Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air

DIRECTIVE 2004/107/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 15 December 2004

relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Economic and Social Committee[(1)],

After consulting the Committee of the Regions,

Acting in accordance with the procedure laid down in Article 251 of the Treaty[(2)],

Whereas:

(1) On the basis of principles enshrined in Article 175(3) of the Treaty, the Sixth Community Environment Action Programme, adopted by Decision No 1600/2002/EC of the European Parliament and of the Council[(3)], establishes the need to reduce pollution to levels which minimise harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, to improve the monitoring and assessment of air quality including the deposition of pollutants and to provide information to the public.

(2) Article 4(1) of Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management[(4)] requires the Commission to submit proposals for regulating the pollutants listed in Annex I to that Directive taking into account the provisions laid down in paragraphs 3 and 4 of that Article.

(3) Scientific evidence shows that arsenic, cadmium, nickel and some polycyclic aromatic hydrocarbons are human genotoxic carcinogens and that there is no identifiable threshold below which these substances do not pose a risk to human health. Impact on human health and the environment occurs via concentrations in ambient air and via deposition. With a view to cost-effectiveness, ambient air concentrations of arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons, which would not pose a significant risk to human health, cannot be achieved in specific areas.

(4) With the aim of minimising harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, of airborne arsenic, cadmium

and nickel and polycyclic aromatic hydrocarbons, target values should be set, to be attained as far as possible. Benzo(a)pyrene should be used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons in ambient air.

(5) The target values would not require any measures entailing disproportionate costs. Regarding industrial installations, they would not involve measures beyond the application of best available techniques (BAT) as required by Council Directive 96/61/EC of 24 September 1996 concerning integrated pollution prevention and control[(5)] and in particular would not lead to the closure of installations. However, they would require Member States to take all cost-effective abatement measures in the relevant sectors.

(6) In particular, the target values of this Directive are not to be considered as environmental quality standards as defined in Article 2(7) of Directive 96/61/EC and which, according to Article 10 of that Directive, require stricter conditions than those achievable by the use of BAT.

(7) In accordance with Article 176 of the Treaty, Member States may maintain or introduce more stringent protective measures relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons provided that they are compatible with the Treaty and that they are notified to the Commission.

(8) Where concentrations exceed certain assessment thresholds, monitoring of arsenic, cadmium, nickel and benzo(a)pyrene should be mandatory. Supplementary means of assessment may reduce the required number of sampling points for fixed measurements. Further monitoring of background ambient air concentrations and deposition is foreseen.

(9) Mercury is a very hazardous substance for human health and the environment. It is present throughout the environment and, in the form of methylmercury, has the capacity to accumulate in organisms, and in particular to concentrate in organisms higher up the food chain. Mercury released into the atmosphere is capable of being transported over long distances.

(10) The Commission intends to come forward in 2005 with a coherent strategy containing measures to protect human health and the environment from the release of mercury, based on a life-cycle approach, and taking into account production, use, waste treatment and emissions. In this context, the Commission should consider all appropriate measures with a view to reducing the quantity of mercury in terrestrial and aquatic ecosystems, and thereby the ingestion of mercury via food, and avoiding mercury in certain products.

(11) The effects of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons on human health, including via the food chain, and the environment as a whole, occur through concentrations in ambient air and via deposition; the accumulation of these substances in soils and the protection of ground water should be taken into account. In order to facilitate review of this Directive in 2010, the Commission and the Member States should consider promoting research into the effects of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons on human health and the environment, particularly via deposition.

(12) Standardised accurate measurement techniques and common criteria for the location of measuring stations are important elements in assessing ambient air quality so that the information obtained is comparable throughout the Community. Providing reference measurement methods is acknowledged to be an important issue. The Commission has already mandated work on the preparation of CEN standards for the measurement of those constituents in ambient air where target values are defined (arsenic, cadmium, nickel and benzo(a)pyrene) as well as for the deposition of heavy metals with a view to their early development and adoption. In the absence of CEN standard methods, the use of international or national standard reference measurement methods should be permitted.

(13) Information on the concentrations and the deposition of the regulated pollutants should be forwarded to the Commission as a basis for regular reports.

(14) Up-to-date information on ambient air concentrations and deposition of regulated pollutants should be readily available to the public.

