

Notice

This Engineering Guide was recently converted to a PC format and it has not been proof read by our engineering staff. Therefore, it is subject to change at a later date.

Ohio EPA

Division of Air Pollution Control

Engineering Section

Engineering Guide #40

Question:

What are the acceptable stack testing methods for particulate emissions from process equipment and incinerators? (This question was previously answered in the now defunct Policy Guideline Series. The policy expressed in that guideline has been updated by the Technical Services Section of the Division of Air Pollution Control and is hereby reissued as an engineering guide).

Answer:

In accordance with OAC rule 3745-17-03 (B)(5) and (B)(7), USEPA Reference Methods 1-5 (August 18, 1977 Federal Register, pages 41755-41782) shall be used for the purpose of measuring the particulate emission rates from existing process equipment and incinerators. These methods shall also apply to new processes or incinerators unless another method is specified under the federal New Source Performance Standards (NSPS). Only the dry filter particulate catch obtained at $248 \pm 25^{\circ}\text{F}$ will be used for purposes of determining compliance with the allowable particulate emission rates specified by OAC rule 3745-17-09 or OAC rule 3745-17-11. Whenever source specific sampling needs or conditions require alternate methods or major modifications of the referenced methods, the acceptability of such alternate methods or major modifications of the reference methods will be determined on a case-by-case basis by the Technical Services Section of the Division of Air Pollution Control after consultation with the appropriate field office personnel.. Minor modifications to the reference methods may be approved by qualified field office personnel.

When the nature of source emission indicates the probable existence of condensible particulate matter, an analysis of the impinger contents should be performed in accordance with the test method detailed in the Appendix to this Guide. The method is not intended to provide a complete or detailed analysis but is intended to be used as a screening device providing maximum information with minimum complexity. The analysis should be used as a first step in approximating the

mass of condensible emissions from a source.

Usually, the analysis will be required of sources which have high visible emissions levels but which are in compliance with mass emission limits as measured by USEPA Method 5 (dry catch only). It is expected that only a limited number of sources will fall into this category. Therefore, application of the analysis will be limited. However, it is important to establish the mechanism for handling such situations when they arise. If the mass of condensible emissions estimated from the analysis appears to be large enough to have an adverse impact on ambient air quality when added to the "dry catch" portion, further action may be required. Such action could include modeling to determine the effect on ambient air quality, development of test methods tailored to the specific source, and/or a rule change and SIP revision when the emissions contribute to nonattainment of the National Ambient Air Quality Standards.

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Appendix to Engineering Guide #40

Method for the Determination
of Condensable Matter in the
Method 5 Impinger Section

1. Apparatus:

- A. Graduated Cylinder
- B. Glass Weighing Dishes
- C. Desiccator
- D. Laboratory Oven
- E. Analytical Balance
- F. Beakers - 250 ml.
- G. Separatory Funnels (2) - 1000 ml.
- H. Buchner Funnel
- I. Erlenmeyer Flask - 500 ml.
- J. Sample Containers - chemically resistant, borosilicate glass

2. Reagents:

- A. Filters - glass fiber without organic binder (99.95% efficiency on 0.3 um DOP particles).
- B. Ethyl ether - reagent grade (<0.001% residue in containers suitable to retain low residue blank).
- C. Chloroform - reagent grade (<0.001% residue in glass bottle).

3. Procedure:

- A. Do not discard the impinger liquid after determination of liquid volume or weight in section 4.2 of method 5 analysis. After these measurements have been made, transfer the impinger liquid to a sample container (chemically resistant, borosilicate glass bottle) for transport to the laboratory.
- B. Note the level of the liquid in the container and confirm on the analysis sheet whether or not leakage occurred during transport. Measure the liquid in this container either volumetrically to the nearest ml. or gravimetrically to ± 5 g. Transfer the contents to a separator funnel. Extract the water with three 25 ml. portions of chloroform, followed by three 25 ml. portions of ether.

Note: Due to the flammability of ether and the health related effects of chloroform, the use of these reagents should be carefully supervised.

Combine the organic phase in another separator funnel and back extract with 100 ml. of distilled water. The aqueous phase from the back extract is to be added to the previously solvent washed aqueous phase.

- C. The organic phase is filtered through a tared glass fiber filter to remove any particulates entrained in the solvent. The filtrate is evaporated at 30^o C until the solvent appears evaporated. Desiccate the remaining residue to constant weight. Report the results to the nearest 0.1 mg.
- D. The tared glass fiber filter containing any particulate

entrained in the solvent layer is dried to apparent dryness at 30^c. It is then desiccated to constant weight and the residue reported to the nearest 0.1 mg.

- E. The water layer (to which the aqueous phase from the solvent back extract has been added) is filtered through a tared glass fiber filter. The filter is dried to apparent dryness at 30^c and then desiccated to constant weight and the residue reported to the nearest 0.1 mg.
- F. The filtrate is evaporated. Initially the evaporation process may be expedited by evaporating at 80^c but must not be evaporated to dryness at this temperature. After the filtrate volume has been reduced by hot evaporation, complete the evaporation process at 30^c and desiccate the residue to constant weight. Report the results to the nearest 0.1 mg.
- G. All residue weights must be adjusted for water and reagent blank residues and filter tare weights.