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STATUTORY INSTRUMENTS

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**2003 No. (W.)**

**ENVIRONMENTAL  
PROTECTION, WALES**

The Air Quality (Ozone) (Wales)  
Regulations 2003

## EXPLANATORY NOTE

*(This note is not part of the Regulations)*

These Regulations implement, in Wales, Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air.

Regulation 3 sets target values and long-term objectives for ozone concentrations in ambient air (“ozone levels”) for the protection of human health and vegetation.

Regulation 4 places a duty upon the National Assembly for Wales (“the National Assembly”) to ensure that concentrations of ozone and ozone precursor substances in ambient air are assessed in each zone in Wales in accordance with the methods specified in that regulation. The regulation provides that the appropriate method of assessment for each zone is to be determined by reference to the history of ozone levels in that zone during the previous five years. It specifies, by reference to Part I of Schedule 3, the minimum number of sampling points required in zones where continuous fixed measurement is the sole method of assessment, and requires measurements of nitrogen dioxide to be made at no less than half those sampling points. It also provides details of the circumstances in which the number of fixed sampling points required by Part I of Schedule 3 may be reduced, and the manner in which air quality must be assessed in those circumstances. The regulation specifies, by reference to Part II of Schedule 3, the minimum number of sampling points required in zones where measurement methods other than continuous fixed measurement may be used. It also sets out, by reference to Schedule 6, the reference methods for the analysis of ozone and calibration of ozone instruments and it requires the National Assembly to obtain data on the concentrations of the ozone precursor substances listed in Schedule 4.

Regulation 5 requires the National Assembly to draw up a list of zones in Wales in which: ozone levels are higher than the target values; ozone levels are higher than the long-term objectives but equal to or below the target values; and ozone levels meet the long-term objectives. The regulation requires the National Assembly to prepare and implement action plans for each zone in the first category to attain the target value within the specified date, where this is achievable through proportionate measures, and to make such plans available to the public. It also requires the National Assembly to prepare and implement cost-effective measures for zones in the second category, with the aim of achieving the long-term objectives. In addition, the regulation places a duty on the National Assembly to ensure that, in each zone in the third category, ozone levels are kept below the long-term

objectives and are preserved through proportionate measures.

Regulation 6 sets the information threshold and alert threshold for ozone, by reference to Part I of Schedule 7.

Regulation 7 places a duty on the National Assembly to ensure that up-to-date information on ozone levels is made available routinely to the public. This information must include an indication of all incidents during which ozone levels exceeded the specified long-term objective and thresholds, together with an evaluation of the effect of those exceedances on human health; comprehensive annual reports; and timely information about actual or predicted exceedances of the alert threshold. The regulation requires all such information to be clear, comprehensible and accessible.

Regulation 8 places a duty on the National Assembly to draw up an action plan for each zone in which there is a risk of the alert threshold being exceeded, if it determines that there is significant potential for reducing that risk or for reducing the duration or severity of any such exceedance. The regulation requires the National Assembly to make available to the public the results of its determinations, the action plans which it draws up, and information on the implementation of those action plans.

Regulation 9 requires the National Assembly to notify the Secretary of State where ozone levels in any zone in Wales exceed a target value or long-term objective, and it appears to the Assembly that this exceedance is due largely to precursor emissions in another Member State of the European Union. It also places a duty on the National Assembly to take such action as is within its powers to give effect to any joint action plan or programme, or joint short-term action plan, drawn up by the Secretary of State and another Member State in compliance with Article 8(1) or (2) of Directive 2002/3/EC.

Regulation 10 requires the National Assembly to ensure that the information specified in Part I of Schedule 8 is obtained and collated. The criteria for aggregating data and calculating statistical parameters specified in Part II of Schedule 8 apply to this information.

Regulation 11 revokes the Ozone Monitoring and Information Regulations 1994, insofar as they apply to Wales.

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STATUTORY INSTRUMENTS

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2003 No. (W.)

**ENVIRONMENTAL  
PROTECTION, WALES****The Air Quality (Ozone) (Wales)  
Regulations 2003***Made* 2003*Coming into force* 9 September 2003

The National Assembly for Wales, in exercise of the powers conferred upon it by section 29 of the Government of Wales Act 1998<sup>(1)</sup> and subsection (2) of section 2 of the European Communities Act 1972<sup>(2)</sup>, and having been designated for the purpose of that subsection by Article 2 of the European Communities (Designation) (No.3) Order 2000<sup>(3)</sup> in relation to measures relating to the assessment and management of ambient air quality and compliance with air quality limit values, target values and objectives, hereby makes the following Regulations:

**Citation, commencement and application**

1.—(1) These Regulations may be cited as the Air Quality (Ozone) (Wales) Regulations 2003 and come into force on 9<sup>th</sup> September 2003.

