inventory recognises 11 main source sectors as agreed with EMEP. These sectors are shown in the table below, those of interest for industrial stations being highlighted:

Associated codes	SNAP code	Sector
1	**01**	**Public power, cogeneration and district heating plants**
2	02	Commercial, institutional and residential combustion plants
4	**03**	**Industrial combustion**
8	**04**	**Production processes**
16	**05**	**Extraction and distribution of fossil fuels**
32	**06**	**Solvent use**
64	07	Road transport
128	08	Other mobile sources and machinery
256	**09**	**Waste treatment and disposal**
512	10	Agriculture
1024	11	Nature

More details on SNAP codes and activities can be found in:
http://reports.eea.eu.int/technical_report_2001_3/en.

- [II.2.3.4.2] the distance (in km) to source/source area.

For rural background stations [II.2.3.5]
- [II.2.3.5] identification of the sub-category: see [II.2.1] under 2.2.2.: near-city, regional and remote area.

2.3. [III] INFORMATION CONCERNING MEASUREMENT CONFIGURATION BY COMPOUND

2.3.1. [III.1] EQUIPMENT

[III.1.1] Name

Name and manufacturer of the measurement device.

[III.1.2] Analytical principle or measurement method

Name of the method used for measuring the pollutant concentration.

Example 2.11

for SO_2	*UV fluorescence*
for NO_2	*chemiluminescence*
for lead	*atomic absorption spectroscopy*
for CO	*non-dispersive infra-red spectrometry*
for benzene	*gas chromatograph*
for ozone	*UV photometry*

2.3.2. [III.2] CHARACTERISTICS OF SAMPLING

[III.2.1] location of sampling point

Describe the location of sampling point by giving one or more of the following characteristics:

Associated code	Definition text
1	façade of building
2	pavement
4	kerbside
8	courtyard
16	free air flow/large flat area
32	roof
64	park

[III.2.2] height of sampling point

Indicate the height at which the sampling point is located (in meters) from the ground level.

[III.2.3] result-integrating time

This corresponds to the averaging time or reference time period for the data, each data being calculated from 1 or more basic data corresponding to the sampling time.

[III.2.4] sampling time

Time gap or interval (in minutes or otherwise specified in the format used) corresponding to a unique sampling.

Example 2.12

Sampling time is 10 minutes and result integrating time is half-hour (calculated from 3 basic data).

2.4. TRANSMISSION OF META-INFORMATION

The meta-information can be transferred by using DEM. They can also be transmitted in a DEM compatible format presented in annex 1 of the present document.

The ISO format can also be used although it does not fully comply with the requirements of the EoI Decision and has therefore to be complemented in order to fulfil the needs. More details, as well as an example of files, are presented in annex 2.

- Information will be submitted to the Commission in electronic files according to the administrative rules and procedures. These files may also be transmitted in parallel to the European Thematic Centre designated by the Commission. Information not officially submitted to the Commission will not be taken into consideration.

- In order to insure that no information is 'lost' during transmission, the Commission will confirm receipt of the information as soon as possible after receiving it.

CHAPTER 3 DATA VALIDATION PROCEDURE AND QUALITY ASSURANCE

3.1. DATA VALIDITY

"All transmitted data are deemed to be valid."

All data -raw data and statistics- transmitted to the Commission are considered to have undergone the validation and quality assurance/quality control procedures implemented by the Member States and so to be valid.

There are two reasons why data might not have been transmitted to the Commission:

- they are valid and have simply not been sent;
- they are invalid or non-existent.

From the rule, it is not possible to differentiate those cases. It is therefore strongly suggested to identify invalid or non validated data either by using flags or dummy values according to the transmission format which is used.

3.2. QUALITY ASSURANCE PROCEDURE

"It is the responsibility of the Member States to ensure that a quality assurance procedure is in place, which meets in general the objectives of this Decision and in particular the objectives of the relevant Directives."

The Framework Directive 96/62/EC states *inter alia* in its article 3 that the Member States shall designate the competent authorities and bodies responsible for:

"…..

- approval of the measuring devices (methods, equipment, networks, laboratories),
- ensuring accuracy of measurement by measuring devices and checking the maintenance of such accuracy by those devices, in particular by internal quality controls carried out in accordance, inter alia, with the requirements of European quality assurance standards,

….."

In the Daughter Directives, reference methods for the analysis of concerned pollutants are provided, which Member States are required to use, or at least any other method which they can demonstrate gives results equivalent to the reference method.

Until recently there was no official description of the requirements of European quality

assurance standards and information about quality control and quality assurance could only be found in the Technical Report n° 12 of the European Environment Agency “Criteria for EUROAIRNET – The EEA Air Quality Monitoring and Information Network” in section 4.5 relating to QA/QC (http://reports.eea.eu.int/TEC12/en/tech12.pdf).

However the Ad-Hoc Working Group of CEN Technical Committee 264 in cooperation with the European Commission's Joint Research Centre, Ispra, Italy, has recently issued the draft technical report “*An Approach to Uncertainty Estimation for Ambient-Air Measurement Methods*”, that gives useful information and a methodology on how to meet quality assurance requirements.
The report points out that compliance to article 3 of the EC Framework Directive of organisations in charge of the measurements can only be achieved by meeting the ISO/IEC FDIS 17025 Standard (previously EN-4501).

The JRC-Ispra also carries out an inter-comparison programme of national primary standards to which participation by Member States should be highly recommended. From this exercise, it appears that organisations that meet the ISO/IEC FDIS 17025 Standard show performances highly better than the others.

CHAPTER 4 CRITERIA FOR THE AGGREGATION OF DATA AND THE CALCULATION OF STATISTICAL PARAMETERS

Annex IV of Decision 2001/752/EC lists the fundamental criteria for the aggregation of data and for the calculation of statistical parameters.

"These criteria mainly concern the data capture"

While the calculation of certain parameters is described in Annex I of the Decision, Annex IV concerns data capture that has to be checked before calculating such parameters. These criteria do not always correspond to those applied in the air quality Directives. More information on the requirements of the Directive is given in annex 5 of the present document.

Data capture is the proportion (%) of a regarded period, to which valid values can be assigned. The extreme values of data capture are 0 % (no valid data) and 100 % (no missing value either not measured or not valid). It is calculated as ratio of the valid values measured during a certain period and the maximum of values that might have been measured during that period.

Example 4.1

The sampling time for a certain pollutant is 10 minutes. During one hour a maximum of six values can be obtained.

number of valid values:	*0*	*1*	*2*	*3*	*4*	*5*	*6*
data capture (%):	*0*	*16,7*	*33,3*	*50*	*66,7*	*83,3*	*100*

"If criteria for the aggregation of data and the calculation of statistical parameters have not been laid down in EU Directives the following applies:"

If the data capture criteria of the relevant Directive differ from those listed in the Decision, the criteria of the Directive shall be applied. That applies, even if the criteria from Annex IV are more stringent. Criteria of relevant Directives will be discussed in annex 5 of this document. In addition to data capture problems, statistical parameters not described in Annex I but specified in relevant Directives are discussed there.

4.1. CRITERIA FOR THE AGGREGATION OF DATA

"(a) Aggregation of data
The criteria for the calculation of one-hour and 24-hour values from data with a smaller averaging time are"

Averaging time in this context means either the basic sampling time of the measurement technique or any smaller averaging time of the basic data.

4.1.1. CALCULATION OF ONE-HOUR VALUES

The examples discussed here are based on different averaging (or sampling) times.

"for one-hour values: Minimum data capture 75 %,"

The following table lists the minimum number of values for the calculation of the one-hour values in relation to the averaging time (representing at least 75 % data capture).

sampling time (minutes)	maximum number of values per hour	minimum number of values for the calculation of the one-hour values
3'	20	15
5'	12	9
6'	10	8
10'	6	5
30'	2	2

Example 4.2

30' values							*calculated 1hr value*	
	40	*41*					***41***	*(40,5)*
	36	*-*					*-*	
10' values							*calculated 1hr value*	
	57	*57*	*56*	*57*	*55*	*53*	***56***	*(55,8)*
	54	*54*	*55*	*56*	*-*	*54*	***55***	*(54,6)*
	66	*80*	*77*	*-*	*71*	*-*	***-***	

4.1.2. CALCULATION OF 24-HOUR VALUES

The calculation of 24-hour values is based on one-hour values, either sampled or calculated according to the mechanism described above.

"for 24-hour values: At least 13 one-hour values available, not more than six successive one-hour values missing."

There are two criteria for the calculation of 24-hour values: an overall data capture criterion and a data capture gap criterion, a data capture gap being defined as a time interval with missing data only (either not measured or not valid).

For the calculation of 24-hour values at least 13 one-hour values (54,2 %) are necessary (minimum data capture) with a maximum of six successive missing values only (maximum data capture gap).
Thus in the case of only 13 valid one-hour values there is a maximum of one gap of six and one gap of five successive missing values allowed. Of course, there can be more than two data capture gaps provided the total number of missing values does not exceed 11.

These EoI criteria for the aggregation of data must be considered as the minimum requirement. It has to be kept in mind that they do not guarantee the representativeness of the calculated daily values as shown in example 4.3.

Example 4.3

The example is based on hourly data for ozone (expressed in µg/m³). The case C1 shows the aggregated one-hour values for that day without decimals, rounded up according to usual rules. Cases 2 to 9 show the same values like in case 1, but with more missing values.

