

# **OPERATOR SELF-MONITORING**



## **IMPEL NETWORK**

European Union Network for the Implementation  
and Enforcement of Environmental Law

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FOREWORD

The European Union Network for the Implementation and Enforcement of Environmental Law is an informal Network of the environmental authorities of the member states of the European Union (EU). The European Commission is also a member of IMPEL and shares the chairmanship of management meetings.

The network is commonly known as the IMPEL Network.

The expertise and experience of the participants within IMPEL makes the network uniquely qualified to work on certain of the technical and regulatory aspects of EU environmental legislation. Its objectives are to create the necessary impetus to make progress on ensuring a more effective application of environmental legislation in the EU. The network promotes the exchange of information and experience, and the development of a more consistent approach in the implementation, application and enforcement of environmental legislation, with a special emphasis on EU environmental legislation. It provides a framework for policy makers, environmental inspectors and enforcement officers to exchange ideas, and encourages the development of enforcement structures and best practices.

Although its focus is on practical implementation issues, IMPEL is involved in all stages of the 'regulatory chain'.

The regulatory chain can be defined as the process through which legislation is conceived, designed, drafted, adopted, implemented and enforced until its efficiency is assessed.

**Environmental inspections** are a key activity in the implementation and enforcement of environmental law, and are essential to secure a high level of environmental protection. IMPEL attaches great importance to environmental inspections. A paper on *Minimum Criteria for Inspections* was presented to the Commission at the end of 1997, and published in June 1998, in response to the invitation contained in the *Commission Communication on Implementing Community Environmental Law*. IMPEL is further developing the work in this area by considering in more detail different aspects of inspections following the recommendations in the paper. One such aspect is frequency of inspections, which is the subject of this paper.

**This report reflects the standpoint of the IMPEL Network but not necessarily of the National Administrations.**

The contributors to this paper are listed on the final page of this document.

## 1. INTRODUCTION

- 1.1 The IMPEL paper *Minimum Criteria for Inspections* published in June 1998 defines minimum criteria for various elements of inspections such as planning, enforcement, analysis, and reporting. It includes terms of reference for further tasks to be undertaken by IMPEL, including the subject of operator self-monitoring. In this respect the “Inspections Cluster” of IMPEL Standing Committee 2 has prepared this paper which was adopted during the IMPEL plenary meeting of 17-18 December 1998.

“The problem of applying these minimum criteria to inspection systems based to a degree on self-monitoring should be further explored to make the minimum criteria applicable in those circumstances or to set up parallel minimum criteria for inspection systems based on self-monitoring and assessment.” (Section 3.4 of minimum criteria for inspections paper)

- 1.2 Other papers are planned for related subjects such as planning and reporting of inspection programmes, and frequency of inspections.
- 1.3 This paper aims to promote common principles for operator self-monitoring at industrial installations, arising from the obligations on industry to respect the implementation of environmental law and to protect the environment. This paper provides guidance on:
- formulating conditions for self-monitoring in permits, or in other statutory requirements appropriate to the systems in place in the member state;
  - the role of the competent authorities under self-monitoring regimes.

## 2. BACKGROUND

- 2.1 The monitoring of industrial processes, their releases and their impact on the environment are key elements of regulatory control. Such monitoring may be undertaken by the competent authorities responsible for inspection duties. Industrial process operators may also be required to carry out monitoring themselves and report their results to the competent authorities. This is known as operator self-monitoring. The responsibilities of operator and competent authority are not affected by who carries out the monitoring. It is the responsibility of the operator to comply with regulations, directives, permits and the like, and it is the duty of the operator to ensure that all necessary measures have been taken to protect the environment. The competent authorities are responsible for assessing and ensuring the operator’s compliance. Also, it is important that the operator has a management system and is organised in such a way as to prevent pollution and maintain compliance with their permits and conditions therein.

2.2 Requirements for self-monitoring are expected to increase as:

- the complexities and sophistication of measurement techniques advance and costs rise;
- industry adopts Eco Management and Audit Scheme (EMAS) and International Standards Organisation (ISO) 14000 environmental standards;
- the European Directive on Integrated Pollution Prevention and Control (IPPC) is implemented;
- the polluter pays principle is applied, particularly under regulatory regimes that do not provide for the recovery of competent authorities' monitoring costs from operators;
- voluntary commitments of the operator are undertaken or mandatory obligations are initiated.