(2) These Regulations apply to Wales.

**Definitions**

2. In these Regulations –

“agglomeration” (“*crynhoad*”) means a zone with a population concentration in excess of 250,000 inhabitants or, where the population concentration is 250,000 or less, a population density per km<sup>2</sup> for which the National Assembly considers that the need for ambient air to be assessed or managed is justified;

“alert threshold” (“*trothwy rhybuddio*”) means that level prescribed as such under regulation 6;

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(1) 1998 c.38.

(2) 1972 c.68.

(3) S.I. 2000/2812.

“ambient air” (“*ambient air*”) means outdoor air in the troposphere, excluding work places;

“assessment” (“*asesu*”) means any method used to measure, calculate, predict or estimate the level of ozone or ozone precursor substances in the ambient air;

“fixed measurement” (“*mesuriadau sefydlog*”) means measurements taken at fixed sites either continuously or by random sampling, the number of measurements being sufficiently large to enable the levels observed to be determined;

“information threshold” (“*trothwy gwybodaeth*”) means that level prescribed as such under regulation 6;

“level” (“*lefel*”) means the concentration of ozone or ozone precursor substances in ambient air;

“local health board” (“*bwrdd iechyd lleol*”) has the meaning given in section 16BA of the National Health Service Act 1977(4);

“long-term objective” (“*amcan hirdymor*”) means that level prescribed as such under regulation 3(2);

“National Assembly” (“*Cynulliad Cenedlaethol*”) means the National Assembly for Wales;

“ozone precursor substances” (“*rhagsywlledion osôn*”) means substances which contribute to the formation of ground-level ozone, including those listed in Schedule 4;

“the public” (“*y cyhoedd*”) includes health care bodies and organisations which represent the interests of sensitive populations, consumers and the environment and which have an interest in ambient air quality;

“relevant averaging period” (“*cyfnod cyfartaleddu perthnasol*”) has the meaning prescribed in regulation 7(5);

“rural background station” (“*gorsaf cefndir gwledig*”) has the meaning given by Part I of Schedule 2;

“target value” (“*gwerth targed*”) means that level prescribed under regulation 3(1);

“volatile organic compounds” (“*cyfansoddion organig anweddol*”) or “VOCs” (“*VOCs*”) means all organic compounds from anthropogenic and biogenic sources, other than methane, that are capable of producing photochemical oxidants by reaction with nitrogen oxides in the presence of sunlight; and

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(4) 1977 c.49. Section 16BA was inserted by section 6(1) of the National Health Service Reform and Health Care Professions Act 2002 (c.17).

“zone” (“*parth*”) means a part of Wales which is designated for the purposes of these Regulations and which is shown on a map published by the National Assembly on 10<sup>th</sup> June 2003, deposited at the offices of the National Assembly, Environmental Protection Division, Cathays Park, Cardiff CF10 3NQ.

### **Target values and long-term objectives**

3.—(1) The target values for levels of ozone are set out in Part II of Schedule 1.

(2) The long-term objectives for levels of ozone are set out in Part III of Schedule 1.

(3) The definitions and provisions of Part I of Schedule 1 apply to Parts II and III of that Schedule.

### **Assessment of levels of ozone and ozone precursor substances**

4.—(1) The National Assembly must ensure that levels of ozone and ozone precursor substances are assessed in each zone in accordance with this regulation.

(2) Continuous fixed measurement must be used in any zone in which, within any of the previous five years, levels of ozone have exceeded a long-term objective.

(3) In order to determine whether, during any of the previous five years, levels of ozone have exceeded a long-term objective in a zone in relation to which data from continuous fixed measurement is not available in for the whole of that period, measurement campaigns of short duration, at times and locations likely to be typical of the highest pollution levels, may be combined with results from emission inventories and modelling.

(4) Where levels of ozone in a zone have not, in any of the previous five years, exceeded the long-term objectives, a combination of continuous fixed measurement, modelling and indicative measurements may be used in that zone.

(5) For each zone to which paragraph (2) applies, the minimum number of sampling points for fixed continuous measurement must be in accordance with Part I of Schedule 3.

(6) For each zone to which paragraph (2) applies, measurements of nitrogen dioxide –

(a) must be made at a minimum of 50 per cent of the ozone sampling points required under Part I of Schedule 3;

(b) must be continuous, except at rural background stations, where other measurement methods may be used.

