

AIR EMISSIONS CONTROL: MEASUREMENT METHODS AND LEGISLATION

Executive Summary

5TH SEMINAR ON AIR QUALITY IN SPAIN

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Air emissions control is represented for the first time in the Spanish Air Quality Seminars, arousing considerable interest among the participants. The various Autonomous Regions that were represented raised a great many issues of interest, not all of which could be addressed in the working period prior to the Seminar. For this reason it was suggested to maintain this working group in order to keep the discussions going and try to reach conclusions regarding issues that were not addressed or discussed in depth.

The working group, formed by technical personnel from several Autonomous Regions as well as various industries and research centres, comprised:

- Meritxell Rodríguez (Government of Catalunya [Generalitat de Catalunya]) - COORDINATION
- Natalia Alonso (Ministry of Environment)
- Francisco Amaya (TIRME – Balearics)
- Carles Bujosa (GESA – Balearics)
- Irina Celades (Institute of Ceramic Technology –Valencian Regional Community)
- Paula M^a Elías (Government Balearics)
- Rosalía Fernández (Carlos III Health Institute)
- Agustín Garnica (Government of Aragon)
- Andrés Herguedas (Government of Castile & Leon)
- José María Infante (Government of La Rioja)
- Txema Mancheño (Government of Catalunya [Generalitat de Catalunya])
- Alberto Moral (Ministry of Environment)
- Manuel Pujadas (CIEMAT)
- Joaquín Rodríguez (EGMASA – Andalusia)
- Aurora Sáez (Government of Galicia)
- Javier Vera (Government of Navarre)
- Jesús Zatika (Government of the Basque Country)

The document analyses several issues related to the air emissions control from a dual point of view; firstly, it attempts to reflect the current situation in the various Autonomous Regions and secondly, it puts forward proposals for the future.

We should emphasize that the fact that a new Air Quality Law is being drafted provides a great opportunity to incorporate the proposals contained in this document.

Thus, the main objectives are:

- Chapter 1: Issues related to current legislation on emission control.

All current state and regional legislation regarding emission control has been included, and proposals have been put forward for consideration as part of the new air pollution law or its enacting legislation. Among these proposals we would highlight the review of existing emission limit values laid down by Decree 833/75 to include activities not previously considered, or the updating of limits for some existing activities. Also included in this chapter is a new proposal for the Catalogue of Potentially Air Polluting Activities which takes into account the current impact of the various activities on air pollution. The current Catalogue was approved in 1975 and includes industrial activities whose impact on the atmosphere has changed significantly since then, and omits a number of present day industrial activities.

- Chapter 2: Measurement methods for emission control
 - Measurement methods

There is a wide range of methodologies for determining pollutants and, as a rule, applicable legislation in the various Autonomous Regions does not establish criteria for the selection of methods. Therefore, the document proposes selection criteria for the various pollutants with a view to their inclusion in state and regional regulations

- Calibration methods for automatic measuring systems (AMS)

After analysing the different approaches to the calibration of AMS in the various Autonomous Regions and at different facilities, a calibration procedure is proposed for those facilities that have AMS but for which there is no legal provision setting out the rules for calibrating equipment (facilities where RD 653/03 or RD 430/04 are not applicable). It was also considered interesting to study issues relating to the management of the data provided by such measuring equipment, and guidelines governing data processing are proposed.

- Good practices for the minimization of diffuse emissions

To ensure the minimization of diffuse emissions caused by the handling of dusty materials, good management practices are proposed that could be included in the facilities' authorizations if so desired.

- Chapter 3: Emission control related procedures

The document includes proposals mainly concerning:

- Controls carried out by Authorized Inspection Agencies (AIA)

Decree 833/75 calls for a periodic control procedure. However, this is not carried out directly by personnel of the Autonomous Regions, but rather by Authorized Inspection Agencies (AIA). These agencies are appropriately authorized or certified and are responsible for taking periodic samples from the various industrial activities. As a rule, there is no common criteria governing either these control agencies' procedures or their relationship with the relevant government authorities in each Autonomous Region. A protocol for controlling these AIA is included in the document.

- Self inspection procedures

The checks and audits that can be carried out by an enterprise are defined according to either its classification in the Catalogue of Potentially Air Polluting Activities, or the regulations in force for that activity. However, in the event of there being no specific legislation, neither Decree 833/75 nor the Ministry of Industry Order of October 18, 1976 clearly establish what the content of these self audits should be. For this reason the document includes criteria for the performance of self audits in the industrial activities that need to implement them.

ISSUES RELATING TO APPLICABLE LEGISLATION ON EMISSION.