Case / Hour	1	2	3	4	5	6	7	8
1	-	-	-	-	-	-	-	-
2	54	54	54	54	54	-	54	54
3	36	36	-	36	36	36	36	36
4	28	28	28	28	-	-	28	28
5	2	2	-	2	-	-	-	2
6	1	1	1	1	-	-	-	1
7	2	2	-	2	-	-	-	2
8	9	9	9	9	-	-	-	9
9	21	21	-	21	-	-	-	21
10	42	42	42	42	42	42	-	42
11	80	80	-	80	80	-	-	80
12	150	150	150	-	150	150	150	-
13	171	171	-	-	171	171	171	-
14	183	183	183	183	183	183	183	-
15	197	-	-	-	197	197	197	-
16	245	-	245	-	245	245	245	-
17	287	-	-	-	287	287	287	-
18	279	-	279	-	279	279	279	-
19	257	-	-	-	257	257	257	-
20	213	-	213	-	213	213	213	-
21	170	170	-	170	170	170	170	-
22	108	108	108	-	108	108	108	108
23	77	77	-	-	77	-	77	77
24	84	84	84	84	84	-	84	84
n valid values	23	17	12	13	17	13	16	13
max. gap	1	6	1	6	6	6	7	10
average value	117	72	116	55	155	180	159	42
EoI 24-hour value	117	72	-	55	155	180	-	-

This example demonstrates that, even in the case that all criteria for the calculation of 24-hour values are fulfilled, a wide range of average concentrations is calculated, dependent on the temporal distribution of missing values. The possible "error" is larger for pollutants with a significant daily variation and for longer periods of (according to the definition above up to six successive) missing values.

Some measuring techniques give result for three-hour sampling. Although not explicitely covered in Annex IV of Decision 2001/752/EC, equivalent criteria will be

used when computing 24-hour values from these three-hour values. In this case the criteria become:

- data capture: at least 5 valid data out of 8.
- data capture gap: not more than 2 consecutive three-hour values missing.

4.2. CRITERIA FOR THE CALCULATION OF STATISTICAL PARAMETERS

"(b) Calculation of statistical parameters"

Annex IV of 2001/752/EC defines different criteria for, on the one hand, mean and median and, on the other hand, for (higher) percentiles and maximum. In addition to these criteria, a ratio between data capture in winter and data capture in summer is defined.
Statistical parameters are calculated for the period of one year. Their calculation is described in Annex I of 2001/752/EC (see 1.4.).

4.2.1. CALCULATION OF MEAN AND MEDIAN

The mean in this context is the arithmetic mean value. The median is the percentile 50. But since the percentile 50 is – like the mean – statistically more stable, the minimum data capture is – differing from the higher percentiles – only 50 %.

"for the mean and the median: minimum data capture 50 %,"

The minimum numbers of values necessary for calculating the mean and the median are shown in example 4.4 for different averaging or aggregating times of the basic data.

Example 4.4

Numbers are given for the whole year (365 days, 8760 hours) and for the winter (182 days, 4368 hours). The numbers in brackets are given for leap years with 366 days (8784 hours) and winters including a leap year's February (183 days, 4392 hours).

basic data (unit of time)	minimum number of values for the calculation of the mean and the median (whole year)		minimum number of values for the calculation of the mean and the median (winter)	
half hour	8760	(8784)	4368	(4392)
one hour	4380	(4392)	2184	(2196)
three hours	1460	(1464)	728	(732)
one day	183	(183)	91	(92)

4.2.2. CALCULATION OF (HIGHER) PERCENTILES AND MAXIMUM

The calculation of parameters with a lower statistical stability requires a higher data capture. The minimum data capture is defined as 75 %.

"for the percentiles 98, 99,9 and the maximum: minimum data capture 75 %."

The minimum numbers of values necessary for these percentiles and the maximum are shown in example 4.5 for different averaging or aggregating times of the basic data.

Example 4.5

Numbers are given for the whole year (365 days, 8760 hours). The numbers in brackets are given for leap years with 366 days (8784 hours).

basic data (unit of time)	***Minimum number of values for the calculation of the (higher) percentiles and the maximum***	
half hour	*13140*	*(13176)*
one hour	*6570*	*(6588)*
three hours	*2190*	*(2196)*
one day	*274*	*(275)*

4.2.3. MINIMUM DATA CAPTURE REQUIREMENT IN RELATION TO THE SEASONS

To avoid the calculation of statistical parameters on the basis of data with an uneven distribution of missing values the following criterion has to be fulfilled in any case. The possible "error" is larger for pollutants with a significant yearly variation. This criterion ensures, that none of the two main seasons (winter and summer) is overestimated. For that reason the ratio has to be checked winter by summer and summer by winter.

"The ratio between the number of valid data for the two seasons of the year considered cannot be greater than 2, the two seasons being winter (from January to March inclusive and from October to December inclusive) and summer (from April to September inclusive)."

The following table shows the defined seasons and the maximum possible values for each period, where winter consists of two parts. Numbers in brackets are given for leap years with 29 days in February.

month		**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**
season		**Winter**			**Summer**						**Winter**		
basic data	half hour	4320	(4368)		8784						4416		
	one hour	2160	(2184)		4392						2208		
	three hours	720	(728)		1464						736		
	24 hours	90	(91)		183						92		

It is obvious that, if the data capture is 100 %, the ratio between the two seasons is approximately 1.

Example 4.6

The example is valid for non-leap years, based on one-hour values.
Case 1 shows the case that all one-hourly data was available and valid. For case 2 the ratio is greater than 2. Case 3 fulfils all necessary criteria for the calculation of the parameters. For cases 4 and 5 the ratio criterion is fulfilled and the data capture is sufficient for the calculation of mean and median, but not for the higher percentiles and for the maximum. Case 6 fulfils the ratio criterion, but misses the data capture criterion even for the calculation of mean and median.

Case	***1***	***2***	***3***	***4***	***5***	***6***
valid data winter	*4368*	*4368*	*4368*	*3000*	*1500*	*1500*
valid data summer	*4392*	*2000*	*3000*	*3000*	*3000*	*1500*
ratio winter/summer	*0,99*	*2,18*	*1,46*	*1,00*	*0,50*	*1,00*
ratio summer/winter	*1,01*	*0,46*	*0,69*	*1,00*	*2,00*	*1,00*
data capture (%)	*100*	*73*	*84*	*68*	*51*	*34*
Calculation possible for:						
mean and median	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*No*
(higher) percentiles and maximum	*Yes*	*No*	*Yes*	*No*	*No*	*No*

ANNEX 1 DEM COMPATIBLE FORMAT

This annex aims at illustrating the use of DEM compatible formats and at providing guidelines. In practice, technical details have to be discussed and fixed together with the Member States who intend to use it.

The Commission provides a simple file format - developed and constantly updated by the ETC-ACC -, specially intended to be used in conjunction with DEM for transfer of raw air quality data and meta information. The description of the file format is taken from the DEM manual, suitably adapted to the changes that occurred in the EoI annexes in the meantime. Version 5.0 of the DEM will give regard to Decision 2001/752/EC, i.e. the revised EoI Annexes. It will be available by 1 July 2002.

A.1.1. AIR QUALITY DATA

The DEM compatible format for raw air quality data is a simple ASCII file (comma separated) with a header.

```
COMPONENT <component code>, <averaging time>
STATION <station code>
<Date_time1>,<value1>
<Date_time2>,<value2>
...
<Date_timeN>,<valueN>
STATION <station code>
<Date_time1>,<value1>
<Date_time2>,<value2>
...
<Date_timeN>,<valueN>
STATION <station code>
<Date_time1>,<value1>
<Date_time2>,<value2>
...
<Date_timeN>,<valueN>
```

The two mandatory keywords COMPONENT and STATION allow to identify
- the pollutant and the averaging time (hour, hour8 and day)
- the station (station code)

The general rules are:
- The file can contain only data for one component declared with the keyword COMPONENT, but can contain data for several stations each of them being declared

with the keyword STATION.
- The station codes used must be exactly the same as those registered in the mark file.
- The different fields are separated by commas. If a value is not an integer, then the decimal point is used.
- The format of date, time is “YYYYMMDD HH:MM”.

An example is given below

```
COMPONENT Ozone, hour
STATION DEBW001
19960101 00:00, 10
19960101 01:00, 11
19960101 02:00, 12
19960101 03:00, 13
19960101 04:00, 94
19960101 05:00, 14
19960101 06:00, 17
19960101 07:00, 10
19960101 08:00, 11
19960101 09:00, 12
19960101 10:00, 13
19960101 11:00, 94
19960101 12:00, 14
19960101 13:00, 10
19960101 14:00, 11
19960101 15:00, 12
19960101 16:00, 13
19960101 17:00, 94
19960101 18:00, 14
19960101 19:00, 17
19960101 20:00, 10
19960101 21:00, 11
19960101 22:00, 12
19960101 23:00, 13
19960102 00:00, 94
19960102 01:00, 14
19960102 02:00, 17
19960102 03:00, 10
...
…
…
STATION DEBW003
19960101 00:00, 10
19960101 01:00, 11
…
...
…
```

The definition and the corresponding example differ from the previously published example

in the following points:

1. The quality flag has been omitted in line with provisions of Annex III: all transmitted data are deemed to be valid.
2. The station name can be ambiguous and has been replaced by the code scheme supplied by the EU (two-character country code followed by a five-character national code) to make unambiguous identification of the station possible.
3. The same holds for the component.