(7) The number of fixed sampling points required under paragraph (5) may be reduced provided that –

- (a) the information from fixed sampling points is supplemented by information from modelling, indicative measurements or both these methods;
- (b) the supplementary sources of information referred to in sub-paragraph (a) provide an adequate level of information for the assessment of air quality with regard to target values, information and alert thresholds;
- (c) the number of sampling points to be installed and the spatial resolution of other techniques are sufficient for the level of ozone to be established in accordance with the data quality objectives specified in Part I of Schedule 5 and lead to assessment results as specified in Part II of that Schedule;
- (d) the number of sampling points in each zone amounts to at least one sampling point per two million inhabitants, or one sampling point per 50,000 km<sup>2</sup>, whichever produces the greater number of sampling points;
- (e) each zone contains at least one sampling point; and
- (f) nitrogen dioxide is measured at all remaining sampling points except at rural background stations.

(8) For each zone to which paragraph (7) applies, the supplementary sources of information referred to in paragraph (7)(a) must be taken into account when assessing air quality with respect to target values.

(9) For each zone to which paragraph (4) applies, the minimum number of sampling points for fixed measurements must be in accordance with Part II of Schedule 3.

(10) Schedule 2 has effect for the purpose of determining the location of sampling points for the measurement of ozone.

(11) The reference methods for the analysis of ozone and the calibration of ozone instruments set out in Schedule 6 must be used unless the National Assembly adopts other methods which it considers can be demonstrated to give equivalent results.

(12) For ozone precursor substances, –

- (a) the National Assembly must ensure that at least one measuring station to supply data on levels of the ozone precursor substances listed in Schedule 4 is installed and operated within Wales; and
- (b) in choosing the number and siting of the stations at which levels of ozone precursor substances are to be measured, the National

Assembly must take account of the objectives, methods and recommendations laid down in that Schedule.

(13) For ozone and nitrogen oxides measurements of volume must be standardised at a temperature of 293 K and a pressure of 101.3 kPa.

#### **Programmes and measures to address ozone levels**

5.—(1) The National Assembly must draw up a list of zones in which –

- (a) levels of ozone, as assessed in accordance with regulation 4, are higher than the target values;
- (b) levels of ozone, as assessed in accordance with regulation 4, are higher than the long-term objectives but equal to or below the target values;
- (c) levels of ozone meet the long-term objectives.

(2) The National Assembly must prepare and implement, for each zone listed under paragraph (1)(a), a plan or programme for attaining the target values by the date specified in Part II of Schedule 1.

(3) Paragraph (2) does not apply if the National Assembly considers that attaining the target values would not be achievable through proportionate measures.

(4) In preparing and implementing a plan or programme under paragraph (2), the National Assembly must ensure that the plan or programme is integrated, where appropriate, with any plan or programme prepared for that zone under regulation 10 of the Air Quality Limit Values (Wales) Regulations 2002<sup>(5)</sup>.

(5) A plan or programme prepared under paragraph (2) must include, as a minimum, information equivalent to that listed in Schedule 7 to the Air Quality Limit Values (Wales) Regulations 2002 (as if references in that Schedule to “pollution” were references to levels of ozone which exceed the target level), and must be made available to the public.

(6) The National Assembly must prepare and implement for each zone listed under paragraph (1)(b) measures which it considers to be cost-effective, with the aim of achieving the long-term objectives.

(7) The measures prepared and implemented under paragraph (6) must, as a minimum, be consistent with any plans or programmes prepared and implemented under paragraph (2).

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<sup>(5)</sup> S.I. 2002/3183 (W.299).



(8) The National Assembly must, for any zone to which paragraph (1)(c) applies –

- (a) as far as factors including the transboundary nature of ozone pollution and meteorological conditions permit, ensure that ozone levels are kept below long-term objectives; and
- (b) preserve, through proportionate measures, the best ambient air quality which it considers to be compatible with sustainable development and a high level of protection for the environment and human health.

### **Information threshold and alert threshold**

6. The information threshold and the alert threshold for ozone are set out in Part I of Schedule 7.

### **Public information**

7.—(1) The National Assembly must ensure that up-to-date information on levels of ozone is routinely made available to the public in accordance with the provisions of this Regulation.

(2) The information on levels of ozone in paragraph (1) must be updated –

- (a) where appropriate and practicable, on an hourly basis;
- (b) in all other cases, as a minimum, on a daily basis.