2.3 Self-monitoring does not constitute self-regulation. Self-monitoring provides additional information on which the competent authorities can judge whether an operator is complying with relevant legislation and conditions of permits. It does not change the duty of the competent authorities to assess compliance by means of inspection, and by using its own monitoring data, or by reliance on operator self-monitoring, or a combination of both. The competent authorities also continue to be responsible for enforcement. Similarly, it does not in any way diminish the duty of the operator to ensure that all necessary measures are taken to comply with relevant legislation and conditions of permits.

2.4 Self-monitoring, for the purpose of this paper, primarily relates to measurements of process conditions, process releases and environmental levels, and reporting of the results by the operator to the competent authorities in accordance with requirements specified in laws, regulations, permits or injunctions. However, self-monitoring of an operator's performance with regard to environmental targets, process/plant improvements and overall compliance is also considered to some extent.

2.5 Requiring self-monitoring can offer benefits to the competent authorities through:

- utilising the operator's knowledge and experience of his process in planning and carrying out a monitoring programme that can lead to improved control over releases to the environment;
- providing a mechanism for educating the operator about the requirements for complying with relevant laws, regulations and permits, and for increasing management responsibility for compliance and the impact of process releases on the environment.

- 2.6 Self-monitoring will normally provide more information than may be obtained by periodic inspection and monitoring by the competent authorities. The operator is also in a better place to deploy self-monitoring because of his proximity to the monitoring points. Non-compliance will become known to the operator first, who must react appropriately and inform the authorities immediately.
- 2.7 The operator must provide the necessary expertise, equipment and analytical facilities to carry out the specified measurements. These may be owned by the operator or be contracted in. Combinations of these arrangements are common whereby the operator takes samples and has the analyses carried out by a contract laboratory.
- 2.8 Whatever the arrangements are for carrying out self-monitoring, the costs are met by the operator. This is consistent with the polluter pays principle.

### **3. LEGAL CONSIDERATIONS**

3.1 Because of its benefits, self-monitoring is likely to develop into an important requirement of EU environmental legislation. Integrated Pollution Prevention and Control (IPPC) already provides for self-monitoring to be introduced in permits. However, Criminal Law is the responsibility of member states and is beyond the scope of EU powers. It is important, therefore, that national legal systems:

- provide the competent authorities with appropriate powers to impose requirements for self-monitoring on the operator;
- allow self-monitoring data to be used for enforcement action against companies and do not consider it inadmissible on the grounds of self-incrimination.

### **4. SELF-MONITORING SCOPE**

4.1 Self-monitoring regimes for the purposes of this paper (see 2.4) may cover:

- controlled emissions of waste gases and airborne particulate to air via chimney stacks;
- controlled discharges of waste water via sewers to and from effluent treatment plants, directly to receiving waters such as the sea, lakes, rivers and streams, and to land via septic tanks and soakaways;
- controlled disposals of solid waste to landfill sites;
- controlled disposals of solid and liquid wastes, including organics, to incinerators;

- industrial process raw material inputs (such as trace contaminants) and operating conditions (such as process temperature, pressure and flowrate);
- fugitive releases to air, water and land;
- receiving environments such as ambient air, grass, soil surface and ground waters;

- use of raw materials and energy (IPPC);
- noise and vibration;
- odour;
- process/plant conditions that are relevant to the time when measurements are taken or that may affect releases, such as down-time of plant or percentage of full utilisation of plant;
- operation and maintenance of monitoring and other relevant equipment.

4.2 Monitoring techniques will vary depending on the applications and may include the use of:

- fixed, in-situ, on-line continuous reading instruments;
- portable discontinuous reading instruments;
- laboratory analysis of samples taken by fixed, in-situ, on-line time or flow proportional samplers;
- laboratory analysis of spot samples;
- calculations based on surrogate measurements of flow-rates, raw material contaminants, temperature, pressure and the like;
- check lists of operation and maintenance of monitoring and other relevant equipment.

4.3 Whatever measurement technique is employed, it must conform to a relevant Standard Method as published by Comité European de Normalisation (CEN), International Standards Organisation (ISO) or (where there is no international standard) an appropriate national standard such as those published by British Standards Institution (BSI) or Verein Deutscher Ingenieure (VDI) and, where considered necessary, should be carried out within a qualified measurement infrastructure conforming to the European Standard 45000 series of European Standards.