A.1.2 META-INFORMATION

Based on the old format designed by the EU to facilitate quick entry of “bulk” meta information into the database, the DEM compatible format for meta-information should allow to generate easily formatted files from national databases or from spreadsheets.

Rules

The general rules would be:
- Comma separated ASCII file.
- Carriage-return new-line pair (CRLF) terminating each line.
- First line contains comma separated keywords specified below describing the fields on the following lines.
- Empty lines are ignored.
- Keywords are case insensitive and have to be spelled exactly as specified.
- Values can optionally be enclosed in double quotes ("), embedded quotes should be duplicated, spaces around values are ignored (except when the value is surrounded by quotes (").
- For the values to each keyword a format is specified.
- Date format is YYYYMMDD.
- Float format uses the decimal point.
- For some keywords a domain is specified. Values should be equal (case insensitive) to one of the specified values in the domain.
- For some keywords with predefined list of values, several values separated by a plus sign (+) can be specified.
- Key keywords should always be specified.
- Optional keywords can be omitted. Values for optional keywords can be left empty.
- Mandatory keywords can be omitted when updating existing meta data. They are mandatory when new meta data (networks or stations) is to be added. Values for mandatory keywords can not be left empty.
- Keywords can be specified in any order.

Keywords

Three sets of keywords would be distinguished, one for network information, one for station information and one for pollutant information. Each set of keywords and the corresponding data needs to be specified in a separate file.
The keywords (and their status) would be the same as those used in ISO 7168 (see annex 2).

Example - network information

network_country_code, network_name, network_short_name, network_coverage ...
NL010A, "Landelijk Meetnet Luchtkwaliteit", "LML", "national", ...
NL009A, "Meetnet TNO-IMW", "TNO-IMW", "local", ...,
…

Example - station information

x_site_commission_code, network_country, site_network_country_code, site_name, ...
NL0245A, NL010A, 934, "Kolummerwaard-Hooge Zuidwal", ...
NL0222A, NL010A, 131, "Vredepeel-Vredeweg", …
…

Example - station information
x_site_commission_code, measurand_code, measurand_name, …
NL0245A, 1, SO2, ...
NL0245A, 3, PM10, ...
...
NL0222A, 1, SO2, …
…

ANNEX 2 ISO 7168 VERSION 2 FORMAT

This annex aims at illustrating the use of ISO 7168 and at providing guidelines. In practice, technical details have to be discussed and fixed together with the Member States who intend to use it.

IMPORTANT REMARKS

All the internal rules specified in ISO7168 must be strictly applied when using the norm for data and information transfer in the frame of the EoI.

The previous remark also applies to the status -mandatory/optional- of the data/information. The rule to be followed is summarised in the following table.

	ISO - Optional	ISO - Mandatory
EoI Optional	Optional	**Mandatory**
EoI Mandatory	**Mandatory**	**Mandatory**

A2.1. INTRODUCTION

The ISO format 7168 version 2 allows to transfer both measurement data and meta-information on the networks, stations and measurement methods.

Basically, the data and information are gathered in six different groups:
- group 1: definition group for the general identification of the file and formatting rules.
- group 2: identification group for the identification of the data supplier.
- group 3: network group for the identification and information on the network.
- group 4: site group for the identification and information on the site or station.
- group 5: measurand group
- group 6: data qualifier group giving the status of the data.
- group 7: data group with the measurement values and/or statistical data.
- group 8: comment group.

In the ISO format, all data and information are associated to 'keywords' that indicate the content of the fields.

The first two groups are used to communicate data and information that are not explicitly covered by the EoI Decision. However, most of these data and information are mandatory in the ISO format.

A.2.2. CORRESPONDENCE BETWEEN EOI REQUIREMENTS AND ISO7168 VERSION 2

The following table presents the correspondence between the requirement of the EoI Decision and the keywords ISO7168 version 2. In the case where there is no corresponding field in ISO, the information will be reported in an additional (fields, all starting with 'x' are indicated in italic characters in the table). Status of the information is given with a M for mandatory and O for optional.

EoI		ISO		Final status	Remarks
status	item	status	field		
	Meta-information (Annex II)				
	I Information concerning networks				
M	I.1 name	M	G3 network_name	**M**	
O	I.2 abbreviation if abbreviation if code	 O M	 G3 network_short_name G3 network_country_code	 **O** **M**	See explanation in [I.2] under 2.1.2.
O	I.3 Type of network	O	G3 network_coverage	**O**	List in [I.3] under 2.1.3.
	I.4 Body responsible for network management				If no difference between the network and the body managing it (see [I.4.1] under 2.1.4), use the fields indicated in the ISO column. Otherwise, information is to be reported in add-on.
M	I.4.1 name	M	G3 network_name *x_network_management_name*	**M**	
M	I.4.2 name of person responsible	O	G3 network_responsible *or x_network_management_responsible*	**M**	
M	I.4.3 address	M	G3 network_address *or x_network_management_responsible*	**M**	
M	I.4.4 telephone/fax	O	G3 network_phone_number *or x_network_management_phone_number*	**M**	
		O	G3 network_fax_number *or x_network_management_fax_number*	**M**	

O	I.4.5 e-mail	O	G3 network_email_address *or* *x_network_management_email_address*	**O**	
O	I.4.6 website		*x_network_management_website*	**O**	In all cases, to be reported in add-on
M	I.5 Time reference base	M	G3 network_time_reference	**M**	
	II. Information concerning stations				
	II.1 General information on the station				
M	II.1.1 name	M M	G4 site_name G4 site_address	**M** **M**	
O	II.1.2 name of town/city/location name of agglomeration		*x_site_city* *x_site_agglomeration*	**O** **O**	To be reported in add-on To be reported in add-on
O	II.1.3 reference/number code	M	G4 site_network_country_code	**M**	Internal ISO rules for elaborating code to be followed.
M	II.1.4 Commission code		*x_site_commission code*	**M**	To be reported in add-on
O	II.1.5 name of technical responsible body	O	G4 site_responsible	**O**	
O	II.1.6 bodies or programmes to which data are reported		*x_site_programmes*	**O**	To be reported in add-on
O	II.1.7 monitoring objectives		*x_site_objectives*	**O**	To be reported in add-on
M	II.1.8 geographical coordinates, altitude	M M M	G4 site_latitude G4 site_longitude G4 site_altitude	**M** **M** **M**	
O	II.1.9 NUTS level IV		*x_site_NUTS*	**O**	To be reported in add-on

M	II.1.10 pollutants measured	M M	G5 measurand_code G5 measurand_name	**M** **M**	
M	II.1.11 meteorological parameters measured	M M	G5 measurand_code G5 measurand_name	**M** **M**	
O	II.1.12 relevant comments		*x_site_comments*	**O**	To be reported in add-on
O	subcategories for background station		*x_site_geography*	**O**	To be reported in add-on
	II.2 Classification of station				
M	II.2.1 type of area	O/M O/M	G4 site_zone_type G4 site_zone_type_code	**M** **M**	
O	II.2.2 type of station	M	G4 site_type *x_site_measurand_type*	**M** **O**	Station type by pollutant; see [2.2.2] under 2.2.2
	II.2.3 additional information				
O	representativeness	O	*x_site_representativeness*	**O**	To be reported in add-on
O	population	O	G4 site_inhabitants	**O**	
O	traffic volume		G4 site_traffic_volume_number	**O**	
O	distance from kerb	O	*x_site_distance_kerb*	**O**	To be reported in add-on
O	heavy-duty traffic		G4 site_lorry_percentage	**O**	
O	traffic speed		*x_site_traffic_speed*	**O**	To be reported in add-on
O	distance between and height of building facades		*x_site_width_street* *x_site_height_buildings*	**O** **O**	To be reported in add-on To be reported in add-on

O	width of street/road		*x_site_width_street*	**O**	To be reported in add-on
O	type of industries		G4 site_emission_sources G4 site_emission_sources_code	**O** **O**	
O	distance to source		*x_site_distance_source*	**O**	To be reported in add-on
O	subcategories for background station		*x_site_background_rural_category*	**O**	To be reported in add-on
	III. Information concerning measurement configuration by compound				
	III.1 Equipment				
O	III.1.1 name	M	G5 measurand_device	**M**	
O	III.1.2 analytical principle or measurement method	M	G5 measurand_method	**M**	
	III.2 Characteristics of sampling				
O	III.2.1 Location of sampling	O	G5 sampling_location	**O**	
O	III.2.2 Height of sampling point	M	G5 sampling_height	**M**	
O	III.2.3 Result-integrating time	M	G6 data_time_interval *or* *x_result_integrating_time*	**M**	If the result integrating time does not correspond to the averaging time of the reported data, use the add-on field.
O	III.2.4 Sampling time	M	G6 data_sampling_time	**M**	
	Data validation (Annex III)				

na	Data validity		G6 usable_datum		This field can be left at blank, the other qualifiers fields not being used
	Data (Annex I)				
	Averaging time Statistics or raw data Measurement unit Concentration value		G6 data_time_interval G7 data_type G5 measurand unit G7 data		

A.2.3. MODALITIES

The information for which there is a corresponding field in the ISO norm will be reported in a standard ISO file. The other information will be transmitted in a separate file. This file will follow the structure in groups of a normal ISO file. The keywords used for transmitting the information will be those indicated in italics in the table presented under A.2.2.