(3) Information made available under paragraph (1) must include –

- (a) an indication of all incidents when the level of ozone, when assessed by reference to any relevant averaging period, exceeded –
  - (i) the long-term objective for the protection of health;
  - (ii) the information threshold;
  - (iii) the alert threshold;and a short evaluation of the effect of those exceedances on human health;
- (b) comprehensive annual reports; and
- (c) timely information about actual or predicted exceedances of the alert threshold.

(4) The annual reports referred to in paragraph (3)(b) must, as a minimum, –

- (a) indicate, for human health, any exceedances of the target value, the long-term objective, the information threshold or the alert threshold for the relevant averaging period;
- (b) indicate, for vegetation, any exceedances of the target value or the long-term objective; and

(c) include, where appropriate, a short evaluation of the effect of those exceedances.

(5) For the purposes of this regulation, the “relevant averaging period” –

(a) in relation to target values, is set out in Part II of Schedule 1;

(b) in relation to the long-term objective for the protection of health, is set out in Part III of Schedule 1; and

(c) in relation to the information threshold and the alert threshold, is set out in Part I of Schedule 7.

(6) Information made available under paragraph (3)(c) must, in addition to being provided to the public, be provided to any local health board whose area is or may be affected by such an exceedance.

(7) The National Assembly may publish the information and reports referred to in this regulation in such a manner as it considers appropriate, having regard to the nature of that information and those reports.

(8) Where the alert threshold or information threshold is exceeded, the National Assembly must supply to the public the information specified in Part II of Schedule 7.

(9) Where an exceedance of the alert threshold or the information threshold is predicted, the National Assembly must, where practicable, supply to the public the information specified in Part II of Schedule 7.

(10) Information made available to the public under this regulation must be clear, comprehensible and accessible.

### **Short term action plans**

8.—(1) Where there is any risk of the alert threshold for ozone being exceeded in a zone, the National Assembly must determine whether there is significant potential for reducing that risk or for reducing the duration or severity of any such exceedance if one should occur and, if so, must draw up an action plan, taking into account particular local circumstances, indicating the measures to be taken, in the short term, to eliminate or reduce that risk or to reduce the duration or severity of the exceedance, as the case may be.

(2) When making the determination referred to in paragraph (1), the National Assembly must take account of national geographical, meteorological and economic conditions.

(3) The National Assembly must make available to the public –

- (a) the results of any determination referred to in paragraph (1);
- (b) any action plans which it draws up under paragraph (1); and
- (c) information on the implementation of those action plans.

### **Transboundary pollution**

**9.**—(1) Where the level of ozone in any zone in Wales exceeds a target value or long-term objective, and that exceedance appears to the National Assembly to be due largely to precursor emissions in another Member State of the European Union, the National Assembly must notify the Secretary of State.

(2) Where the Secretary of State draws up a joint plan or programme, or a joint short-term action plan, with another Member State of the European Union in compliance with a Community obligation, the National Assembly must take such action as is within its powers to give effect to that plan or programme in Wales.

(3) For the purposes of this regulation, “Community obligation” means an obligation placed on the United Kingdom by Article 8(1) or (2) of Directive 2002/3/EC of the European Parliament and of the Council relating to ozone in ambient air<sup>(6)</sup>.

### **Information requirements**

**10.**—(1) The National Assembly must ensure that the information specified in Part I of Schedule 8 is obtained and collated.

(2) The criteria for aggregating data and calculating statistical parameters specified in Part II of Schedule 8 apply to the information specified in paragraph (1).

### **Revocation of the Ozone Monitoring and Information Regulations 1994**

**11.**The Ozone Monitoring and Information Regulations 1994<sup>(7)</sup> are hereby revoked, insofar as they apply to Wales.

Signed on behalf of the National Assembly for Wales under section 66(1) of the Government of Wales Act 1998

Date

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<sup>(6)</sup> OJ L 67, 9.3.2002, p.14.

<sup>(7)</sup> S.I. 1994/440.

The Presiding Officer of the National Assembly

## SCHEDULE 1

Regulations 3 and 5(2)

## TARGET VALUES AND LONG-TERM OBJECTIVES FOR OZONE LEVELS

## PART I

## Definitions and interpretation

When assessing compliance with the target values and long-term objectives set out in this Schedule-

- (a) all values must be expressed in  $\mu\text{g}/\text{m}^3$ ;
- (b) the volume must be standardised at the following conditions of temperature and pressure: 293K and 101.3kPa;
- (c) the time must be specified in Central European Time;
- (d) "AOT40" (expressed in  $(\mu\text{g}/\text{m}^3)\cdot\text{hours}$ ) means the sum of the difference between hourly concentrations greater than  $80\mu\text{g}/\text{m}^3$  (which equals 40 parts per billion) and  $80\mu\text{g}/\text{m}^3$  over a given period using only the 1 hour values measured between 8:00 and 20:00 Central European Time each day;
- (e) in order to be valid, the annual data on exceedances must meet the criteria set out in Part II of Schedule 8.