Currently the various Autonomous Regions are governed by the basic state legislation that considers mainly general issues. This includes the 1972 Air Environment Protection Law and Decree 833/75 that enacts it, and the Ministry of Industry Order of 1976, along with a number of subsequent related regulations of a more specific nature, that tend to be the result of the transposition of European directives to Spanish state legislation and are normally related to specific activities. In addition there is regional legislation defining control criteria or emission limits for various activities that may or may not be covered by basic state legislation.

In view of the disparity of legislation on emission control in the various Autonomous Regions, together with the age of the basic state legislation, and after analysing the content of these regulations, it is clear that there is a need for the future Air Quality Law or its subsequent enacting regulations to address the following issues:

Update of the Catalogue of Potentially Air Polluting Activities .

The Catalogue of Potentially Air Polluting Activities currently in force was approved in 1975. It is in dire need of an update so as to take into account current technology and the impact that industrial activities have on air quality. Therefore, a new proposal for the catalogue has been drawn up, although more work is required from this working group since it is of vital importance that the IPPC classification of activities be compatible with the “Group A” classification of activities in the Catalogue.

Setting of emission limit values according to current technology

The emission limit values currently in force date back to Decree 833/75 and they have not been subject to any general review since then. Therefore, these values differ significantly from the emissions actually achievable by today’s industrial facilities, while in some cases no emission limits are provided for a number of pollutants from specific activities.

To address this problem, a proposal of the different pollutants to be evaluated for each activity is included. However, it has not been possible to include emission limit values for all pollutants and activities because the complexity of the task would require a more lengthy and in-depth study by the members of the working group. The group did try to include the emission values applied for each activity by each Autonomous Region in cases that were not covered by state regulations. Also, an in-depth analysis of the content of the BREF documents is required in order to adjust the limit values proposed, together with the limit values set by the various Autonomous Regions in the relevant integrated environmental authorizations, to the various industrial activities.

Consideration of general aspects related to emissions control not considered by basic state legislation.

It is essential that definitions such as emission source or exceedance of emission limit values (in the case of both automatic measuring systems and discontinuous measurements) are incorporated in future regulations.

In the case of exceedance of emission limit values from discontinuous measurements, the proposal is to establish a general criterion by updating article 21.2 of the Order of October 18, 1976. Activities covered by regulations that already include the definition of the exceedance of limit values are thus excluded from this criterion.

Technical issues related to the condition of sampling points considered in the Order of October 18, 1976

General considerations have been developed for the taking of samples in a representative manner, in order to make conditions at sampling points compatible with newly developed reference methods.

MEASUREMENT METHODS FOR EMISSION CONTROL

With regard to emission control, it is necessary to differentiate between discontinuous measurements carried out at various industrial facilities and the continuous measurements of emissions through automatic measuring systems, in some instances imposed by sectoral regulations.

In the case of discontinuous measurements to be taken at the emission source, only RD 653/03, on waste incineration and RD 430/04, on large combustion plants, reflect the obligation to use EN standards for individual sampling as part of periodic controls, and for the reference methods used in the calibration of automatic measuring systems.

For the other activities, regulations do not provide criteria for establishing the reference method to be used. In this regard, some Autonomous Regions have defined criteria for the measurement method selection.

Having analysed the situation in the various Autonomous Regions concerning emission control by discontinuous sampling, the conclusions of the working group are as follows:

- All emission limit values, either in specific regulations or in individual authorizations, should indicate the reference method to be used in order to validate those limit values.
- If specific sectoral regulations make no mention of reference methods, a hierarchy of the various methods is proposed:
 - a) UNE methods equivalent to EN standards. This includes EN methods published before their publication as UNE standards
 - b) UNE methods equivalent to ISO standards
 - c) UNE methods that are not equivalent to either EN or ISO standards
 - d) Other international methods
 - e) Internal procedures accepted by the Government.

With regard to calibration procedures for continuous analysers, the publication of standard UNE-EN 14181 aims to provide quality assurance to analysers installed at emission sources in the scope of application of RD 653/03 and RD 430/04 (waste incineration and large combustion plants)

This standard establishes three quality assurance levels:

- NGC 1, the aim of which is to demonstrate that the device is appropriate to the purpose of the measurement, and requires that it holds a certificate issued by an accredited assay laboratory where the suitability of the equipment is evaluated using laboratory and field trials under ISO standard 14956.
- NGC 2, the aim of which is to demonstrate that the device is correctly installed; this comprises a functionality test and a comparison with standard reference methods to obtain a calibration function.
- NGC 3, the aim of which is to demonstrate that the required quality is maintained during the normal operation of the analyser at the plant. These trials should be carried out by plant operatives and the results recorded in a logbook.