In order to maintain coherence with the standard ISO file, the add-on file will repeat fields essential for the identification of the networks, sites-stations and pollutants (respectively groups 3, 4 and 5). The add-on file will then be organised in line with the following table.
Status of the information is given with a 'M' for mandatory and 'O' for optional while the brackets means if not reported otherwise.

Groups and Fields		Status	Remark
Group 3: network group			
G3	network_country_code	M	repeated field
G3	network_name	M	repeated field
	x_network_management_name	M	
	x_network_management_responsible	(M)	
	x_network_management_responsible	(M)	
	x_network_management_phone_number	(M)	
	x_network_management_fax_number	(M)	
	x_network_management_email_address	(M)	
	x_network_management_website	(O)	
		O	
Group 4: site group			
		M	repeated field
G4	site_name	M	repeated field
G4	site_address	M	repeated field
G4	site_network_country_code		
		O	
	x_site_city	O	
	x_site_agglomeration	M	
	x_site_commission code	O	
	x_site_programmes	O	
	x_site_objectives	O	
	x_site_NUTS	O	
	x_site_comments	O	
	x_site_geography	O	
	x_site_representativeness	O	
	x_site_distance_kerb	O	
	x_site_traffic_speed	O	
	x_site_width_street	O	
	x_site_height_buildings	O	
	x_site_distance_source	O	
	x_site_background_rural_category	O	

Group 5: measurand group		repeated field
G5 measurand_code		repeated field
G5 measurand_name	M	
	M	
x_site_measurand_type		
x_result_integrating_time	O	
	(M)	

A.2.4. EXAMPLE

[definition_group]
file_name =; "FR010802.00$"
file_creation_time =; "2001-08-22.09-50-09"
file_data_status =; "validated"
file_data_separator =; ;
file_comment_separator =; {}
file_decimal_separator =; ,
file_format =; "ISO7168-1:1998"

[identification_group]

[data_supplier_record]
data_supplier_name =; "Agence de l'environnement et de la Maîtrise
nergie"
data_supplier_code =; "99"
data_supplier_address =; "27, Rue Louis Vicat";"75737 Paris cedex
";""
data_supplier_responsible =; "Joëlle Colosio"
data_supplier_phone_number =; "+33 1 47 65 20 33"
data_supplier_fax_number =; "+33 1 47 65 20 35"
data_supplier_email_address =; "joelle.colosio@ademe.fr"
data_supplier_country_name =; "FRANCE"
data_supplier_country_code =; "FR"

[header_record]
number_of_network_records =; 1
number_of_site_records =; 17
number_of_measurand_records =; 2
number_of_data_blocks =; 11

[network_group]
[network_record]
network_country_code =; "01.FR"
network_name =; "Association-AERFOM"
network_short_name =; "AERFOM"
network_address =; "9, rue Edouard Belin";"Technopôle Metz 2000";"";""
network_responsible =; "LEBOIS"
network_phone_number =; "03 87 74 56 04"
network_fax_number =; "03 87 74 41 99"
network_email_address =; "aerfom@aerfom.org"

network_start_time =; "1977-05-12.00-00-00"
network_end_time =; "9999-99-99.99-99-99"
network_coverage =; "région"
network_time_reference =; "UT"

[site_group]

[site_record]
site_network_country_code =; "01001.01.FR"
site_name =; "LONGLAVILLE"
site_address =; "LONGLAVILLE"
site_responsible =; "Association-AERFOM"
site_start_time =; "1993-01-01.00-00-00"
site_end_time =; "9999-99-99.99-99-99"
site_type =; "background"
site_scale =; "local"
site_scale_code =; 1
site_latitude =; "+493206,52"
site_longitude =; "+54818,26"
site_altitude =; "+245"
site_geodesic_system =; "WGS84"
site_zone_type =; "suburban"
site_zone_type_code =; 2
site_inhabitants =; 0
site_traffic_volume =; "medium"
site_traffic_volume_number =; ""
site_street_type =; ""
site_traffic_situation =; "carrefour"

[site_record]
site_network_country_code =; "01003.01.FR"
site_name =; "THIONVILLE"
site_address =; "THIONVILLE"
site_responsible =; "Association-AERFOM"
site_start_time =; "1990-06-01.00-00-00"
site_end_time =; "9999-99-99.99-99-99"
site_type =; "traffic"
site_scale =; "local"
site_scale_code =; 1
site_latitude =; "+491921,34"
site_longitude =; "+61020,14"
site_altitude =; "+155"
site_geodesic_system =; "WGS84"
site_zone_type =; "rural"
site_zone_type_code =; 3
site_inhabitants =; 0
site_traffic_volume =; "medium"
site_traffic_volume_number =; ""
site_street_type =; ""
site_traffic_situation =; ""
…
…
…
[measurand_group]

[measurand_record]
measurand_code =; "08 "
measurand_name =; "Ozone"
measurand_unit =; "ug/m3"
measurement_method =; "ultraviolet method"
measurement_method_standard =; "absorption UV"
measurement_type =; "automatic"
length_unit =; "metre"
sampling_location =; ""
sampling_height =; 3
sampling_lower_limit =; 0
sampling_upper_limit =; 1000
…
…
[data_qualifier_group]
[data_qualifier_record]
calibration_drift =; "D"
calibration_mode =; "C"
corrected_datum =; "O"
estimated_datum =; "E"
faulty_measurement =; "F"
maintenance_mode =; "M"
no_datum =; ""
zero_mode =; "Z"

[data_group]

[data_block]
[data_control_record]
measurand_code =; "08 "
site_network_country_code =; "01001.01.FR"
data_start_time =; "2000-01-01.00-00-00"
data_duration =; "0001-00-00.00-00-00"
data_number =; 1
data_time_interval =; "0000-00-01.00-00-00"
data_samples_per_time_interval =; 96
data_sampling_time =; "0000-00-00.00-15-00"
data_multiplication_factor =; 1
data_type =; "non-sequential data"
data_type_code =; 0
data_columns =; "arithmetic mean";"arithmetic mean";"arithmetic mean"
[data_record]
data =; 13;97;159;
…
…

ADD-ON

[network_group]
[network_record]
network_country_code =; "01.FR"
network_name =; "Association-AERFOM"
x_network_management_name =; "Association-AERFOM"

x_network_management_responsible =; "MR DURAND"
x_network_management_phone_number =; "0149990101"
x_network_management_fax_number =; "0149990102"
x_network_management_email_address =; "manager@aerfom.fr"
x_network_management_website =; "www.aerfom.fr"

[SITE_GROUP]

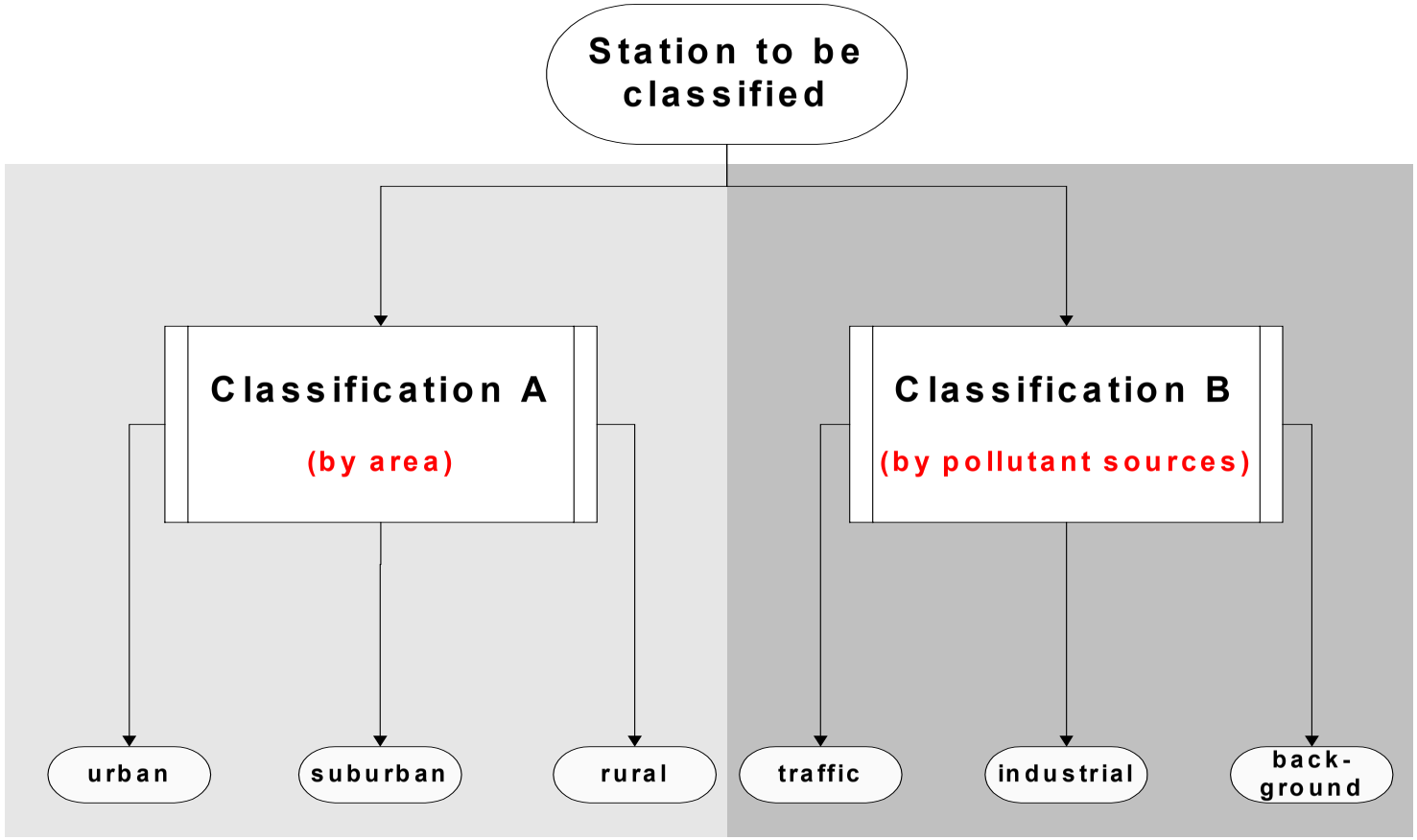
[site_record]
site_name =; "LONGLAVILLE"
site_address =; "1 rue leclerc 14001 LONGLAVILLE"
site_network_country_code =; "01001.01.FR"
x_site_city =; "LONGLAVILLE"
x_site_agglomeration =; "FRANCHEVILLE"
x_site_commission_code =; ""
x_site_programmes =; ""
x_site_objectives =; "EU"
x_site_NUTS =; " "
x_site_comments =; " "
x_site_geography =; " "
x_site_representativeness =; ""
x_site_distance_kerb =; ""
x_site_traffic_speed =; "60"
x_site_width_street =; "10"
x_site_height_buildings =; "40"
x_site_distance_source =; "20"
x_site_background_rural_category =; ""