## PART II

## Target values for ozone

	<i>Parameter</i>	<i>Target value for 2010 (a)</i>
1. Target value for the protection of human health	Maximum daily 8-hour mean (b)	$120\mu\text{g}/\text{m}^3$ not to be exceeded on more than 25 days per calendar year averaged over three years (c)
2. Target value for the protection of vegetation	AOT40, calculated from 1h values from May to July	$18,000\mu\text{g}/\text{m}^3\cdot\text{h}$ averaged over five years (c)

- (a) compliance with target values will be assessed as of this value. That is, 2010 will be the first year the data for which is used in calculating compliance over three or five years, as appropriate.
- (b) the maximum daily 8-hour mean concentration is to be selected by examining 8-hour running averages, calculated from hourly data and updated each hour. Each 8-hour average so calculated is to be assigned to the day on which it ends – that is, the first calculation period for any one day will be the period from 17:00 on the previous day to 01:00 on that day; the last calculation period for any one day will be the period from 16:00 to 24:00 on that day.
- (c) if the three or five year averages cannot be determined on the basis of a full and consecutive set of annual data, the minimum annual data required for checking compliance with the target values will be as follows:
  - (i) for the target value for the protection of human health, valid data for one year; and

- (ii) for the target value for the protection of vegetation, valid data for three years.

## PART III

### Long-term objectives for ozone

	<i>Parameter</i>	<i>Long-term objective</i>
1. Long-term objective for the protection of human health	Maximum daily 8-hour mean within a calendar year	120 $\mu\text{g}/\text{m}^3$
2. Long-term objective for the protection of vegetation	AOT40, calculated from 1h values from May to July	6,000 $\mu\text{g}/\text{m}^3\cdot\text{h}$

## SCHEDULE 2

Regulation 4(10)

### CLASSIFICATION AND LOCATION OF SAMPLING POINTS

The following considerations apply to fixed measurement:

## PART I

### Macroscale siting

<i>Type of station</i>	<i>Objective of measurement</i>	<i>Representativeness (a)</i>	<i>Macroscale siting criteria</i>
Urban	<b>Protection of human health:</b> to assess the exposure of the urban population to ozone, i.e. where the population density and ozone concentration are relatively high and representative of the exposure of the general population.	A few $\text{km}^2$ .	Away from the influence of local emissions such as traffic, petrol stations etc.; vented locations where well-mixed levels can be measured; locations such as residential and commercial areas of cities, parks (away from the trees), big streets or squares with very little or no traffic, open areas characteristic of education, sports or recreation facilities.
Suburban	<b>Protection of human health and vegetation:</b> To assess the exposure of the population and vegetation located in the outskirts of the agglomeration, where the highest ozone levels, to which the population and vegetation is likely to be	Some tens of $\text{km}^2$	At a certain distance from the area of maximum emissions downwind following the main wind directions during conditions favourable to ozone formation; where population, sensitive crops or natural ecosystems located in the outer fringe of an agglomeration are exposed to high ozone levels;

	directly or indirectly exposed, occur.		where appropriate, some suburban stations also upwind of the area of maximum emissions, in order to determine the regional background levels of ozone.
Rural	<b>Protection of human health and vegetation:</b> To assess the exposure of population, crops and natural ecosystems to sub-regional scale ozone concentrations.	Sub-regional levels (a few km <sup>2</sup> )	Stations can be located in small settlements and/or areas with natural ecosystems, forests or crops; representative for ozone away from the influence of immediate local emissions such as industrial installations and roads; at open area sites, but not on higher mountain-tops.
Rural background	<b>Protection of vegetation and human health:</b> To assess the exposure of crops and natural ecosystems to regional-scale ozone concentrations as well as exposure of the populations.	Regional/national/continental levels (1,000 to 10,000km <sup>2</sup> )	Station located in areas with lower population density, e.g. with natural ecosystems, forests, far removed from urban and industrial areas and away from local emissions; avoid locations which are subject to locally enhanced formation of near-ground inversion conditions, also summits of higher mountains; coastal sites with pronounced diurnal wind cycles of local character are not recommended.

