United States
Environmental Protection
Agency

Industrial Environmental Research
Laboratory
Research Triangle Park NC 27711

Research and Development

EPA-600/S8-84-002 Mar. 1984

EPA

Project Summary

Sampling and Analysis Methods for Hazardous Waste Combustion

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This report is a reference document that describes sampling and analysis methods for measuring the hazardous constituents (as defined in 40 C.F.R., Part 261, Appendix VIII) which might be designated as principal organic hazardous constituents (POHCs) in various influent and effluent streams of incineration facilities. The sampling and analysis methods for these constituents are described in the text. Also included is a concise summary sheet for each recommended method which states the name and number of the method, the types of samples and specific analytes to which the method applies, a brief description of the method, instrument, and operating conditions, and reference(s) to more detailed descriptions of the procedure. Technician-level protocols are thus incorporated by reference, rather than by reproduction in this report. In addition to presenting the methods for sampling and analysis of POHCs at these facilities, information concerning additional sampling and analysis requirements, general strategies for preparing sampling and analysis plans to meet the regulatory requirements, and guidelines for reporting and documentation are discussed.

This Project Summary was developed by EPA's Industrial Environmental Research Laboratory, Research Triangle Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Discussion

As part of the Resource Conservation and Recovery Act of 1976, the U.S. Environmental Protection Agency (EPA) has proposed regulations for owners and operators of facilities that treat hazardous wastes by incineration to ensure that the incinerators are operated in an environmentally responsible manner. The primary criterion upon which the operational specifications are based is the destruction and removal efficiency (DRE) of the incinerator. The DRE value, defined in terms of waste input and stack output levels of designated principal organic hazardous constituents (POHCs), must be equal to or greater than 99.99 percent according to the performance standards (§264.343) for hazardous waste incineration. Additional performance standards limit the particulate and hydrochloric acid emissions in the stack gas effluent.

This report reviews the regulatory requirements for sampling and analysis activities for hazardous waste incineration, with emphasis on the data needs for trial burns (Section III). Subsequent sections describe the sampling methods (Section IV), sample preparation methods (Section V),and analysis methods (Section VI) appropriate for the various types of streams, sample media, and analytes which might be encountered in a trial burn situation. Section VII describes general methods which will aid in the collection of high-quality sampling and analysis data; it also discusses the reporting and documentation concerns for the data which are collected during

sampling and analysis activities at a hazardous waste incineration facility.

The sampling methods which are prerequisite for the analysis of hazardous waste and incinerator effluents during trial burns may be required to address a variety of media. The hazardous waste prior to incineration may be in the form of a solid, liquid, slurry, or sludge. Following combustion, POHCs may be found in solids (bottom ash, fly ash/ESP catches), in liquids (scrubber water), or in the stack gas with its entrained particulate material. This report discusses the sampling methods appropriate to each of the influent and effluent streams of a hazardous waste incinerator.

Liquid sampling methods and gaseous sampling methods are the most important methods for both routine and trial burn monitoring. It is expected that most of the hazardous wastes to be incinerated will be liquids, sludges, or slurries. Often these wastes will be contained in drums following transportation from the generator to the disposal facility. Such wastes are amenable to sampling with a Coliwasa (composite liquid waste sampler).

The overall strategy for hazardous waste incinerator stack gas effluent characterization, to determine compliance with the Part 264 performance standards, is to collect replicate 3 to 6 hours (5-30 dscm) samples of stack exhaust gas, using a comprehensive sampling train, such as a modified EPA Method 5 (MM5) train or the EPA/IERL-RTP Source Assessment Sampling System (SASS). Either train provides a sample sufficient for determination of particulate mass loading, concentrations of particulate and vapor phase organics, concentration of HCl, and concentrations of particulate and volatile metals. If the POHCs of interest are volatile (B.P. $< 100°C$), the Volatile Organic Sampling Train (VOST) described in Appendix F may be necessary.

The overall strategy for the analysis of the wastes and stack emissions includes both test procedures to determine the characteristics of the waste, and analysis procedures (proximate, survey, and directed) to determine the composition of the waste and related emissions (stack gas, scrubber water, bottom ash). Both the preparation and analysis methods were chosen to be as widely applicable as possible. The directed and survey analysis procedures were selected to be appropriate to a large number of compounds, and are not necessarily optimized for each specific POHC. The primary rationale for this approach is to minimize the cost of providing assessments of the levels of POHCs while meeting the constraints of the permitting process.

The sampling, sample preparation, and analysis methods described are primarily in the form of brief descriptions with reference to other documents which contain highly detailed method descriptions. Existing collections of sampling and analysis methods have not been directly incorporated into this report but are incorporated by reference.

The structure of this manual is intended to permit quick access for the user. Brief summary descriptions of each sampling, sample preparation, and analysis method are grouped at the ends of their respective chapters. Appendix A provides basic information (structure, CAS registry number, molecular weight, melting point, boiling point, and heat of combustion, when available) for all compounds listed in Appendix VIII of the May 20, 1981, Federal Register. Additional appendices list specific Appendix VIII compounds with the appropriate sampling and analysis methods. Mass spectral analytical ions for compounds analyzed by GC/MS are tabulated in report Appendix E.

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The complete report, entitled "Sampling and Analysis Methods for Hazardous Waste Combustion," (Order No. PB 84-155 845; Cost: $32.50, subject to change) will be available only from:
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☆ U S GOVERNMENT PRINTING OFFICE, 1984 — 759-015/7606

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