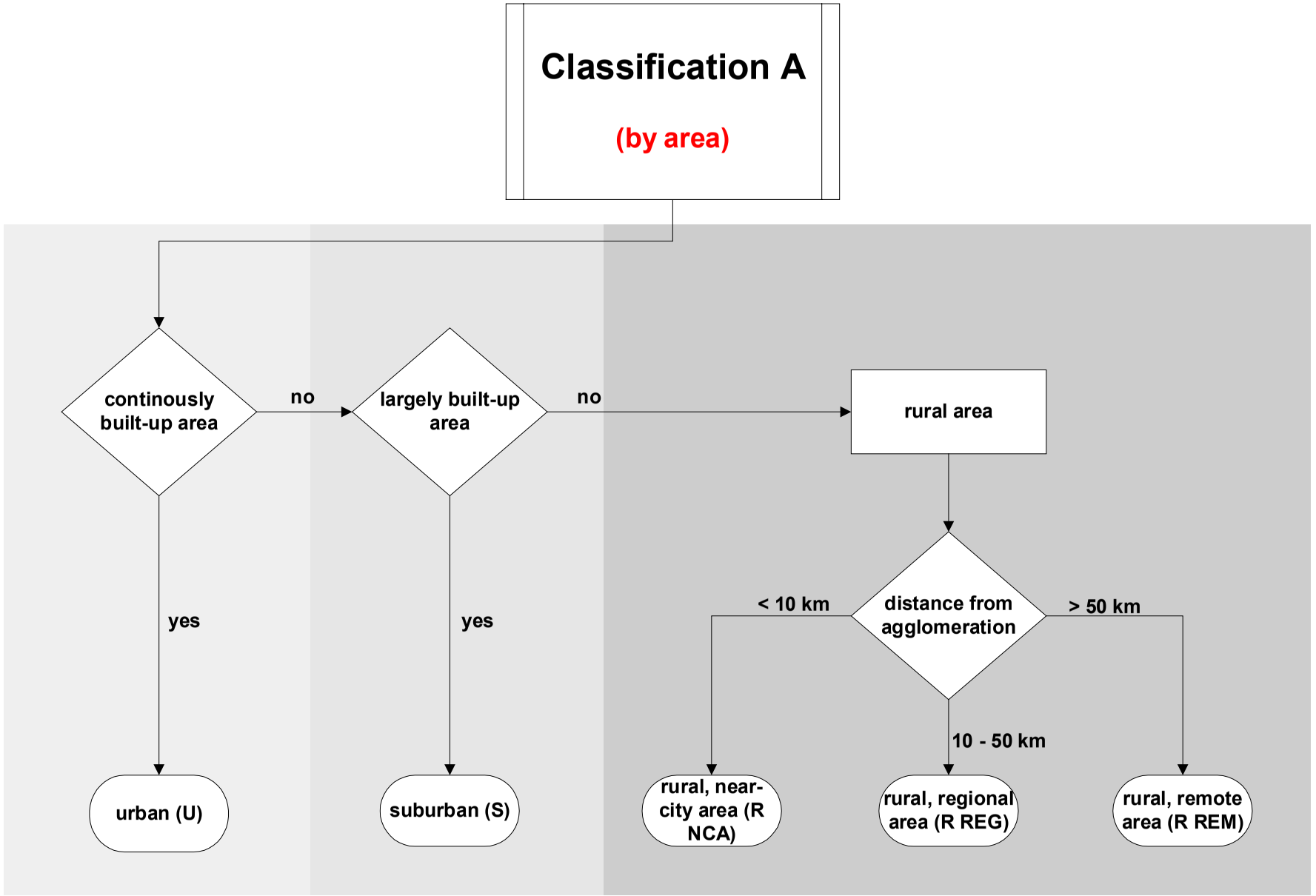
[MEASURAND_GROUP]

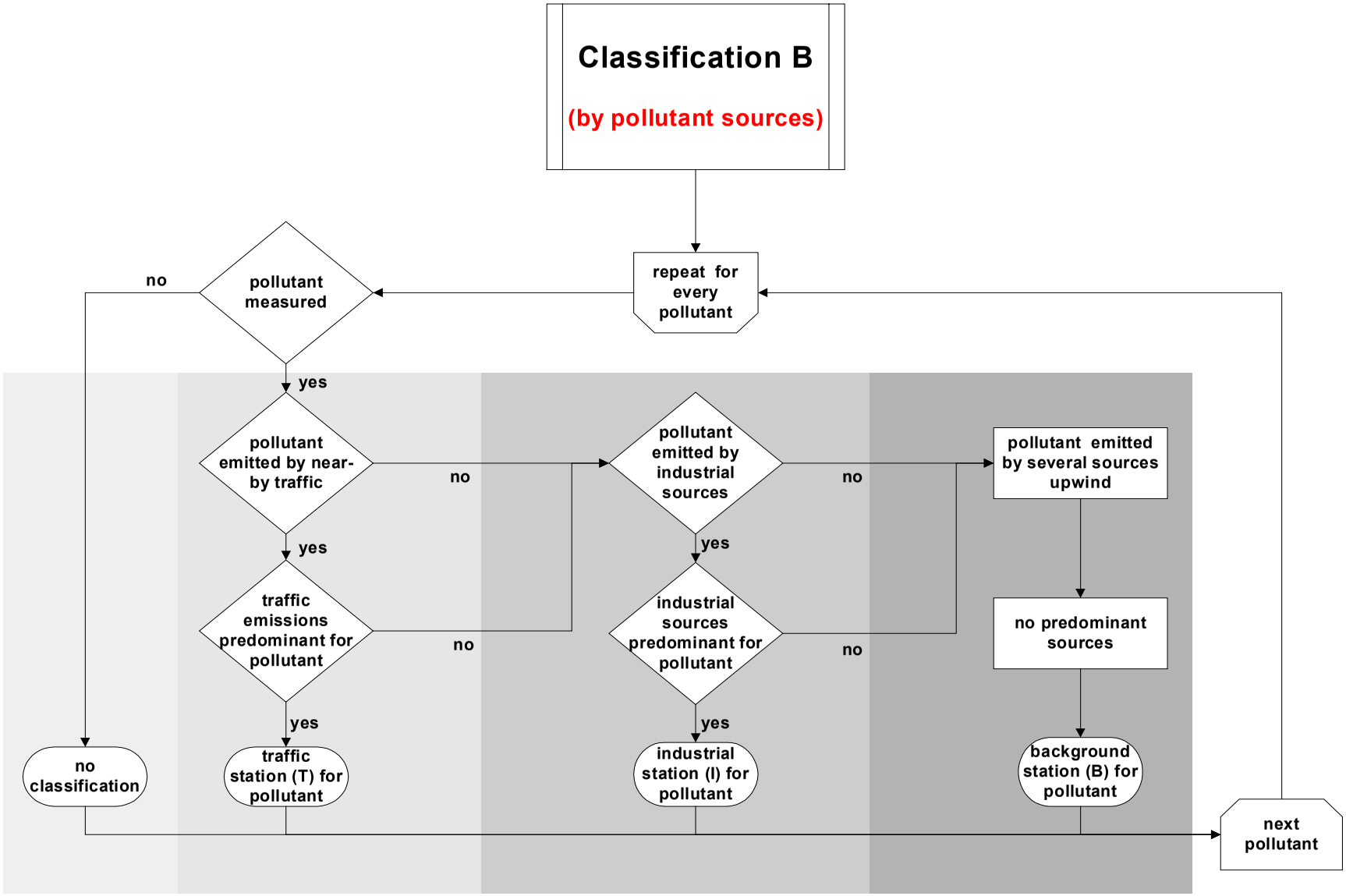
[MEASURAND_RECORD]

measurand_code =; "08A"
measurand_name =; "Ozone"
x_site_measurand_type =; ""
x_result_integrating_time =; "1"