## 5. **REQUIREMENTS ON OPERATOR REGARDING SELF-MONITORING**

5.1 Requirements on the operator should be included in permits, general binding rules or other relevant mechanisms appropriate to the systems in place in each member state. These requirements will depend on the scope of the self-monitoring. Generally they are likely to cover:

- instrumental measurements;
  - process/plant conditions that are relevant to the time when measurements are taken or that may affect releases, such as down-time of plant or percentage of full utilisation of plant;
  - data reduction;
  - reporting;
  - standards and quality assurance.
- 5.2 Where the regulatory arrangements are such that the operator himself has to propose a programme of self-monitoring, the operator should allow an appropriate time for the competent authorities to consider the operator's proposals and accept that the authorities may need to seek additional information before either rejecting or accepting them.
- 5.3 Careful specification is required to minimise possibilities for fraud, negligence and misunderstanding on the part of the operators. Generally, the requirements on the operators should ensure that:
- self-monitoring is organised and undertaken in accordance with clearly defined requirements, ensuring that compliance can be readily assessed by the competent authorities;
  - all necessary samples, analyses, instrumental measurements and so on, as well as reports are recorded in a traceable manner allowing easy auditing by the competent authorities.

### **Instrumental measurements**

- 5.4 Instrumental measurements are carried out on-site using either fixed or portable equipment. Permit conditions should specify:
- that instrumentation must meet the competent authorities' performance standards (where these exist) for appropriate instrumentation;
  - the exact location(s) at which the measurements are to be taken;
  - a period of advance notice (for example, two weeks) to be given to the competent authorities by the operator of the intention to carry out periodic (discontinuous) measurement such as using portable instrumentation for which there is no programme date;
  - the method and frequency of instrument calibration;

- the instrument maintenance requirements;
- the data recording requirements (for example, electronic, automatic or manual) including provision for uniquely identifying the dates and times of start and finish of measurements, the measurement location, last calibration date and comments, for example technical problems resulting in measurement gaps;
- the record-keeping requirements covering instrument calibration, maintenance and data recording;
- the arrangements for data reduction and results reporting.

## Sampling

5.5 Samples for laboratory analysis may be taken continuously using either fixed-time or flow-proportional samplers or periodically (discontinuously) using manual means. Permit conditions should specify:

- the exact location(s) at which the samples are to be taken - it can be useful to label all release points;
- a period of advance notice (for example, two weeks) to be provided to the competent authorities by the operator of the intention to take samples;
- requirements for safe access on site to sampling points;
- the frequency at which the samples are to be taken, including any restrictions with regard to process-cycle timing, process loading, fuel/feed material composition;
- the sampling method and/or equipment;
- the type of sampling for example automatic time or flow proportional, manual spot;
- the size of individual samples and possible bulking arrangements to provide composite samples;
- the type of sample such as sample for single or multiple determinand analysis;
- the arrangements for chemically preserving, storing and transporting samples;
- the record-keeping arrangements, which may be based on the use of paper or electronic forms. The forms must include:
  - a unique sample identification number assigned from a sequentially

- number register
- date and time of sampling
- sampling location
- sample type
- name of sampler
- sample equipment
- sample preservation (if applicable)
- process details
- sampler's comments.

## **Analysis**

5.6 Analysis will usually be undertaken in a laboratory under controlled conditions. The requirements on the operator should specify:

- the determinands to be analysed;
- the method of analysis, including the limit of detection and any special restrictions;
- the performance standard (for example, accredited under European Standard 45001) requirement for the laboratory undertaking analysis relevant to the standard(s);
- the record-keeping arrangements to provide an auditable trail from sample receipt to results reporting. These will include:
  - assigning (a) unique laboratory number(s) related to the sample number
  - date and time of sample receipt
  - formal signing off of all sample transfers to establish a “chain of custody”
  - date (and time) of analysis
  - analytical method
  - any comments, including non-compliances with the specified method.

## **Process/plant operations**

- 5.7 Reports on process/plant operations and maintenance of monitoring and other equipment relevant to the time when measurements are taken should be required. These should include information on routine operations as well as on deviations, disturbances and down-time.

## **Data reduction and reporting**

- 5.8 A considerable amount of data may be generated by the operator carrying out self-monitoring. This may be particularly so where continuous monitoring instrumentation is used. Data reduction may be necessary to calculate time-averaged means, percentile values and the like, which are to be reported to the competent authorities for comparison with numerical limits on permitted releases and environmental quality standards. The following should be specified:

- the relevant calculations for data reduction;
- the reporting requirements, including the format and frequency;
- the requirements for signing-off reports to be forwarded to the competent authorities;
- the requirements for retention of records and for public access.

- 5.9 Pro-forma reports are a useful means of standardising reporting formats and can be adapted for electronic transfer where acceptable to the competent authority by e-mail or disc. They should be signed-off at a senior and responsible management level.

