GUIDELINE FOR PREPARING AN AUDIT OF THE MERCURY BALANCE IN A CHLORINE PLANT

Env. Prot. 17

1st Edition

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This document can be obtained from:

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Euro Chlor

Euro Chlor is the European federation which represents the producers of chlorine and its primary derivatives.

Euro Chlor is working to:

- improve awareness and understanding of the contribution that chlorine chemistry has made to the thousands of products, which have improved our health, nutrition, standard of living and quality of life;
- maintain open and timely dialogue with regulators, politicians, scientists, the media and other interested stakeholders in the debate on chlorine;
- ensure our industry contributes actively to any public, regulatory or scientific debate and provides balanced and objective science-based information to help answer questions about chlorine and its derivatives;
- promote the best safety, health and environmental practices in the manufacture, handling and use of chlor-alkali products in order to assist our members in achieving continuous improvements (*Responsible Care).*

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Prior to 1990, Euro Chlor's technical activities took place under the name BITC (Bureau International Technique du Chlore). References to BITC documents may be assumed to be to Euro Chlor documents.

RESPONSIBLE CARE IN ACTION

Chlorine is essential in the chemical industry and consequently there is a need for chlorine to be produced, stored, transported and used. The chlorine industry has co-operated over many years to ensure the well-being of its employees, local communities and the wider environment. This document is one in a series which the European producers, acting through Euro Chlor, have drawn up to promote continuous improvement in the general standards of health, safety and the environment associated with chlorine manufacture in the spirit of Responsible Care.

The voluntary recommendations, techniques and standards presented in these documents are based on the experiences and best practices adopted by member companies of Euro Chlor at their date of issue. They can be taken into account in full or partly, whenever companies decide it individually, in the operation of existing processes and in the design of new installations. They are in no way intended as a substitute for the relevant national or international regulations which should be fully complied with.

It has been assumed in the preparation of these publications that the users will ensure that the contents are relevant to the application selected and are correctly applied by appropriately qualified and experienced people for whose guidance they have been prepared. The contents are based on the most authoritative information available at the time of writing and on good engineering, medical or technical practice but it is essential to take account of appropriate subsequent developments or legislation. As a result, the text may be modified in the future to incorporate evolution of these and other factors.

This edition of the document has been drawn up by the Environmental Protection Working Group to whom all suggestions concerning possible revision should be addressed through the offices of Euro Chlor.

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I. INTRODUCTION

The importance of accurate, complete and consistent data for the compilation of the annual mercury balance cannot be overstated.

All European chlorine producers operating mercury cells have signed up to several voluntary commitments. One of them is:

"Reporting of individual plant mercury emissions data
Euro Chlor members with chlor-alkali production plants using mercury technology agree to disclose their individual plant mercury emission data in conformity with the OSPAR reporting guidelines. In others words no objection will be made because of the confidential nature of this data. The data will be open to audit by the competent national authorities through a designated independent third party."

Making a mercury balance in a chlorine plant is described in the Euro Chlor recommendation ***Env Prot 12 - Guidelines for Making a Mercury Balance in a Chlorine Plant***. The calculation process is based on data obtained from:

- Mercury emissions in products, to water and gaseous streams
- Mercury in wastes
- Mercury inventories

For plants with ISO or similar systems, the best way is to include, as a whole, the document ***Env. Prot. 12*** in the system, with all the associated requirements. For the others, this recommendation is a guideline to comply with the mercury balance audit; it includes requirements both for calculation procedure and used data.

II. ORGANISATION AND RESPONSIBILITY

The scope of the audit is the building of the mercury balance from data listed in the introduction. The following actions have to be done:

- Describe the organisation to make the work (written document)
- Define the principle responsibilities (written document)
- Establish a process description : prepare a flow sheet describing the main elements of the mercury balance
- Take a contact with the auditor in order to:
    - Establish and finalise the agenda
    - Fulfil if any an audit questionnaire.

III. PROCEDURES

All the documented procedures shall be consistent with the requirements for making a mercury balance (See ***Env Prot 12 - Guidelines for Making a Mercury Balance in a Chlorine Plant***).