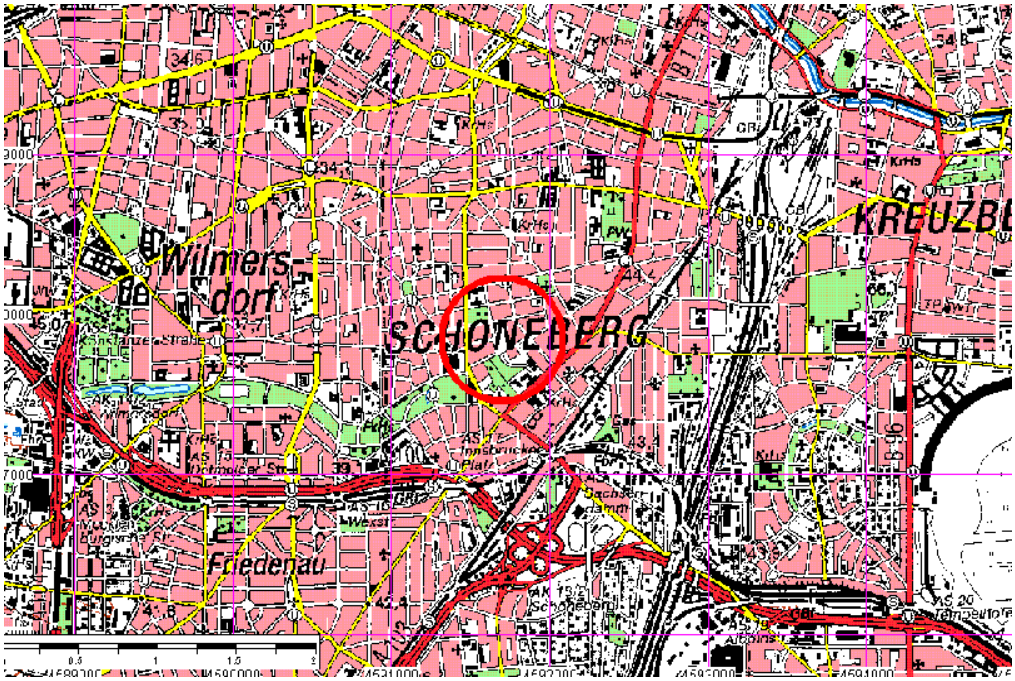
ANNEX 3 CLASSIFICATION OF STATIONS IN RELATION TO GEOGRAPHICAL SITING AND SOURCES OF INFLUENCE



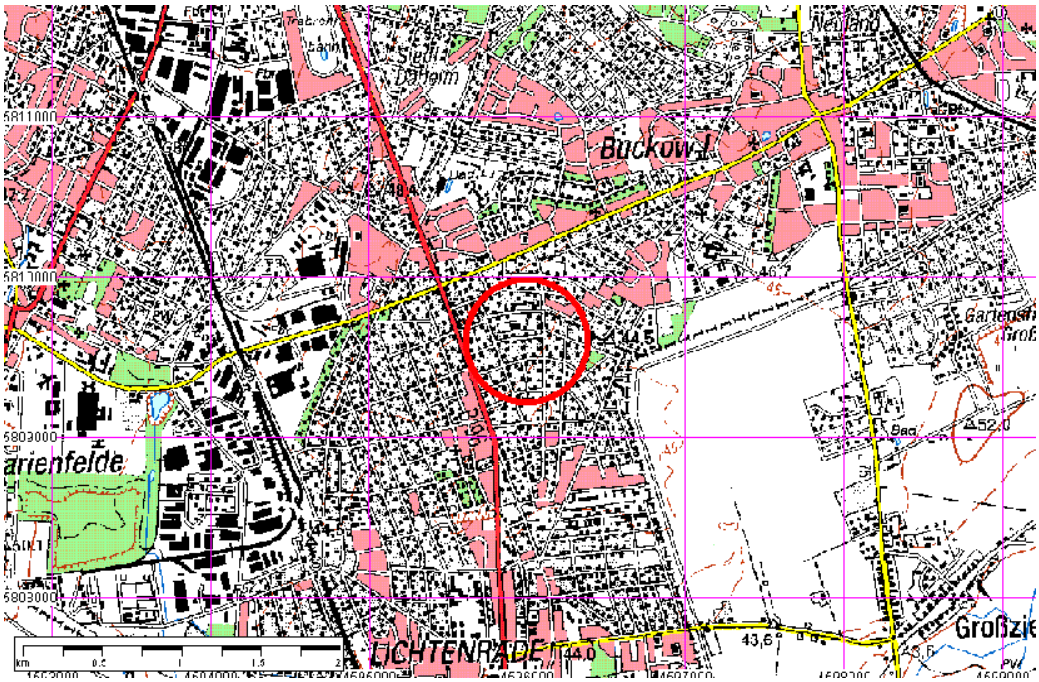

Classification A
(by area)
continously built-up area
no
largely built-up area
no
rural area
yes
yes
< 10 km
distance from agglomeration
> 50 km
10 - 50 km
urban (U)
suburban (S)
rural, near-city area (R NCA)
rural, regional area (R REG)
rural, remote area (R REM)


Classification B
(by pollutant sources)
repeat for every pollutant
pollutant measured
no
yes
pollutant emitted by near-by traffic
no
yes
traffic emissions predominant for pollutant
no
yes
traffic station (T) for pollutant
pollutant emitted by industrial sources
no
yes
industrial sources predominant for pollutant
no
yes
industrial station (I) for pollutant
pollutant emitted by several sources upwind
no predominant sources
background station (B) for pollutant
no classification
next pollutant