(15) The Member States should lay down rules on penalties applicable to infringements of the provisions of this Directive and ensure that they are implemented. Those penalties should be effective, proportionate and dissuasive.

(16) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission[(6)].

(17) The amendments necessary for adaptation of this Directive to scientific and technical progress should relate solely to criteria and techniques for the assessment of concentrations and deposition of regulated pollutants or detailed arrangements for forwarding information to the Commission. They should not have the effect of modifying the target values either directly or indirectly,

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Objectives

The objectives of this Directive shall be to:

(a) establish a target value for the concentration of arsenic, cadmium, nickel and benzo(a)pyrene in ambient air so as to avoid, prevent or reduce harmful effects of arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons on human health and the environment as a whole;

(b) ensure, with respect to arsenic, cadmium, nickel and polycyclic aromatic hydrocarbons, that ambient air quality is maintained where it is good and that it is improved in other cases;

(c) determine common methods and criteria for the assessment of concentrations of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient

air as well as of the deposition of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons;

(d) ensure that adequate information on concentrations of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air as well as on the deposition of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons is obtained and ensure that it is made available to the public.

Article 2

Definitions

For the purposes of this Directive the definitions in Article 2 of Directive 96/62/EC, with the exception of the definition of 'target value', shall apply.

The objectives of this Directive shall be to:

(a) 'target value'	means a concentration in the ambient air fixed with the aim of avoiding, preventing or reducing harmful effects on human health and the environment as a whole, to be attained where possible over a given period;
(b) 'total or bulk deposition'	means the total mass of pollutants which is transferred from the atmosphere to surfaces (e.g. soil, vegetation, water, buildings, etc.) in a given area within a given time;
(c) 'upper assessment threshold'	means a level specified in Annex II below which a combination of measurements and modelling techniques may be used to assess ambient air quality, in accordance with Article 6(3) of Directive 96/62/EC;
(d) 'lower assessment threshold'	means a level specified in Annex II below which the sole use of modelling or objective estimation techniques shall be possible to assess ambient air quality, in accordance with Article 6(4) of Directive 96/62/EC;
(e) 'fixed measurements'	means measurements taken at fixed sites either continuously or by random sampling, in accordance with Article 6(5) of Directive 96/62/EC;
(f) 'arsenic', 'cadmium', 'nickel' and 'benzo(a)pyrene'	mean the total content of these elements and compounds in the PM_{10} fraction;
(g) 'PM_{10}'	means particulate matter, which passes through a size-selective inlet as defined in EN 12341 with a 50 % efficiency cut-off at 10 μm aerodynamic diameter;
(h) 'polycyclic aromatic hydrocarbons'	means those organic compounds, composed of at least two fused aromatic rings made entirely from carbon and hydrogen;
(i) 'total gaseous mercury'	means elemental mercury vapour (Hg^0) and reactive gaseous mercury, i.e. water-soluble mercury species with sufficiently high vapour pressure to exist in the gas phase.

Article 3

Target values

1 Member States shall take all necessary measures not entailing disproportionate costs to ensure that, as from 31 December 2012, concentrations of arsenic, cadmium, nickel and benzo(a)pyrene, used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons, in ambient air, as assessed in accordance with Article 4, do not exceed the target values laid down in Annex I.

2 Member States shall draw up a list of zones and agglomerations in which the levels of arsenic, cadmium, nickel, and benzo(a)pyrene are below the respective target values. Member States shall maintain the levels of these pollutants in these zones and agglomerations below the respective target values and shall endeavour to preserve the best ambient air quality, compatible with sustainable development.

3 Member States shall draw up a list of the zones and agglomerations where the target values laid down in Annex I are exceeded.

For such zones and agglomerations, Member States shall specify the areas of exceedance and the sources contributing thereto. In the areas concerned, Member States shall demonstrate the application of all necessary measures not entailing disproportionate costs, directed in particular at the predominant emission sources, in order to attain the target values. In the case of industrial installations covered by Directive 96/61/EC this means the application of BAT as defined by Article 2(11) of that Directive.

Article 4

Assessment of ambient air concentrations and deposition rates

1 Ambient air quality with respect to arsenic, cadmium, nickel and benzo(a)pyrene shall be assessed throughout the territory of the Member States.

2 In accordance with the criteria referred to in paragraph 7, measurement is mandatory in the following zones:

a zones and agglomerations in which levels are between the upper and the lower assessment threshold, and

b other zones and agglomerations where levels exceed the upper assessment threshold.

