SAMPLING, ANALYSIS AND QUALITY ASSURANCE/QUALITY CONTROL FOR DETERMINATION OF POLYCHLORINATED DIBENZO-*p*-DIOXINS AND DIBENZOFURANS IN STACK GAS EMISSIONS AND AMBIENT AIR

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Abstract

Sampling and analysis procedures, some past and current findings of polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDDs and PCDFs), and preparation of quality assurance/quality control (QA/QC) samples are briefly described. The MM_5 train is used for sampling stack gas emissions and the General Metals Works PS-1 PUF sampler spiked with $^{13}C_{12}$-PCDD is used to sample 320-400 m^3 ambient air over a 24 hour period. For analysis, the PS-1 filter and PUF are combined, spiked with $^{13}C_{12}$ labeled PCDD/PCDF internal standards, and subjected to a 16 hour Soxhlet extraction with benzene. Cleanup is accomplished using an acid/base procedure followed by micro-alumina and micro-carbon columns. High resolution gas chromatography - high resolution mass spectrometry (HRGC-HRMS) analyses are performed with a Finnigan MAT 90 HRMS system. Minimum limits of detection for PCDDs and PCDFs in the range of 0.01 to 0.08 pg/m^3 are achieved with these procedures.

The findings reported in EPA Report 450/4-84-014, September 1987, for Tier 4 of the U. S. EPA National Dioxin Study indicated that relative high levels of PCDDs and PCDFs were detected in certain types of incineration processes. Atmospheric transport is considered to be the major mode for dispersal of these compounds from stack gas emissions throughout the environment. Findings from a recent long-term ambient air monitoring study indicated relative high levels of PCDDs and PCDFs occasionally detected in ambient air were rapidly dispersed and only elevated background levels were detectable in the next sampling period 12 days later. Low levels, 0.3 to 2.0 pg/m^3, of total PCDDs and PCDFs are often detected in ambient air.

The PCDDs and PCDFs were removed from ash and used to prepare hundreds of 40 gram QA/QC samples of XAD_2. These samples are used to determine and evaluate laboratories analytical capabilities for determination of total PCDDs, PCDFs and 2378 substituted congeners and as audit samples in stack gas emission tests. The same concept is being used in preparation of PUF for use in ambient air monitoring studies.

"This is an abstract of a proposed presentation and does not necessarily reflect EPA policy."