

**L.N. 292 of 2007**

**ENVIRONMENT PROTECTION ACT  
(CAP. 435)**

**Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic  
Hydrocarbons in Ambient Air Regulations, 2007**

BY virtue of the powers conferred by articles 9 and 11 of the Environment Protection Act, the Minister for Rural Affairs and the Environment has made the following regulations:-

**1.** The title of these regulations is the Arsenic, Cadmium, Mercury, Nickel and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations, 2007. Citation.

**2. (1)** These regulations transpose the provisions of 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, hereinafter referred to as “the Directive”. Scope and applicability.

**(2)** The objectives of these regulations are 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.

**3. (1) For the purposes of these regulations –**

“the 2001 Regulations” means the Ambient Air Quality Assessment and Management Regulations, 2001;

“arsenic”, “cadmium”, “nickel” and “benzo(a)pyrene” mean the total content of these elements and compounds in the PM<sub>10</sub> fraction;

“the competent authority” means the Malta Environment and Planning Authority as designated by the notice entitled Nomination of the Malta Environment and Planning Authority as the competent authority;

“fixed measurements” means measurements taken at fixed sites either continuously or by random sampling, in accordance with sub-regulation (4) of regulation 6 of the 2001 Regulations;

“lower assessment threshold” means a level specified in the Second Schedule to these regulations below which the sole use of modelling or objective estimation techniques shall be possible to assess ambient air quality, in accordance with sub-regulation (3) of regulation 6 of the 2001 Regulations;

“PM<sub>10</sub>” means particulate matter, which passes through a size-selective inlet as defined in MSA EN 12341 with a 50 % efficiency cut-off at 10 µm aerodynamic diameter;

“polycyclic aromatic hydrocarbons” means those organic compounds, composed of at least two fused aromatic rings made entirely from carbon and hydrogen;

“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;

“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;

“total gaseous mercury” means elemental mercury vapour (Hg<sup>0</sup>) and reactive gaseous mercury, i.e. water-soluble mercury species with sufficiently high vapour pressure to exist in the gas phase;

“upper assessment threshold” means a level specified in the Second Schedule to these regulations below which a combination of measurements and modelling techniques may be used to assess ambient air quality, in accordance with sub-regulation (2) of regulation 6 of the 2001 Regulations.

(2) The definitions in the 2001 Regulations, with the exception of the definitions “competent authority” and “target value”, shall apply.

**4.** (1) 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 regulation 5, shall not exceed the target values laid down in the First Schedule. Target values.

(2) The competent authority shall take all necessary measures not entailing disproportionate costs in order to achieve the objective in regulation 4(1). For this purpose, the competent authority shall, prior to 31 December 2012, engage in a consultation exercise with all interested stakeholders.

(3) The competent authority 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. Levels of these pollutants in these zones and agglomerations shall be maintained below the respective target values and the competent authority shall endeavour to preserve the best ambient air quality, compatible with sustainable development.

(4) The competent authority shall draw up a list of the zones and agglomerations where the target values laid down in the First Schedule are exceeded. For such zones and agglomerations, the competent authority shall specify the areas of exceedance and the sources contributing thereto. In the areas concerned, the competent authority 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 the Integrated Pollution Prevention and Control Regulations, 2002 this means the application of BAT as defined by regulation 2 of these regulations. L.N. 234 of 2002.

**5.** (1) Ambient air quality with respect to arsenic, cadmium, nickel and benzo(a)pyrene shall be assessed throughout the territory of Malta. Assessment of ambient air concentrations and deposition rates.

(2) In accordance with the criteria referred to in sub-regulation (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 the Fourth Schedule, 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 the Second Schedule, Section II.

(4) In zones and agglomerations where the levels are below the lower assessment threshold, to be determined pursuant to the Second Schedule, 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 the Second Schedule. The classification of each zone or agglomeration for the purposes of this regulation shall be reviewed at least every five years in accordance with the procedure laid down in Section II of the Second Schedule. 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 the Third Schedule. The minimum number of sampling points for fixed measurements of concentrations of each pollutant shall be as laid down

in Section IV of the Third Schedule, 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, the competent authority 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 the Third Schedule shall apply.

(9) Irrespective of concentration levels, one background sampling point shall be installed 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 sub-regulation 8 and of the total deposition of arsenic, cadmium, mercury, nickel, benzo(a)pyrene and the other polycyclic aromatic hydrocarbons referred to in sub-regulation 8. Where appropriate, monitoring shall be co-ordinated 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 the Third Schedule 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 the Third Schedule and Section I of the Fourth Schedule.

(12) Data quality objectives are laid down in Section I of the Fourth Schedule. Where air quality models are used for assessment, Section II of the Fourth Schedule 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 the Fifth Schedule. Section IV of the Fifth Schedule sets out reference techniques for measuring the total deposition of arsenic, cadmium, mercury, nickel and the polycyclic aromatic hydrocarbons and Section V of the Fifth Schedule refers to reference air quality modelling techniques when such techniques are available.

Public information.