The measurements provided for may be supplemented by modelling techniques to provide an adequate level of information on ambient air quality.

3 A combination of measurements, including indicative measurements as referred to in Annex IV, Section I, and modelling techniques may be used to assess ambient air quality in zones and agglomerations where the levels over a representative period are between the upper and lower assessment thresholds, to be determined pursuant to Annex II, Section II.

4 In zones and agglomerations where the levels are below the lower assessment threshold, to be determined pursuant to Annex II, Section II, the sole use of modelling or objective estimation techniques for assessing levels shall be possible.

5 Where pollutants have to be measured, the measurements shall be taken at fixed sites either continuously or by random sampling. The number of measurements shall be sufficient to enable the levels to be determined.

6 The upper and lower assessment thresholds for arsenic, cadmium, nickel and benzo(a)pyrene in ambient air shall be those laid down in Section I of Annex II. The classification of each zone or agglomeration for the purposes of this Article shall be reviewed at least every five years in accordance with the procedure laid down in Section II of Annex II. Classification shall be reviewed earlier in the event of significant change in activities relevant to concentrations of arsenic, cadmium, nickel and benzo(a)pyrene, in ambient air.

7 The criteria for determining the location of sampling points for the measurement of arsenic, cadmium, nickel and benzo(a)pyrene in ambient air in order to assess compliance with the target values shall be those listed in Sections I and II of Annex III. The minimum number of sampling points for fixed measurements of concentrations of each pollutant shall be as laid down in Section IV of Annex III, and they shall be installed in each zone or agglomeration within which measurement is required if fixed measurement is the sole source of data on concentrations within it.

8 To assess the contribution of benzo(a)pyrene in ambient air, each Member State shall monitor other relevant polycyclic aromatic hydrocarbons at a limited number of measurement sites. These compounds shall include at least: benzo(a)anthracene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and dibenz(a,h)anthracene. Monitoring sites for these polycyclic aromatic hydrocarbons shall be co-located with sampling sites for benzo(a)pyrene and shall be selected in such a way that geographical variation and long-term trends can be identified. Sections I, II and III of Annex III shall apply.

9 Irrespective of concentration levels, one background sampling point shall be installed every 100 000 km^2 for the indicative measurement, in ambient air, of arsenic, cadmium, nickel, total gaseous mercury, benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in paragraph 8 and of the total deposition of arsenic, cadmium, mercury, nickel, benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in paragraph 8. Each Member State shall set up at least one measuring station; however, Member States may, by agreement, and in accordance with guidelines to be drawn up under the procedure laid down in Article 6, set up one or several common measuring stations, covering neighbouring zones in adjoining Member States, to achieve the necessary spatial resolution. Measurement of particulate and gaseous divalent mercury is also recommended. Where appropriate, monitoring shall be coordinated with the European Monitoring and Evaluation of Pollutants (EMEP) monitoring strategy and measurement programme. The sampling sites for these pollutants shall be selected in such a way that geographical variation and long-term trends can be identified. Sections I, II and III of Annex III shall apply.

10 The use of bio indicators may be considered where regional patterns of the impact on ecosystems are to be assessed.

11 For zones and agglomerations within which information from fixed measurement stations is supplemented by information from other sources, such as emission inventories, indicative measurement methods and air quality modelling, the number of fixed measuring stations to be installed and the spatial resolution of other techniques shall be sufficient for the concentrations of air pollutants to be established in accordance with Section I of Annex III and Section I of Annex IV.

12 Data quality objectives are laid down in Section I of Annex IV. Where air quality models are used for assessment, Section II of Annex IV shall apply.

13 The reference methods for the sampling and analysis of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air shall be as laid down in Sections I, II and III of Annex V. Section IV of Annex V sets out reference techniques for measuring the total deposition of arsenic, cadmium, mercury, nickel and the polycyclic aromatic hydrocarbons and Section V of Annex V refers to reference air quality modelling techniques when such techniques are available.

14 The date by which Member States shall inform the Commission of the methods used for the preliminary assessment of air quality under Article 11(1)(d) of Directive 96/62/EC shall be the date referred to in Article 10 of this Directive.

15 Any amendments necessary to adapt the provisions of this Article and of Section II of Annex II and of Annexes III to V to scientific and technical progress shall be adopted in accordance with the procedure referred to in Article 6 but may not result in any direct or indirect changes to target values.