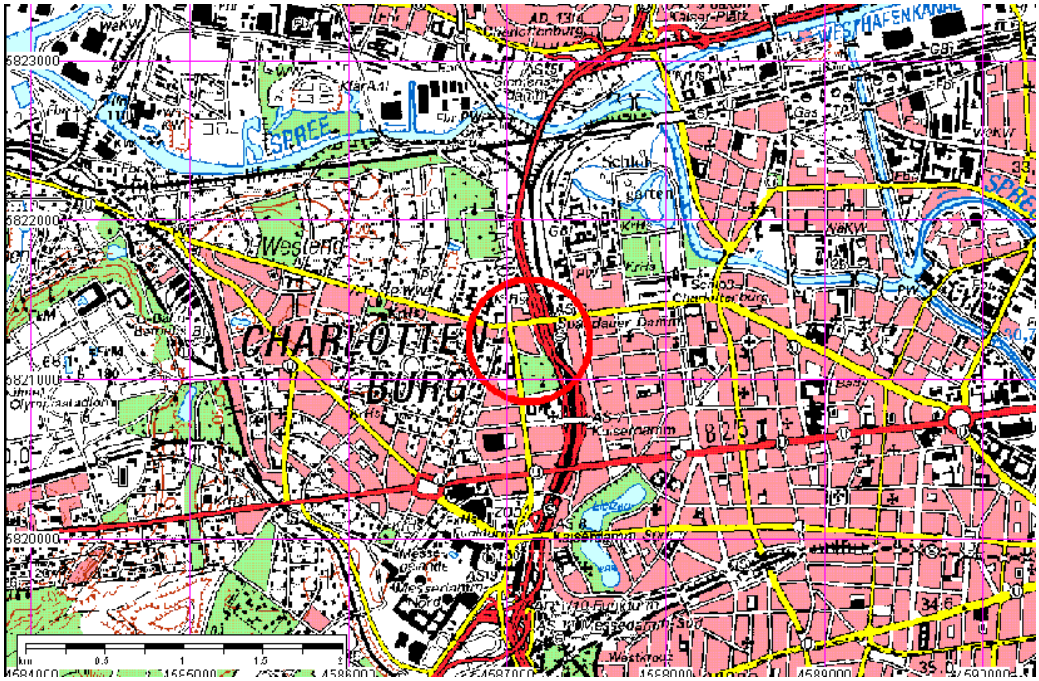
Urban

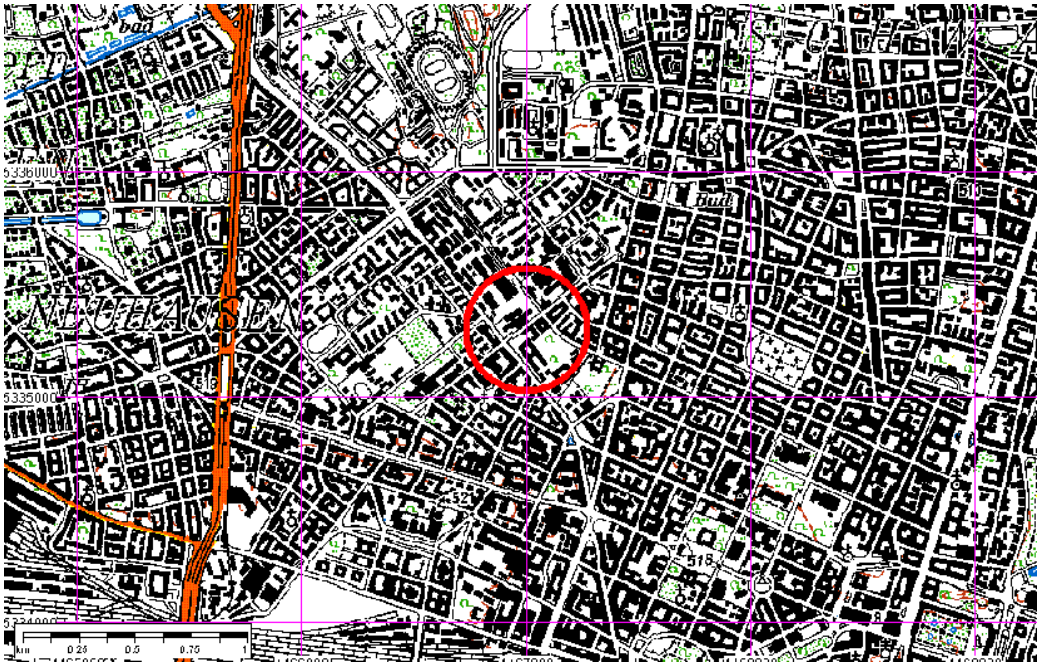


Suburban

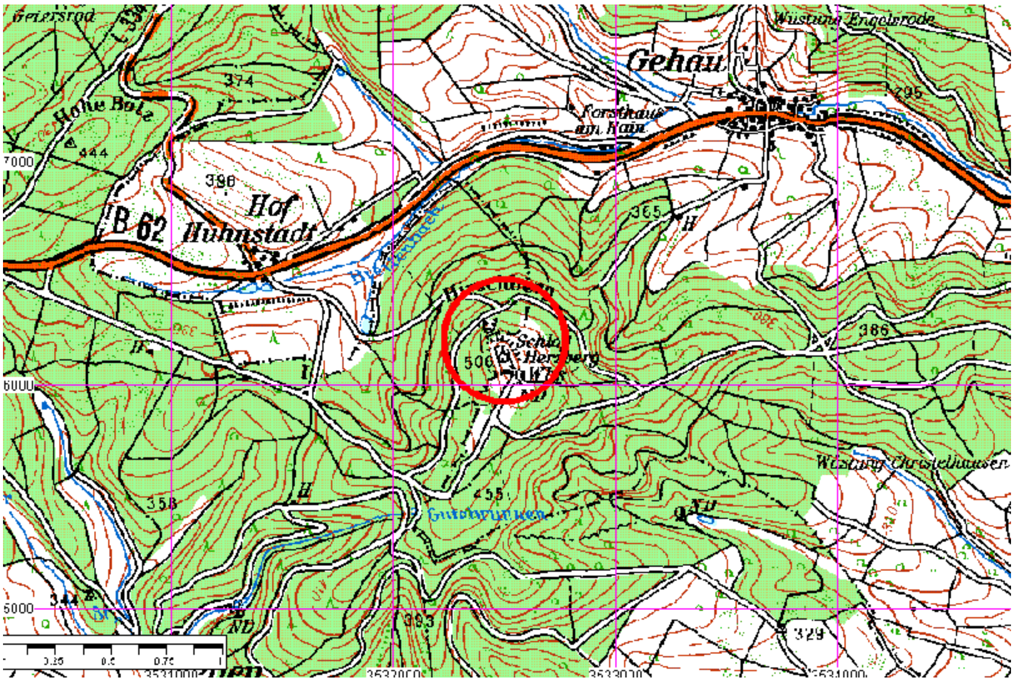


Urban Traffic

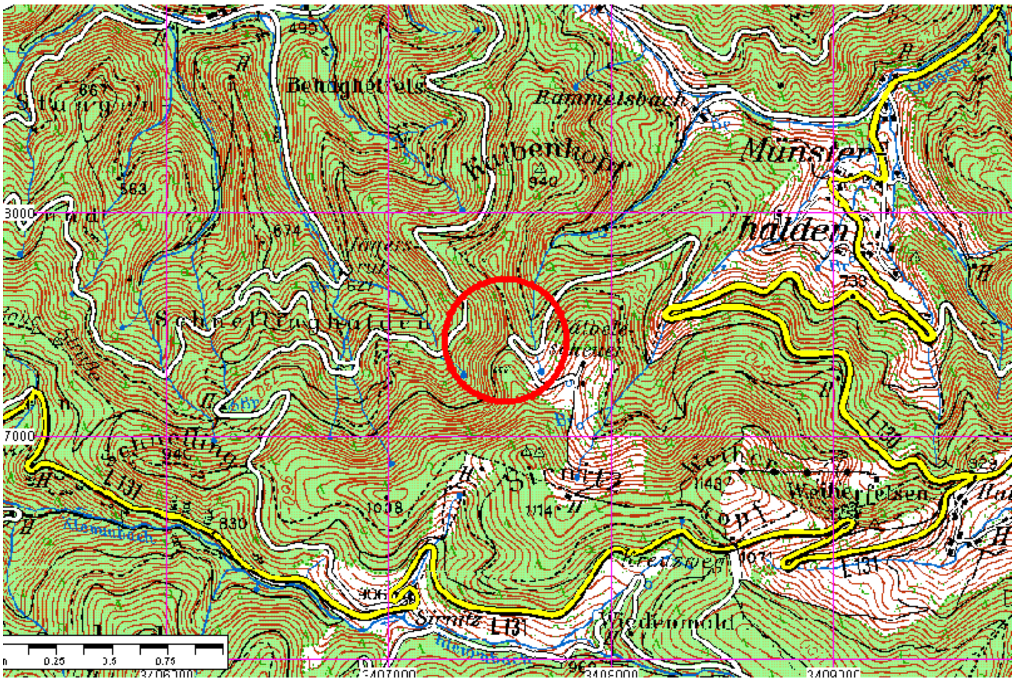




Rural



Geiersrod
Wüstung Engelsrode
Gehau
Forsthaus am Rain
Hohe Bolz
374
444
390
Hof Huhnstadt
B 62
365
295
Schloß Herzberg
506
366
Wüstung Christelhausen
358
455
344
393
329



Rammelsbach
Münster halden
640
563
674
738
L131
Weiherfelsen
1018
830
929

ANNEX 5 DATA CAPTURE CRITERIA AND STATISTICAL PARAMETERS DEFINED IN RELEVANT DIRECTIVES

Annex IV of EoI defines data capture criteria and statistical parameters, which shall be applied only, if the relevant Directive does not define special criteria and parameters.

"If criteria for the aggregation of data and the calculation of statistical parameters have not been laid down in EU Directives the following applies:"

The criteria and parameters of the Directives have to be applied, even if the criteria from Annex IV are more stringent. In addition to data capture criteria, statistical parameters not described in Annex I but specified in relevant Directives are discussed in the following.

Decision 82/459/EEC of 24 June 1982 established exchange procedures for information received from air pollution monitoring stations and networks for supply to the UNEP Global Environmental Monitoring Service (GEMS). It was replaced by 97/101/EC. There is a reference to this Decision in Annex I as strong acidity was listed there together with a description to supply data on sulphur compounds.

The following sub-chapters are sorted by the date of adoption.

A.5.1. 80/779/EEC AND 89/427/EEC (SO_2 AND TSP)

Council Directive 80/779/EEC of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulates[2] Council Directive 89/427/EEC of 21 June 1989 amending Directive 80/779/EEC on air quality limit values and guide values for sulphur dioxide and suspended particulates[3]

Limit values are defined as mean, median (percentile 50), percentile 95 and percentile 98, based on 24-hour values or on half-hour values (Annex IV), and calculated for one year or the winter half-year. Guide values are defined as mean, based on 24-hour values and calculated for one year, and as 24-hour average value.

A.5.2. 82/884/EEC (PB)

Council Directive 82/884/EEC of 3 December 1982 on a limit value for lead in the air[4]

Article 2 of this Directive defines a limit value as annual mean, but no data capture criterion.

[2] OJ L 229/30, 30.08.1980
[3] OJ L 201/53, 14.07.1989
[4] OJ L 378/15, 31.12.1982

A.5.3. 85/203/EEC (NO_2)

Council Directive 85/203/EEC of 7 March 1985 on air quality standards for nitrogen dioxide[5]

A limit value is defined as percentile 98, based on one-hour values (or smaller sampling time), and calculated for one year. In Annex I (footnote (2)) a data capture criterion is defined similar to this defined in EoI (for higher percentiles):

> "To ensure that the validity of the calculation of the 98th percentile is recognized, 75 % of the possible values must be available and, as far as possible, distributed uniformly throughout the year in question for that particular measurement site.
> In cases where the values measured on certain sites are not available over a period exceeding 10 days, the calculated percentile must mention this fact."

The criterion demands the same data capture as EoI (75 %), but at the same time formulates a demand on the distribution of data. The consequence is not, that the data has to be rejected, if a period of missing values exceeds 10 days, but that this fact shall be mentioned in connection with the 98th percentile for that measuring site.

A.5.4. 92/72/EEC (O_3)

Council Directive 92/72/EEC of 21 September 1992 on air pollution by ozone[6]

Limit values are defined (Article 6) as maximum, median and 98th percentile, based on one-hour values, 8-hour values or 24-hour values (averaging time), and calculated for one year. The 99,9th percentile may also be submitted.

In Annex III a data capture criterion is defined similar to this defined in EoI (for higher percentiles) and in 85/203/EEC:

> "3. For the validity of the calculation of the percentiles ([1]) to be recognized, 75 % of the possible values must be available and, as far as possible, distributed uniformly throughout the period in question for the particular measurement site. If that is not the case, this fact must be mentioned when the results are communicated. The calculation of the 50th (98th) percentile on the basis of the values recorded throughout the year must be carried out as follows: the 50th (98th) percentile must be calculated from the values actually measured. The measured values must be rounded off to the nearest µg/m³.
>
> ([1]) The median must be calculated as the 50th percentile"

[5] OJ L 87/1, 27.03.1985
[6] OJ L 297/1, 13.10.1992

The criterion demands the same data capture as EoI (75 %, also for the median), but at the same time formulates a requirement regarding the distribution of data. Contrary to 85/203/EEC there is no maximum data capture gap defined. The consequence is not, that the data has to be rejected, but that this fact shall be mentioned in connection with the statistical parameter for that measuring site. "Actually measured" values are the measured or aggregated one-hour values, as they represent the smallest time-scale of the statistical parameters for ozone. These values shall be rounded off to the nearest µg/m³.