**6.** (1) The competent authority 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 regulation 5(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 regulation 5(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 the First Schedule. 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 regulation 4 shall be made available to the organisations referred to in sub-regulation 1 of this regulation.

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

Offences.

**7.** A person shall be guilty of an offence under these regulations if:

(a) he fails to comply with any measure adopted by the competent authority pursuant to regulation 4 of these regulations, or fails to comply with any relevant permit conditions or with any order lawfully given in terms of any provision of these regulations, or

(b) he contravenes any restriction, prohibition or requirement imposed by the competent authority pursuant to regulation 4 of these regulations.

**8.** Any person who commits an offence against these regulations shall, on conviction, be liable - Penalties.

(a) on a first conviction to a fine (*multa*) of not less than one thousand liri but not exceeding two thousand liri and where applicable, the revocation of any relevant licence or permit;

(b) on a second or subsequent conviction, to a fine (*multa*) of not less than two thousand liri, but not exceeding ten thousand liri or to imprisonment for a term not exceeding two years, or to both such fine and imprisonment and where applicable, the revocation of any relevant licence or permit.

## FIRST SCHEDULE

Target values for arsenic, cadmium, nickel and benzo(a)pyrene

| Pollutant      | Target Value ( <sup>1</sup> ) |
|----------------|-------------------------------|
| Arsenic        | 6 ng/m <sup>3</sup>           |
| Cadmium        | 5 ng/m <sup>3</sup>           |
| Nickel         | 20 ng/m <sup>3</sup>          |
| Benzo(a)pyrene | 1 ng/m <sup>3</sup>           |

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<sup>1</sup> For the total content in the PM<sub>10</sub> fraction averaged over a calendar year.

## SECOND SCHEDULE

**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:

|                                                           | <b>Arsenic</b>                   | <b>Cadmium</b>                 | <b>Nickel</b>                   | <b>B(a)P</b>                     |
|-----------------------------------------------------------|----------------------------------|--------------------------------|---------------------------------|----------------------------------|
| Upper assessment threshold in percent of the target value | 60 %<br>(3.6 ng/m <sup>3</sup> ) | 60 %<br>(3 ng/m <sup>3</sup> ) | 70 %<br>(14 ng/m <sup>3</sup> ) | 60 %<br>(0.6 ng/m <sup>3</sup> ) |
| Lower assessment threshold in percent of the target value | 40 %<br>(2.4 ng/m <sup>3</sup> ) | 40 %<br>(2 ng/m <sup>3</sup> ) | 50 %<br>(10 ng/m <sup>3</sup> ) | 40 %<br>(0.4 ng/m <sup>3</sup> ) |

**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, the competent authority 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.

### THIRD SCHEDULE

#### **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<sup>2</sup> 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 regulation 4(4) 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<sub>10</sub>.

##### **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 Schedules.

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 ( <sup>2</sup> ) |       | 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 – 1999                                      | 2                                                                                | 2     | 1                                                                               | 1     |
| 2000 – 3749                                     | 2                                                                                | 3     | 1                                                                               | 1     |
| 3750 – 4749                                     | 3                                                                                | 4     | 2                                                                               | 2     |
| 4750 – 5999                                     | 4                                                                                | 5     | 2                                                                               | 2     |
| ≥6000                                           | 5                                                                                | 5     | 2                                                                               | 2     |

##### (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 regulation 2 of the Integrated Pollution Prevention and Control Regulations, 2002, can be monitored.

<sup>2</sup> 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.

## FOURTH SCHEDULE

## 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,<br>cadmium and<br>nickel | Polycyclic<br>aromatic<br>hydrocarbons<br>other than<br>benzo(a)pyrene,<br>total gaseous<br>mercury | Total<br>deposition |
|---------------------------------------------|----------------|-----------------------------------|-----------------------------------------------------------------------------------------------------|---------------------|
| - Uncertainty                               |                |                                   |                                                                                                     |                     |
| Fixed and indicative<br>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<br>( <sup>3</sup> ) | 14 %           | 14 %                              | 14 %                                                                                                | 33 %                |

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

<sup>3</sup> Indicative measurement being measurements which are performed at reduced regularity but fulfil the other data quality objectives.

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.

The competent authority may use wet only instead of bulk sampling if it can demonstrate that the difference between them is within 10 %. Deposition rates should generally be given as  $\mu\text{g}/\text{m}^2$  per day.

The competent authority 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 it 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  $\text{PM}_{10}$  fraction, the sampling volume refers to ambient conditions.

## FIFTH SCHEDULE

**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<sub>10</sub> sampling equivalent to MSA 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, the competent authority may use national standard methods or ISO standard methods.

The competent authority 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<sub>10</sub> sampling equivalent to MSA EN 12341. In the absence of a CEN standard method, for benzo(a)pyrene or the other polycyclic aromatic hydrocarbons referred to in regulation 5(8), the competent authority may use national standard methods or ISO methods such as ISO standard 12884.

The competent authority 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, the competent authority may use national standard methods or ISO standard methods.

The competent authority 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.