

ECETOC REVIEW OF THE TOXICOLOGICAL SIGNIFICANCE OF HUMAN EXPOSURE TO DIOXINS AND DIBENZOFURANS FROM THE INCINERATION OF CHEMICAL WASTES IN RELATION TO OTHER SOURCES

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For the foreseeable future high temperature incineration will continue to be an important method for the disposal of combustible wastes from the chemical industry - particularly for the destruction of chlorinated and other halogenated waste compounds which cannot be destroyed easily or economically by other means and which pose a threat to the environment because of their toxicity and persistence. This process has attracted much public and political concern. Originally this concern could be attributed to obvious difficulties with combustion control causing visible emissions from early generation plants. In recent years the concern has focussed more on the potential for the process to generate and release dioxins.

Several factors have contributed to this situation:

- media publicity about the high toxicity of 2,3,7,8-TCDD, mainly deriving from reports of accidents such as the Seveso incident in 1976 and the use of defoliants with significant dioxin content in the Vietnam war,
- advancing knowledge of the potential for formation of PCDD's and PCDF's in combustion processes when chlorine compounds are present,
- improvements in analytical techniques which now provide the capability to detect these compounds at the ppt level and below.

All this has led to the popularisation of "dioxins" as "the most dangerous substance known to man". In response to these concerns considerable funding has been made available for numerous studies by research institutes, regulatory authorities and industry into the formation of PCDD's and PCDF's in manufacturing processes and in combustion processes involving organic compounds with chlorine or chlorine compounds. Numerous measurements have been made of the amounts of PCDD's and PCDF's emitted from such processes in flue gases, in waste water discharges and in solid wastes.

Municipal and industrial waste incinerators have been studied extensively to understand the mechanisms of formation, both in combustion chambers and in flue gas cleaning systems. Surveys have been undertaken to determine the distribution of these substance in the immediate vicinity of known sources and in the environment generally.

A number of regulatory authorities and other organisations have used the information available on occurrence, distribution, environmental fate and toxicological properties of dioxins and dibenzofurans to make assessments of the likely risks to human health attributable to the man-made generation of these substances.

Against this background the European Chemical Industry Ecology and Toxicology Centre (ECETOC) decided to set up a Task Force with the following remit:

- to review the knowledge of production of dioxins and dibenzofurans during the incineration of chemical wastes in relation to their occurrence from other sources;
to review the approaches for assessing exposure to dioxins and dibenzofurans of toxicological significance and the relevance of such exposure for man;
- in the light of these findings to review the approaches adopted for controlling emissions from chemical waste incineration.

The outcome of this study will be a report covering the following aspects of the subject:

- a review of physico-chemical properties;
- a discussion of analytical techniques;
- a toxicological profile;
- a review of the origin, distribution and fate in the environment;
- an assessment of human exposure to dioxins and dibenzofurans in general and in particular to populations in the vicinity of chemical waste incinerators,
- an assessment of the significance of these exposure levels for human health;
- a review of present approaches for controlling emissions from chemical waste incinerators.

The report will conclude with recommendations from the Task Force on plant performance criteria that can be used as the basis of design and control for chemical waste incinerators in order to minimize discharges of PCDD's and PCDF's to the environment and provide adequate safeguard for public health.