Article 5

Transmission of information and reporting

1 With regard to the zones and agglomerations where any of the target values laid down in Annex I is exceeded, Member States shall forward the following information to the Commission:

a the lists of the zones and agglomerations concerned,

b the areas of exceedance,

c the concentration values assessed,

d the reasons for exceedance, and in particular any sources contributing to it,

e the population exposed to such exceedance.

Member States shall also report all data assessed in accordance with Article 4, unless already reported under 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[(7)].

The information shall be transmitted for each calendar year, by no later than 30 September of the following year, and for the first time for the calendar year following 15 February 2007.

2 In addition to the requirements laid down in paragraph 1, Member States shall also report any measures taken pursuant to Article 3.

3 The Commission shall ensure that all information submitted pursuant to paragraph 1 is promptly made available to the public by appropriate means, such as Internet, press and other easily accessible media.

4 The Commission shall adopt, in accordance with the procedure referred to in Article 6, any detailed arrangements for forwarding the information to be provided under paragraph 1 of this Article.

Article 6

Committee

1 The Commission shall be assisted by the committee established by Article 12(2) of Directive 96/62/EC.

2 Where reference is made to this Article, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to the provisions of Article 8 thereof.

The period laid down in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3 The Committee shall adopt its Rules of Procedure.

Article 7

Public information

1 Member States shall ensure that clear and comprehensible information is accessible and is routinely made available to the public as well as to appropriate organisations, such as environmental organisations, consumer organisations, organisations representing the interests of sensitive populations and other relevant healthcare bodies, on ambient air concentrations of arsenic, cadmium, mercury, nickel and benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 4(8) as well as on deposition rates of arsenic, cadmium, mercury, nickel and benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in Article 4(8).

2 The information shall also indicate any annual exceedance of the target values for arsenic, cadmium, nickel and benzo(a)pyrene laid down in Annex I. The information shall give the reasons for the exceedance and the area to which it applies. It shall also provide a short assessment in relation to the target value and appropriate information regarding effects on health and impact on the environment.

Information on any measures taken pursuant to Article 3 shall be made available to the organisations referred to in paragraph 1 of this Article.

3 The information shall be made available by means of, for example, Internet, press and other easily accessible media.

Article 8

Report and review

1 The Commission shall, by 31 December 2010 at the latest, submit to the European Parliament and the Council a report based on:

a the experience acquired in the application of this Directive,

b in particular, the results of the most recent scientific research concerning the effects on human health, paying particular attention to sensitive populations, and on the environment as a whole, of exposure to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons, and

c technological developments including the progress achieved in methods of measuring and otherwise assessing concentrations of these pollutants in ambient air as well as their deposition.

2 The report referred to in paragraph 1 shall take into account:

a current air quality, trends and projections up to and beyond 2015;

b the scope for making further reductions in polluting emissions from all relevant sources, and the possible merit in introducing limit values aimed at reducing the risk to human health, for the pollutants listed in Annex I, taking account of technical feasibility and cost-effectiveness and any significant additional health and environmental protection that this would provide;

c the relationships between pollutants and opportunities for combined strategies for improving Community air quality and related objectives;

d current and future requirements for informing the public and for the exchange of information between Member States and Commission;

e the experience acquired in the application of this Directive in Member States, and in particular the conditions under which measurement has been carried out as laid down in Annex III;

f secondary economic benefits for the environment and health in reducing the emissions of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons to the extent that these can be assessed;

g the adequacy of the particle size fraction used for sampling in view of general particulate matter measurement requirements;

h the suitability of benzo(a)pyrene as a marker for the total carcinogenic activity of polycyclic aromatic hydrocarbons, having regard to predominantly gaseous forms of polycyclic aromatic hydrocarbons such as fluoranthene.

In the light of the latest scientific and technological developments the Commission shall also examine the effect of arsenic, cadmium and nickel on human health with a view to quantifying their genotoxic carcinogenicity. Taking account of measures adopted pursuant to the mercury strategy the Commission shall also consider whether there would be merit in taking further action in relation to mercury, taking account of technical feasibility and cost-effectiveness and any significant additional health and environmental protection that this would provide.