(a) sampling points should also, where possible, be representative of similar locations not in their immediate vicinity.

For rural and rural background stations, consideration should be given, where appropriate, to co-ordination with the monitoring requirements of Commission Regulation (EC) No. 1091/94 (8) concerning protection of the Community's forests against atmospheric pollution.

## PART II

### Microscale siting

The following guidelines should be followed, as far as practicable:

1. The flow around the inlet sampling probe should be unrestricted (free in an arc of at least 270<sup>0</sup>) without any obstructions affecting the air flow in the vicinity of the sampler, i.e. away from buildings, balconies, trees and other obstacles by more than twice the height the obstacle protrudes above the sampler.

2. In general, the inlet sampling point should be between 1.5m (the breathing zone) and 4m above the ground. Higher positions are possible for urban stations in some circumstances and in wooded areas.

3. The inlet probe should be positioned well away from such sources as furnaces and incineration flues and more than 10m from the nearest road, with distance increasing as a function of traffic intensity.

4. The sampler's exhaust outlet should be positioned so as to avoid recirculation of exhaust to the sampler inlet.

The following factors may also be taken into account:

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(8) OJ L 125, 18.5.1994, p.1.

- (a) interfering sources;
- (b) security;
- (c) access;
- (d) availability of electrical power and telephone communications;
- (e) visibility of the site in relation to its surroundings;
- (f) safety of public and operators;
- (g) the desirability of co-locating sampling points for different pollutants; and
- (h) planning requirements.

### PART III

#### Documentation and review of site selection

Site selection procedures should be fully documented at the classification stage by such means as compass point photographs of the surroundings and a detailed map. Sites should be reviewed at regular intervals with repeated documentation to ensure that selection criteria are still being met.

This requires proper screening and interpretation of the monitoring data in the context of the meteorological and photochemical processes affecting the ozone concentrations measured at the respective site.

### SCHEDULE 3

Regulation 4(5), (6) and (9)

#### CRITERIA FOR DETERMINING MINIMUM NUMBERS OF SAMPLING POINTS FOR FIXED MEASUREMENT OF OZONE LEVELS

##### PART I

Minimum number of sampling points for fixed continuous measurement to assess air quality in view of compliance with the target values, long-term objectives and information and alert thresholds where continuous measurement is the sole source of information

<i>Population (x 1,000)</i>	<i>Agglomerations (urban and suburban) (a)</i>	<i>Other zones (suburban and rural) (a)</i>	<i>Rural background</i>
0 – 250		1	1 station/50,000 km <sup>2</sup> as an average density over all zones per country (b)
251 – 500	1	2	
501 – 1,000	2	2	
1,001 – 1,500	3	3	
1,501 – 2,000	3	4	
2,001 – 2,750	4	5	
2,751 – 3,750	5	6	
> 3,750	1 additional station per 2 million inhabitants	1 additional station per 2 million inhabitants	

(a) at least 1 station in suburban areas, where the highest exposure of the population is likely to occur. In agglomerations, at least 50% of the stations should be located in suburban areas.



(b) 1 station per 25,000 km<sup>2</sup> for complex terrain is recommended.

## PART II

### Minimum number of sampling points for fixed measurement for zones attaining the long-term objectives

The number of sampling points for ozone must, in combination with other means of supplementary assessment such as air quality modelling and co-located nitrogen dioxide measurements, be sufficient to examine the trend of ozone pollution and check compliance with the long-term objectives. The number of stations located in agglomerations and other zones may be reduced to one-third of the number specified in Part I. Where information from fixed measurement stations is the sole source of information, at least one monitoring station should be kept. If, in zones where there is supplementary assessment, the result of this is that a zone has no remaining station, co-ordination with the number of stations in neighbouring zones must ensure adequate assessment of ozone concentrations against long-term objectives. The number of rural background stations should be 1 per 100,000 km<sup>2</sup>.

## SCHEDULE 4

Regulation 4(12)

### MEASUREMENTS OF OZONE PRECURSOR SUBSTANCES

#### Objectives

The main objectives of measurements of ozone precursor substances are to analyse any trend in ozone precursors, to check the efficiency of emission reduction strategies, to check the consistency of emissions inventories and to help attribute emission sources to pollution concentration.

An additional aim is to support the understanding of ozone formation and precursor dispersion processes, as well as the application of photochemical models.

#### Substances

Measurements of ozone precursor substances must include at least nitrogen oxides, and appropriate volatile organic compounds (VOCs). A list of VOCs recommended for measurement is given below.