## **6. COMPETENT AUTHORITIES' ROLE**

- 6.1 As discussed at 2.1 and 2.3, the overall duty of the competent authorities and the operator are not changed under a self-monitoring regime. The competent authorities are responsible for ensuring that the operator complies with laws, regulations, permit and permit conditions, including those specifying the requirements for self-monitoring. In order to achieve this, the competent authorities must:

- determine or approve the self-monitoring programmes;
- determine or approve the specified measurement standards and quality requirements;
- assess compliance with regulations, permit and permit conditions, and other relevant limits;
- inspect operators' self-monitoring arrangements;

- check the reliability of the operator (for example, by carrying out independent monitoring).
- 6.2 The competent authorities must approve the monitoring programme, which may become a publicly available document, specify the standards and quality requirements for self-monitoring that are to be achieved by the operator, and ensure that possibilities for cheating and fraud are minimised.
- 6.3 In order to ensure that self-monitoring provides reliable data, the competent authorities must specify standards and quality requirements. This may be best achieved by working with other bodies such as standards organisations or accreditation bodies to establish a quality measurement infrastructure covering:
- performance standards for monitoring instruments and type approval, or product certification, or other systems providing equal assurance;
  - the requirements for on-site calibration and qualification of instruments;
  - performance standards and accreditation schemes for personnel and organisations carrying out manual sampling, periodic measurement using portable instruments, and calibration of fixed instruments;
  - standards methods of sampling and analysis;
  - quality assurance requirements for laboratory analysis, which are best developed by third-party accreditation to European Standard EN45011;
  - safe transfer and storage of data;
  - proficiency testing, including the analysis of common samples (round-robin testing) and internal laboratory quality control arrangements.
- 6.4 The competent authorities will receive self-monitoring reports periodically from the operator. These should provide summary information, following data reduction, in a format facilitating easy comparison with permit limits. Additionally, the competent authorities should inspect the operator's self-monitoring records, including log sheets covering sampling, analysis and instrumental monitoring, and data-reduction calculations.
- 6.5 As part of the competent authorities on-site work, the operator's self-monitoring arrangements should be inspected. Particular aspects requiring scrutiny include:
- the positioning and serviceability of fixed instrumentation;
  - records confirming the maintenance and calibration of fixed and portable instrumentation and sampling equipment;

- manual sampling procedures;
  - analytical procedures;
  - record keeping, including samples and analysis logs, data-capture arrangements for example computers, charts and the like for instruments;
  - data-reduction calculations;
  - the professional competency, including training, of relevant staff.
- 6.6 The more technical aspects of checking the correct operation of instruments, the correct application of manual stack-emission sampling and analytical procedures may require the use of specialist staff.
- 6.7 The competent authorities should also arrange for independent monitoring to be undertaken to provide checks on the reliability of self-monitoring data. This independent monitoring may include:
- the calibration of instruments;
  - sampling and analysis;
  - analysis of split or replicate self-monitoring samples.
- 6.8 The scope, frequency and extent of the competent authorities' independent monitoring should be proportionate to that undertaken by the operator carrying out self-monitoring so as to avoid unnecessary duplication. The competent authorities' independent monitoring should be targeted by risk-based assessment of:
- the reliability of the operator's self-monitoring regime;
  - the hazard to the environment of normal operations;
  - the operator's compliance history.

## 7. CONCLUSIONS

- 7.1 The monitoring of industrial processes, their releases and their impact on the environment are key elements of regulatory control. This paper reviews the benefits, scope and legal considerations relevant to operator self-monitoring' regimes. It provides guidance on formulating statutory requirements and the role of the competent authorities. It focuses mainly on measurements of releases, but it also recognises the need to monitor the process, management systems and organisation of an installation.

- 7.2 Self-monitoring regimes may cover all forms of process releases to air, water and land. Monitoring may also include a wide variety of measurement techniques, including use of fixed and portable instrument, sampling and laboratory analysis.
- 7.3 Guidance is provided on the drafting of statutory requirements for self-monitoring to minimise possibilities for fraud, negligence and misunderstanding on the part of the operator.
- 7.4 Guidance is also provided on the role of the competent authorities in approving operators' monitoring programmes, specifying standards and quality requirements, inspecting operators' self-monitoring arrangements and undertaking a proportionate amount of independent monitoring.
- 7.5 Because of its benefits, self-monitoring is likely to develop into an important requirement of EU environmental legislation. The European Directive on Integrated Pollution Prevention and Control already provides for its introduction in permits. However, self-monitoring does not constitute self-regulation and competent authorities remain responsible for assessing compliance and enforcing environmental legislation.

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