3 With a view to achieving levels of ambient air concentrations that would further reduce harmful effects on human health and would lead to a high level of protection of the environment as a whole, taking into account the technical feasibility and cost-effectiveness of further action, the report referred to in paragraph 1 may be accompanied, if appropriate, by proposals for amendments to this Directive, particularly taking into account the results obtained in accordance with paragraph 2. In addition the Commission shall consider regulating the deposition of arsenic, cadmium, mercury, nickel and specific polycyclic aromatic hydrocarbons.

Article 9

Penalties

Member States shall determine the penalties applicable to infringements of the national provisions adopted pursuant to this Directive and shall take all the measures necessary to ensure that they are implemented. The penalties provided for must be effective, proportionate and dissuasive.

Article 10

Implementation

1 Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 15 February 2007 at the latest. They shall forthwith inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2 Member States shall communicate to the Commission the texts of the main provisions of national law, which they adopt in the field covered by this Directive.

Article 11

Entry into force

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union.*

Article 12

Addressees

This Directive is addressed to the Member States.

Done at Strasbourg, 15 December 2004.

For the European Parliament

The President

J. P. BORRELL FONTELLES

For the Council

The President

A. NICOLAÏ

ANNEX I

TARGET VALUES FOR ARSENIC, CADMIUM, NICKEL AND BENZO(A)PYRENE

Pollutant	**Target value**[a]
Arsenic	6 ng/m^3
Cadmium	5 ng/m^3
Nickel	20 ng/m^3
Benzo(a)pyrene	1 ng/m^3

a For the total content in the PM_{10} fraction averaged over a calendar year.

ANNEX II

Determination of requirements for assessment of concentrations of arsenic, cadmium, nickel and benzo(a)pyrene in ambient air within a zone or agglomeration

I.Upper and lower assessment thresholds

The following upper and lower assessment thresholds will apply:

	Arsenic	**Cadmium**	**Nickel**	**B(a)P**
Upper assessment threshold in percent of the target value	60 % (3,6 ng/m^3)	60 % (3 ng/m^3)	70 % (14 ng/m^3)	60 % (0,6 ng/m^3)
Lower assessment threshold in percent of the target value	40 % (2,4 ng/m^3)	40 % (2 ng/m^3)	50 % (10 ng/m^3)	40 % (0,4 ng/m^3)

II. Determination of exceedances of upper and lower assessment thresholds

Exceedances of upper and lower assessment thresholds must be determined on the basis of concentrations during the previous five years where sufficient data are available. An assessment threshold will be deemed to have been exceeded if it has been exceeded during at least three calendar years out of those previous five years.

Where fewer than five years' data are available, Member States may combine measurement campaigns of short duration during the period of the year and at locations likely to be typical of the highest pollution levels with results obtained from information from emission inventories and modelling to determine exceedances of the upper and lower assessment thresholds.

ANNEX III

Location and minimum number of sampling points for the measurement of concentrations in ambient air and deposition rates

I.Macroscale siting

The sites of sampling points should be selected in such a way as to:

— provide data on the areas within zones and agglomerations where the population is likely to be directly or indirectly exposed to the highest concentrations averaged over a calendar year;

— provide data on levels in other areas within zones and agglomerations which are representative of the exposure of the general population;

— provide data on deposition rates representing the indirect exposure of the population through the food chain.

Sampling points should in general be sited so as to avoid measuring very small micro-environments in their immediate vicinity. As a guideline, a sampling point should be representative of air quality in surrounding areas of no less than 200 m^2 at traffic-orientated sites, at least 250 m × 250 m at industrial sites, where feasible, and several square kilometres at urban-background sites.

Where the objective is to assess background levels the sampling site should not be influenced by agglomerations or industrial sites in its vicinity, i.e. sites closer than a few kilometres.

Where contributions from industrial sources are to be assessed, at least one sampling point shall be installed downwind of the source in the nearest residential area. Where the background concentration is not known, an additional sampling point shall be situated within the main wind direction. In particular where Article 3(3) applies, the sampling points should be sited such that the application of BAT can be monitored.

Sampling points should also, where possible, be representative of similar locations not in their immediate vicinity. Where appropriate they should be co-located with sampling points for PM_{10}.