Ethane	1-butene	isoprene	ethyl benzene
Ethylene	trans-2-butene	n-hexane	m+p-xylene
Acetylene	cis-2-butene	i-hexane	o-xylene
Propane	1.3-butadiene	n-heptane	1,2,4-trimeth.benzene
Propene	n-pentane	n-octane	1,2,3-trimeth.benzene
n-butane	i-pentane	i-octane	1,3,5-trimeth.benzene
i-butane	1-pentene	benzene	Formaldehyde
	2-pentene	toluene	total non-methane hydrocarbons

#### Reference methods

The reference method for the analysis of oxides of nitrogen must be that specified in Part II of Schedule 6 to The Air Quality Limit Values (Wales) Regulations 2002, S.I. 2002/3183 (W.299).

#### Siting

Measurements should be taken in particular in urban and suburban areas at any monitoring site set up in accordance with the requirements of The Air Quality Limit Values (Wales) Regulations 2002 and considered appropriate with regard to the monitoring objectives in this Schedule.

## SCHEDULE 5

Regulation 4(7)

### DATA QUALITY OBJECTIVES AND COMPILATION OF RESULTS OF AIR QUALITY ASSESSMENT

#### PART 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:

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<i>For ozone, NO and NO<sub>2</sub></i>	
<b>Continuous fixed measurement</b>	
Uncertainty of individual measurements	15%
Minimum data capture	90% during summer 75% during winter
<b>Indicative measurement</b>	
Uncertainty of individual measurements	30%
Minimum data capture	90%
Minimum time coverage	>10% during summer
<b>Modelling</b>	
Uncertainty	
1 hour averages (daytime)	50%
8 hours daily maximum	50%
<b>Objective estimation</b>	
Uncertainty	75%

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The uncertainty (on a 95% confidence interval) of the measurement methods must be evaluated in accordance with the principles laid down in the 'Guide to the Expression of Uncertainty of Measurements' (ISO 1993) or the methodology in ISO 5725-1 'Accuracy (trueness and precision) of measurement methods and results' (ISO 1994) (9) or equivalent. The percentages for uncertainty in the table are given for individual measurements, averaged over the period for calculating target values and long-term objectives, for a 95% confidence interval. The uncertainty for continuous fixed measurements should be interpreted as being applicable in the region of the concentration used for the appropriate threshold.

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(9) Copies of these International Standards Organisation publications can be purchased from the British Standards Institution 'BSI' sales department either by telephone on 020-8996-9001 or by post from the BSI, Standards House, 389 Chiswick High Road, London, W4 4AL

The uncertainty for modelling and objective estimation means the maximum deviation of the measured and calculated concentration levels, over the period for calculating the appropriate threshold, without taking into account the timing of events.

‘Time coverage’ means the percentage of time considered for settling the threshold value during which the pollutant is measured.

‘Data capture’ means the ratio of the time for which the instrument produces valid data, to the time for which the statistical parameter or aggregated value is to be calculated.

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

## PART II

### Results of air quality assessment

The following information should be compiled for zones within which sources other than measurement are employed to supplement information from measurement:

- a description of the assessment activities carried out;
- specific methods used, with references to descriptions of the method;
- sources of data and information;
- a description of results, including uncertainties and, in particular, the extent of any area within the zone over which concentrations exceed long-term objectives or target values;
- for long-term objectives or target values whose object is the protection of human health, the population potentially exposed to concentrations in excess of the threshold.

Where possible, the National Assembly must ensure that maps are compiled showing concentration distributions within each zone.

## SCHEDULE 6

Regulation 4(11)

### REFERENCE METHODS FOR ANALYSIS OF OZONE AND CALIBRATION OF OZONE INSTRUMENTS

The reference method for analysis of ozone shall be the UV photometric method (ISO FDIS 13964)(10).

The reference method for calibration of ozone instruments shall be the Reference UV photometer method (ISO FDIS 13964, VDI 2468, B1.6)(11).

## SCHEDULE 7

Regulations 6, 7(8) and (9)

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(10) Copies of this International Standards Organisation publication can be purchased from the British Standards Institution ‘BSI’ sales department either by telephone on 020 8996 9001 or by post from the BSI Standards House, 389 Chiswick High Road, London W4 4AL.

(11) See above.

# INFORMATION AND ALERT THRESHOLDS

## PART I

### Information and alert thresholds for ozone

	<i>Parameter</i>	<i>Threshold</i>
Information threshold	1 hour average	180 $\mu\text{g}/\text{m}^3$
Alert threshold	1 hour average (a)	240 $\mu\text{g}/\text{m}^3$

(a) The exceedance of the threshold is to be measured or predicted for three consecutive hours.