Examples 34,5 µg/m³ → 35 µg/m³
32,2 µg/m³ → 32 µg/m³
54,8 µg/m³ → 55 µg/m³

A.5.5. 96/62/EC (SO_2, NO_2, PM, TSP, Pb, O_3, C_6H_6, CO, PAH, Cd, As, Ni, Hg)

Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management[7]

The so called Framework Directive sets the framework for new Directives on the above mentioned pollutants. For some of the pollutants regulation existed before, for some not. Although there is a date specified, when there should be detailed legislation for all pollutants listed (Article 4: 31.12.1999), this is not yet fulfilled for all pollutants. There are no data capture criteria or statistical parameters defined in this Directive.

A.5.6. 1999/30/EC (SO_2, NO_2, NO_X, PM, Pb)

Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air[8]

"Article 1
Objectives
The objectives of this Directive shall be to: […]
- assess concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air on the basis of common methods and criteria, […]"

This Directive ("First Daughter Directive") refers to "common methods and criteria" as which the criteria laid down in EoI can be seen. In the following only criteria differing from EoI will be discussed.

[7] OJ L 296/55, 21.11.1996
[8] OJ L 163/41, 29.06.1999

Data capture criteria

"Annex VIII
DATA-QUALITY OBJECTIVES AND COMPILATION OF RESULTS OF AIR-QUALITY ASSESSMENT
I: Data-quality objectives
The following data-quality objectives for the required accuracy of assessment methods, of minimum time coverage and of data capture of measurement are laid down to guide quality-assurance programmes. […]"

The following table contains the relevant information on data capture and time coverage (requirements regarding accuracy – especially for modelling and objective estimation – shall not be discussed here):

	Sulphur dioxide, nitrogen dioxide and oxides of nitrogen	**Particulate matter and lead**
Continuous measurement		
Minimum data capture	90 %	90 %
Indicative measurement		
Minimum data capture	90 %	90 %
Minimum time coverage	14 % (One measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year)	14 % (One measurement a week at random, evenly distributed over the year, or eight weeks evenly distributed over the year)

The following remarks are related to continuous measurements:
In this context the following quote from Annex VIII of the Directive has to be considered:

"The requirements for minimum data capture and time coverage do not include losses of data due to the regular calibration or the normal maintenance of the instrumentation."

Data check could follow the indicated levels:
1) If data capture is > 90 %, the minimum data capture criterion is fulfilled (see table below, numbers for leap years in brackets).

BASIC DATA (UNIT OF TIME)	Minimum number of values 90 % data capture related to the whole year		Maximum number of values 100 % data capture related to the whole year	
half hour	**15768**	**(15812)**	**17520**	**(17568)**
one hour	**7884**	**(7906)**	**8760**	**(8784)**
three hours	**2628**	**(2636)**	**2920**	**(2928)**
one day	**329**	**(330)**	**365**	**(366)**

2) If data capture related to the whole year is < 90 %, the proportion of calibration and maintenance time should be checked (as sum). This proportion shall be subtracted from 100 %, or the number of values missing due to calibration and maintenance shall be subtracted from the maximum number of values for the whole year (right column table above). The remainder is the maximum possible number of values. 90 % of this is the minimum data capture, means that only 10 % missing values are allowed, besides calibration and maintenance missing values.

Example The proportion of calibration and maintenance summed up to 5 %, checked over one year. The remainder is then 95 %, related to the whole year, as maximum possible data. 90 % of those 95 % are the minimum data capture: The minimum data capture results in 85,5 %.

3) If it can not be differentiated between missing values due to calibration and maintenance on the one hand and other missing values on the other hand, the following rough (maximum) estimation could be applied:
If the calibration cycle takes one hour per day (-4,2 %) and the normal maintenance of the instrumentation is assumed to take 10 days per year as maximum (-2,7 %) a device-caused data loss of up to 6,9 % is possible.
Thus the above mentioned minimum data capture of 90 % in relation to the maximal "possible data" (without calibration and maintenance) reduces to **85 % related to the whole** year. Examples for continuous measurement are given in the table below (numbers for leap years in brackets):

Basic data (unit of time)	Minimum number of values 85 % data capture related to the whole year	
half hour	14892	(14933)
one hour	7446	(7467)
three hours	2482	(2489)
one day	311	(312)

In any case: in comparison to EoI this criterion is more stringent.

For indicative measurement a minimum time coverage of 14 % is given in addition. The basic conditions for such indicative measurement are given in brackets:

a) "One measurement a week at random, evenly distributed over the year" means 52 measurements per year. That corresponds exactly to 14 % time coverage for one year.

b) "eight weeks evenly distributed over the year" means 56 days per year, which corresponds to 15 % time coverage for one year.

Calculation and conversion of concentrations

In Article 2 a mechanism for the calculation of oxides of nitrogen (NO_X) is given.

"Article 2
Definitions
For the purposes of this Directive: […]
10. 'oxides of nitrogen' shall mean the sum of nitric oxide and nitrogen dioxide added as parts per billion and expressed as nitrogen dioxide in micrograms per cubic meter; […]"

The calculation of NO_X has to be done hour by hour. Statistical parameters shall be calculated on the time series of NO_X. The data capture criteria of EoI shall be applied to the time series of NO_X. The annual mean of NO_X may not be calculated on the basis of the annual mean values of NO_2 and NO.

Time series	1/10	2/10	3/10	4/10	5/10	6/10	7/10	8/10	9/10	10/10	data capture	calc. of mean
Examples												
NO	X	X	X	X	X	X					60 %	Yes
NO_2	X	X	X	X	X	X					60 %	Yes
NO_X	X	X	X	X	X	X					60 %	Yes
NO	X	X	X	X	X	X	X				70 %	Yes
NO_2			X	X	X	X	X	X			60 %	Yes
NO_X			X	X	X	X	X				50 %	Yes
NO	X	X	X	X	X						50 %	Yes
NO_2						X	X	X	X	X	50 %	Yes
NO_X											0 %	No
NO	X	X	X	X	X	X					60 %	Yes
NO_2					X	X	X	X	X	X	60 %	Yes
NO_X					X	X					20 %	No
NO	X	X		X	X		X	X			60 %	Yes
NO_2		X	X		X	X		X	X	X	70 %	Yes
NO_X		X			X			X			30 %	No

Example If both of the time series of NO and of NO_2 have a data capture of 60 % (first example in the table), the calculation of mean and median is allowed for NO and NO_2 (≥ 50 %). The calculation of the mean and the median for NO_X is allowed, if the data capture of the NO_X time series is ≥ 50 %.

A.5.7. 2000/69/EC (C_6H_6, CO)

Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air[9]

> "Article 1
> Objectives
> The objectives of this Directive shall be: […]
> (b) to assess concentrations of benzene and carbon monoxide in ambient air on the basis of common methods and criteria; […]"

This Directive ("Second Daughter Directive") refers to "common methods and criteria", as the First Daughter Directive 1999/30/EC does, as which the criteria laid down in EoI can be seen. In the following only criteria differing from EoI will be discussed.

Limit values are defined as annual mean (benzene), respectively as maximum daily 8-hour mean, calculated on the basis of one-hour values (carbon monoxide). Each 8-hour average value shall be assigned to the day (and hour) on which it ends.

Annex VI of 2000/69/EC concerns data quality objectives and is structured similar to Annex VIII of 1999/30/EC.

> "Annex VI
> DATA QUALITY OBJECTIVES AND COMPILATION OF RESULTS OF AIR QUALITY ASSESSMENT
> I: Data quality objectives
> The following data quality objectives, for allowed uncertainty of assessment methods, and of minimum time coverage and of data capture of measurement are provided to guide quality-assurance programmes. […]"

The following table contains the relevant information on data capture and time coverage. Requirements regarding accuracy – especially for modelling and objective estimation – shall not be discussed here.

	Benzene	Carbon monoxide
Fixed measurement ([1])		
Minimum data capture	90 %	90 %
Minimum time coverage	35 % urban background and traffic sites (distributed over the year to be representative of various conditions for climate and traffic) 90 % industrial sites	
Indicative		

[9] OJ L 313/12, 13.12.2000

measurement		
Minimum data capture	90 %	90 %
Minimum time coverage	14 % (one day's measurement a week at random, evenly distributed over the year, or 8 weeks evenly distributed over the year)	14 % (one measurement a week at random, evenly distributed over the year, or 8 weeks evenly distributed over the year)

([1]) Member States may apply random measurements instead of continuous measurements for benzene if they can demonstrate to the Commission that the uncertainty, including the uncertainty due to random sampling, meets the quality objective of 25 %. Random sampling must be evenly distributed over the year in order to avoid skewing of results.

In this context the following quote from Annex VI of the Directive has to be considered:

"The requirements for minimum data capture and time coverage do not include losses of data due to the regular calibration or the normal maintenance of the instrumentation."

Data check should follow a mechanism analogous to that described for Directive 1999/30/EC with 90 % reducing to 85 % and 35 % reducing to 30 % in level 3 (see above).