II. Microscale siting

The following guidelines should be met as far as practicable:

— the flow around the inlet sampling probe should be unrestricted, without any obstructions affecting the airflow in the vicinity of the sampler (normally some metres away from buildings, balconies, trees and other obstacles and at least 0,5 m from the nearest building in the case of sampling points representing air quality at the building line);

— in general, the inlet sampling point should be between 1,5 m (the breathing zone) and 4 m above the ground. Higher positions (up to 8 m) may be necessary in some circumstances. Higher siting may also be appropriate if the station is representative of a large area;

— the inlet probe should not be positioned in the immediate vicinity of sources in order to avoid direct intake of emissions unmixed with ambient air;

— the sampler’s exhaust outlet should be positioned so that recirculation of exhaust air to the sample inlet is avoided;

— traffic-orientated sampling points should be at least 25 metres from the edge of major junctions and at least 4 m from the centre of the nearest traffic lane; inlets should be sited so as to be representative of air quality near the building line;

— for the deposition measurements in rural background areas, the EMEP guidelines and criteria should be applied as far as practicable and where not provided for in the Annexes.

The following factors may also be taken into account:

— interfering sources
— security
— access
— availability of electrical power and telephone communications
— visibility of the site in relation to its surroundings
— safety of the public and operators
— the desirability of co-locating sampling points for different pollutants
— planning requirements.

III. Documentation and review of site selection

The site selection procedures should be fully documented at the classification stage by such means as compass-point photographs of the surrounding area and a detailed map. Sites should be reviewed at regular intervals with repeated documentation to ensure that selection criteria remain valid over time.

IV. Criteria for determining numbers of sampling points for fixed measurement of concentrations of arsenic, cadmium, nickel and benzo(a)pyrene in ambient air

Minimum number of sampling points for fixed measurement to assess compliance with target values for the protection of human health in zones and agglomerations where fixed measurement is the sole source of information.

(a) Diffuse sources

Population of agglomeration or zone(thousands)	**If maximum concentrations exceed the upper assessment threshold[a]**		**If maximum concentrations are between the upper and lower assessment thresholds**	
	As, Cd, Ni	**B(a)P**	**As, Cd, Ni**	**B(a)P**
0–749	1	1	1	1
750–1 999	2	2	1	1
2 000–3 749	2	3	1	1
3 750–4 749	3	4	2	2
4 750–5 999	4	5	2	2
≥ 6 000	5	5	2	2

a To include at least one urban-background station and for benzo(a)pyrene also one traffic-oriented station provided this does not increase the number of sampling points.

(b) Point sources

For the assessment of pollution in the vicinity of point sources, the number of sampling points for fixed measurement should be determined taking into account emission densities, the likely distribution patterns of ambient air pollution and potential exposure of the population.

The sampling points should be sited such that the application of BAT as defined by Article 2(11) of Directive 96/61/EC can be monitored.

ANNEX IV

Data quality objectives and requirements for air quality models

I.Data quality objectives

The following data quality objectives are provided as a guide to quality assurance.

	Benzo(a)pyrene	**Arsenic, cadmium and nickel**	**Polycyclic aromatic hydrocarbons other than benzo(a)pyrene, total gaseous mercury**	**Total deposition**
— Uncertainty				
Fixed and indicative measurements	50 %	40 %	50 %	70 %
Modelling	60 %	60 %	60 %	60 %
— Minimum data capture	90 %	90 %	90 %	90 %
— Minimum time coverage:				
Fixed measurements	33 %	50 %		
Indicative measurements[a]	14 %	14 %	14 %	33 %

a Indicative measurement being measurements which are performed at reduced regularity but fulfil the other data quality objectives.

The uncertainty (expressed at a 95 % confidence level) of the methods used for the assessment of ambient air concentrations will be evaluated in accordance with the principles of the CEN Guide to the expression of uncertainty in measurement (ENV 13005-1999), the methodology of ISO 5725:1994, and the guidance provided in the CEN Report, ‘Air quality — Approach to uncertainty estimation for ambient air reference measurement methods’ (CR 14377:2002E). The percentages for uncertainty are given for individual measurements, which are averaged over typical sampling times, for a 95 % confidence interval. The uncertainty of the measurements should be interpreted as being applicable in the region of the appropriate target value. Fixed and indicative measurements must be evenly distributed over the year in order to avoid skewing of results.