In addition, there should be an annual follow-up test should be conducted by an accredited assay laboratory to evaluate the correct operation and the validity of the calibration function and the variability test obtained during NGC 2.

For other facilities that have analysers but are not included in the scope of the aforementioned standards, there is no defined methodology for selecting a calibration procedure. Only the Basque and Catalan Autonomous Regions have calibration procedures for AMS that meet this requirement.

Having analysed the current situation of AMS calibration procedures in point 1.2, it is proposed that the calibration of continuous analysers installed in activities not covered by RD 653/03 and RD 430/04 should not need to comply with UNE-EN 14181, given the stringency of its requirements.

In any case, it is necessary to have a calibration procedure based on the provisions of standard UNE-EN 14181 that, broadly speaking, could consist of:

- An NGC1 that would not necessarily have to be conducted by an accredited laboratory

- An NGC2 that would not necessarily have to be conducted by a 17025 accredited laboratory, and would not have to include all fifteen measures defined in the UNE-EN 14181 but only nine of them
- A similar test to the annual test considered in UNE-EN 14181 but conducted less frequently.

Among other interesting issues related with AMS that have been considered in the document are the data acquisition and recording systems connected to the AMS, and the procedures for processing the data from the AMS, which are of vital importance if emission regulations such as those set out in RD 430/2004 are to be met.

In addition to the facilities that are obliged by sectoral regulations to have AMS, it is proposed that all activities classified as Group A potentially air polluting activities should be obliged to install AMS, together with those where the relevant authorities deem it necessary, at those emission sources where the mass flow is higher than:

- $\text{SO}_2 \geq 75 \text{ Kg/h}$
- $\text{NO}_x \geq 75 \text{ Kg/h}$
- $(\text{Addition of } \text{SO}_2 + \text{NO}_x) \geq 1000 \text{ t/year}$
- $\text{Particles} \geq 5 \text{ Kg/h}$
- $\text{COV} \geq 10 \text{ Kg/h}$
- $\text{HCl} \geq 5 \text{ Kg/h}$
- $\text{HF} \geq 2 \text{ Kg/h}$

With regard to diffuse emissions control, this is generally achieved using following methodology:

- Control through immission measurements in areas near the emission sources
- For activities included in the scope of RD 117/03, diffuse emissions are being estimated by compiling an annual solvent balance. An EN standard is currently planned in order to provide tools to verify compliance with RD 117/03.

- In the case of extractive activities, diffuse emissions are being estimated by using emission factors. In some instances, concentration measurement methods and dispersion models that estimate emission factors are also being used. EPA emission factors are generally used, but some Australian ones are also employed. Below are some bibliographical references:
 - “Emission Estimation Technique Manual for Mining” version 2.3 (December 2001), proposed to perform the National Pollutant Inventory of Australia
 - AP-42 from the EPA
 - “*Cálculo de emisiones fugitivas de partículas en actividades extractivas con o sin planta de tratamiento de productos minerales asociada y operaciones similares.*” (IT013. *Cálculo de emisiones fugitivas de partículas en actividades extractivas y operaciones similares.* 1st edition, May 2004. *Generalitat de Catalunya*).

These calculations are also applicable to other activities such as the storage of dusty materials and storage in ports. To minimize the generation of diffuse emissions, it is very important to adopt good industrial practices. It is also necessary to guarantee that all these measures are adopted in an effective manner, and the working group is still weighing up the possibility of checking whether these measures are sufficient by using emission measurements.

Applicable measures can be broken down into two main groups; on the one hand measures applicable to the storage of raw materials and on the other, those related to its transport.

EMISSION CONTROL RELATED PROCEDURES

As a rule, in all the Autonomous Regions the periodic control established in the current state legislation is conducted by means of external inspection by agencies that, in most cases (though not in Catalunya) send their inspection report to the inspected industry who then send it on to the relevant Government authorities.

Generally speaking, neither the inspected industries nor the Government authorities are satisfied with the performance of these agencies. Various initiatives to raise the quality of the inspections carried out by the AIA's and to standardize their procedures have been suggested.

Some Autonomous Regions have their own inspection services while others conduct inspections through various AIA's.

With regard to the controls carried out by the companies themselves, as a general rule the industries that are obliged to carry out self audits (Groups A and B of the Catalogue of Potentially Polluting Activities) perform these audits according to the periodicity established in the Order of October 18, 1976, that only actually indicates a frequency for Group A industries. Therefore, some Autonomous Regions have established periodicity for the performance of self inspections for the activities included in Groups B and C of the Catalogue of Potentially Polluting Activities.

Although state regulations for group A activities stipulate fortnightly inspections and do not stipulate any periodicity for Group B activities, the performance of self inspections by companies, at least for activities included in groups B and C, requires a more stringent approach.