The management of these documents shall include the characteristics of a professional documentation system:

- All documented procedures shall be in place
- The authorised personnel shall approve documents prior to issue
- The old versions of procedures shall be deleted from the working area, in order to avoid their use.
- Track changes shall be used in order to identify modifications in revised documents
- Documents shall be available to personnel undertaking data and procedure for making a mercury balance
- Documents shall be stored and maintained in such a way that they are readily retrievable in facilities that provide a suitable environment to prevent damage or deterioration and to prevent loss
- Documents shall be archived, indexed and retrievable
- Document retention times shall be established and recorded.

IV. PURCHASING

- A contract including the technical requirements associated to the document ***Env. Prot. 12*** shall be written for all subcontractors linked to all the steps of the mercury balance, including the basic data.
- An external company in charge the analysis shall be accredited.

V. PROCESS CONTROL (PRODUCTS, AIR, WATER, WASTES)

The process (making a mercury balance from data) has to be carried out in compliance with the document ***Env. Prot. 12***.

The appropriate equipment has to be used to comply with: it is notably the case for the accuracy and the sensitivity of the measurements which are to be defined.

Maintenance of the control equipment shall be defined in order to ensure the measurements remains valid.

VI. CONTROL OF INSPECTION – MEASURING AND TEST EQUIPMENT (MERCURY BALANCE PRODUCTS, AIR, WATER, WASTES)

- Documented procedures shall be established and maintained to control, calibrate and maintain inspection, measuring and test equipment (including test software) to demonstrate the conformity to the specified requirements.
- Documented procedures shall be in place for obtaining information for each stage of the mass balance.
- Validation exercise shall be conducted for each stage of the mass balance. A

record of the validation exercise shall be maintained.

- Inspection, measuring and test equipment shall be used in a manner which ensures that measurement uncertainly is known, and consistent with the required measurement capability.
- Instruments shall be calibrated at the manufacturers prescribed intervals, or prior to use, against certified equipment having a known and valid relationship to internationally or nationally recognised standards.
- The extend and the frequency of such checks shall be established.
- Records of these checks shall be maintained.
- Action taken when instrumentation is found to be out of calibration shall be defined. The validity of previous inspections and test results shall be assessed and documented.
- Instrumentation shall be clearly labelled indicating whether it has been calibrated.
- In anyway, adjusted equipment shall be re-calibrated.
- For each particular method the accuracy/precision shall be established and suitable for the purpose of undertaking a mercury mass balance.
- The personnel for undertaking the various measurements shall be authorised and trained. Where analytical chemistry methods are employed, the laboratory shall be accredited or follow best lab practice procedures.
- Training procedures shall be documented.
- Individual training records shall be maintained, reviewed and updated.
- If any modifications/improvements are made to methods, procedures shall be in place to ensure that these are validated and that appropriate training is given.

VII. CROSS-CHECKING OF THE RESULTS

In order to get more consistent values, it is recommended to cross-check the results.

- Documented procedures shall be established and maintained for implementing corrective and preventive actions resulting from the cross-checking.
- Any changes resulting from the cross-checking shall be implemented in the documented procedures.

VIII. CONTROL OF QUALITY RECORDS (MERCURY BALANCE, PRODUCTS, AIR, WATER, WASTES)

- Documented procedure shall be established and maintained for identification, collecting, indexing, access, filing, storage, maintenance and disposition of quality records.
- Records shall be maintained to demonstrate conformance to specified requirements (including subcontractor quality records).
- Records shall be stored and maintained in such a way that they are readily retrievable in facilities that provide a suitable environment to prevent damage or deterioration and to prevent loss.
- Retention times shall be established and recorded.

IX. INTERNAL COMPANY AUDIT (MERCURY BALANCE, PRODUCTS, AIR, WATER, WASTES)

It is recommended to:

- Audit the process by independent trained personnel.
- Identify and record non-conformances.
- Issue corrective actions for non-conformances.

Corrective actions shall be completed.

Records of the audits shall be archived.

X. TRAINING (MERCURY BALANCE, PRODUCTS, AIR, WATER, WASTES)

- Documented procedures shall be established and maintained for identifying training needs.
- The training of all involved people shall be provided for.
- Personnel performing specific assigned tasks shall be qualified on the basis of appropriate education, training and/or experience.
- Appropriate records of training shall be maintained.

XI. REFERENCES

Env Prot 12 - Guidelines for Making a Mercury Balance in a Chlorine Plant

Industrial consumers of chlorine, engineering and equipment supply companies worldwide and chlorine producers outside Europe may establish a permanent relationship with Euro Chlor by becoming Associate Members or Technical Correspondents.

Details of membership categories and fees are available from:

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