The requirements for minimum data capture and time coverage do not include losses of data due to regular calibration or normal maintenance of the instrumentation. Twenty-four-hour sampling is required for the measurement of benzo(a)pyrene and other polycyclic aromatic

hydrocarbons. With care, individual samples taken over a period of up to one month can be combined and analysed as a composite sample, provided the method ensures that the samples are stable for that period. The three congeners benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene can be difficult to resolve analytically. In such cases they can be reported as sum. Twenty-four hour sampling is also advisable for the measurement of arsenic, cadmium and nickel concentrations. Sampling must be spread evenly over the weekdays and the year. For the measurement of deposition rates monthly, or weekly, samples throughout the year are recommended.

Member States may use wet only instead of bulk sampling if they can demonstrate that the difference between them is within 10 %. Deposition rates should generally be given as $\mu g/m^2$ per day.

Member States may apply a minimum time coverage lower than indicated in the table, but not lower than 14 % for fixed measurements and 6 % for indicative measurements provided that they can demonstrate that the 95 % expanded uncertainty for the annual mean, calculated from the data quality objectives in the table according to ISO 11222:2002 — 'Determination of the uncertainty of the time average of air quality measurements' will be met.

II. Requirements for air quality models

Where an air quality model is used for assessment, references to descriptions of the model and information on the uncertainty shall be compiled. The uncertainty for modelling is defined as the maximum deviation of the measured and calculated concentration levels, over a full year, without taking into account the timing of the events.

III. Requirements for objective estimation techniques

Where objective estimation techniques are used, the uncertainty shall not exceed 100 %.

IV. Standardisation

For substances to be analysed in the PM_{10} fraction, the sampling volume refers to ambient conditions.

ANNEX V

Reference methods for assessment of concentrations in ambient air and deposition rates

I.Reference method for the sampling and analysis of arsenic, cadmium and nickel in ambient air

The reference method for the measurement of arsenic, cadmium and nickel concentrations in ambient air is currently being standardised by CEN and shall be based on manual PM_{10} sampling equivalent to EN 12341, followed by digestion of the samples and analysis by Atomic Absorption Spectrometry or ICP Mass Spectrometry. In the absence of a CEN standard method, Member States are allowed to use national standard methods or ISO standard methods.

A Member State may also use any other methods which it can demonstrate give results equivalent to the above method.

II. Reference method for the sampling and analysis of polycyclic aromatic hydrocarbons in ambient air

The reference method for the measurement of benzo(a)pyrene concentrations in ambient air is currently being standardised by CEN and shall be based on manual PM_{10} sampling equivalent to

EN 12341. In the absence of a CEN standard method, for benzo(a)pyrene or the other polycyclic aromatic hydrocarbons referred to in Article 4(8), Member States are allowed to use national standard methods or ISO methods such as ISO standard 12884.

A Member State may also use any other methods which it can demonstrate give results equivalent to the above method.

III. Reference method for the sampling and analysis of mercury in ambient air

The reference method for the measurement of total gaseous mercury concentrations in ambient air shall be an automated method based on Atomic Absorption Spectrometry or Atomic Fluorescence Spectrometry. In the absence of a CEN standardised method, Member States are allowed to use national standard methods or ISO standard methods.

A Member State may also use any other methods which it can demonstrate give results equivalent to the above method.

IV. Reference method for the sampling and analysis of the deposition of arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons

The reference method for the sampling of deposited arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons shall be based on the exposition of cylindrical deposit gauges with standardised dimensions. In the absence of a CEN standardised method, Member States are allowed to use national standard methods.

V. Reference air quality modelling techniques

Reference air quality modelling techniques cannot be specified at present. Any amendments to adapt this point to scientific and technical progress must be adopted in accordance with the procedure laid down in Article 6.

(**1**) OJ C 110, 30.4.2004, p. 16.

(**2**) Opinion of the European Parliament of 20 April 2004 (not yet published in the Official Journal), Council Decision of 15 November 2004.

(**3**) OJ L 242, 10.9.2002, p. 1.

(**4**) OJ L 296, 21.11.1996, p. 55. Directive as amended by Regulation (EC) No 1882/2003 of the European Parliament and of the Council (OJ L 284, 31.10.2003, p. 1).

(**5**) OJ L 257, 10.10.1996, p. 26. Directive as last amended by Regulation (EC) No 1882/2003.

(**6**) OJ L 184, 17.7.1999, p. 23.

(**7**) OJ L 35, 5.2.1997, p. 14. Decision as amended by Commission Decision 2001/752/EC (OJ L 282, 26.10.2001, p. 69).