## PART II

Minimum details to be supplied to the public when the information or alert threshold is exceeded or exceedance is predicted

Details to be supplied to the public on a sufficiently large scale as soon as possible should include:

1. Information on any observed exceedance:
  - (a) the location or area of the exceedance;
  - (b) the type of threshold exceeded (information threshold or alert threshold);
  - (c) the time at which the exceedance began and its duration; and
  - (d) the highest 1-hour and 8-hour mean concentration.
2. Forecast for the following afternoon, day or days:
  - (a) the geographical area of expected exceedances of an information threshold or alert threshold; and
  - (b) the expected change in pollution (that is, improvement, stabilisation or deterioration)
3. Information on the type of population concerned, possible health effects and recommended conduct:
  - (a) information on population groups at risk;
  - (b) description of likely symptoms;
  - (c) recommended precautions to be taken by the population concerned; and
  - (d) where to find further information.
4. Information provided under this Schedule shall also include:
  - (a) information on preventive action to reduce pollution or exposure to it;
  - (b) an indication of main source sectors; and
  - (c) recommendations for action to reduce emissions.

## SCHEDULE 8

Regulations 7(5), 10(1) and (2)

**INFORMATION TO BE OBTAINED AND COLLATED ON OZONE LEVELS, AND CRITERIA FOR AGGREGATING DATA AND CALCULATING STATISTICAL PARAMETERS**

**PART I**

Information on ozone levels

The following information on ozone concentrations must be obtained and collated:

	<i>Type of station</i>	<i>Level</i>	<i>Averaging/accumulation time</i>	<i>Provisional date for each month from April to September</i>	<i>Report for each year</i>
Information threshold	Any	180µg/m <sup>3</sup>	1 hour	– for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO <sub>2</sub> values when required. – monthly 1 hour maximum ozone.	–for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO <sub>2</sub> values when required.
Alert threshold	Any	240µg/m <sup>3</sup>	1 hour	– for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO <sub>2</sub> values when required.	– for each day with any exceedance: date, total hours of exceedance, maximum 1 hour ozone and related NO <sub>2</sub> values when required.
Health protection	Any	120µg/m <sup>3</sup>	8 hours	– for each day with any exceedance: date, 8 hours maximum (b)	– for each day with any exceedance: date, 8 hours maximum (b)
Vegetation protection	Suburban, rural, rural background	AOT40 (a) = 6,000 µg/m <sup>3</sup> ·h	1 hour, accumulated from May to June		Value
Forest protection	Suburban, rural, rural background	AOT40 (a) =20,000 µg/m <sup>3</sup> ·h	1 hour, accumulated from April to September		Value
Materials	Any	40µg/m <sup>3</sup>	1 year		Value

(a) in this Schedule, “AOT40” has the same meaning as in paragraph (d) of Part I to Schedule 1.

(b) maximum daily 8-hour mean.



## PART II

### Criteria for aggregating data and calculating statistical parameters

In this Part, percentiles are to be calculated using the method specified in Council Directive 97/101/EC<sup>(12)</sup>.

The following criteria are to be used for checking validity when aggregating data and calculating statistical parameters:

<i>Parameter</i>	<i>Required proportion of valid data</i>
1 hour values	75% (45 minutes)
8 hour values	75% of values (6 hours)
Maximum daily 8 hours mean from hourly running 8 hours averages	75% of the hourly running 8 hour averages (8 hours per day)
AOT40	90% of the 1 hour values over the time period defined for calculating the AOT40 (a)
Annual mean	75% of the 1 hour values over summer (April to September) and winter (January to March, October to December) seasons separately
Number of exceedances and maximum values per month	90% of the daily maximum 8 hours mean value (27 available daily values per month) 90% of the 1 hour values between 8:00 and 20:00 Central European Time
Number of exceedances and maximum values per year	Five out of six summer months over the summer season (April to September)

(a) in cases where all possible measured data are not available, the following factor must be used to calculate AOT40 values:

$$\text{AOT40 (estimate)} = \text{AOT40 (measured)} \times \frac{\text{total possible number of hours}^*}{\text{number of measured hourly values}}$$

\* being the number of hours within the time period of AOT40 definition (that is, 8:00 to 20:00 Central European Time from 1 May to 31 July each year, for vegetation protection and from 1 April to 30 September each year for forest protection).

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(12) OJ L 35, 5.2.1997, p14