

**COMMITTEE ON CARCINOGENICITY OF CHEMICALS IN FOOD,
CONSUMER PRODUCTS AND THE ENVIRONMENT**

**FIRST DRAFT UPDATE STATEMENT ON THE REVIEW OF CANCER
INCIDENCE NEAR MUNICIPAL SOLID WASTE INCINERATORS**

Introduction

1. In light of recent public interest and new European Union (EU) legislation on emissions from plants incinerating and co-incinerating waste, we undertook an update review of recent publications on cancer incidences near municipal solid waste incinerators (MSWIs). The COC last discussed this topic in the late 1990s following the publication of a study by the Small Area Health Statistics Unit on cancer incidence near incinerators in Great Britain (Elliott et al, 1996) and agreed a statement on MSWIs and cancer in 2000 (<http://www.iacoc.org.uk/statements/Municipalsolidwasteincineratorscoc00s1march2000.htm>). This update statement presents information on the new European Union (EU) Waste Incineration Directive and details of the legally binding limit values for the emission of environmental pollutants set out in the directive. It also provides a review of reports and epidemiological investigations of cancer incidence near to MSWIs published since 2000 and the conclusions reached by the committee regarding the risk of cancer associated with living near to municipal incinerators.

2. The statement published in 2000 concluded that *“The Committee was reassured that any potential risk of cancer due to residency (for periods in excess of 10 years) near to municipal solid waste incinerators was exceedingly low and probably not measurable by the most modern epidemiological techniques. The Committee agreed that, at the present time, there was no need for any further epidemiological investigations of cancer incidence near municipal solid waste incinerators”*.

3. The by-products of the incinerator process may contain potentially toxic pollutants and emissions which will contribute to background pollution levels. We were informed that, since 1996, there have been significant cuts in emissions from incinerators in order to meet strict limits set by EU legislation. The EU Waste Incineration Directive (2000/76/EC, often termed “WID”), which applies to the incineration and co-incineration of both hazardous and non-hazardous waste, will further reduce the potential to pollute. The WID requires the setting and maintenance of stringent operational conditions, technical specifications and emission limit values for plants which incinerate and co-incinerate waste throughout the European Community. It was transposed into UK law on the 28th Dec 2002 and the new requirements have applied to new incinerators since the end of 2002. Older incinerators had until 28th Dec 2005 to meet these standards. The new directive aims to reduce and/or prevent possible negative effects on the environment caused by emissions into air, soil, surface water and groundwater and thus lessen the risks which these

pose to human health. We were also informed that, according to the WID, the protocol on persistent organic pollutants signed by the Community within the framework of the United Nations Economic Commission for Europe (UN-ECE) Convention on long-range transboundary air pollution sets legally binding limit values for the emission of polychlorinated-*p*-dibenzodioxins and polychlorinated-*p*-dibenzofurans (PCDDs and PCDFs) of 0.1 ng/m³ TEQ (Toxic Equivalents)¹ for installations burning more than 3 tonnes per hour of municipal solid waste, 0.5 ng/m³ TEQ for installations burning more than 1 tonne per hour of medical waste, and 0.2 ng/m³ TEQ for installations burning more than 1 tonne per hour of hazardous waste. The WID also outlines emission limit values (ELV)² for a number of other pollutants including dust, TOC (total organic carbon excluding carbon monoxide), hydrogen chloride, hydrogen fluoride, sulphur dioxide, total mono-nitrogen oxides, mercury, cadmium, titanium and heavy metals.

Current review

4. Six further relevant epidemiological papers have been published since the 2000 statement, three of which investigated cancer incidence around a single incinerator in France. Positive associations were reported between exposure to pollutants (principally, PCDDs and PCDFs) from MSWI and non-Hodgkin's lymphoma (NHL), soft tissue sarcomas (STS), and childhood cancers. No association or a decreased association was reported between emissions of PCDDs and PCDFs and invasive breast cancer. We note that all the epidemiology studies were carried out on incinerators in operation prior to new current controls on emissions.

5. Knox (2000) carried out an analysis of the birth and death addresses of all children in Great Britain who died of cancer between 1953 and 1980 and who had moved at sometime between birth and death. He used a technique that compares distances from suspect sources such as MSWI to the address at birth and to the address at death. The study showed a greater incidence of cancer in children born close to incinerators and moving away than in those who were born further away and who moved closer to an incinerator. We note that this study has been criticised on the grounds that there was no information provided on the net migration of total population inwards and outwards from the vicinity of the plants and therefore no control for temporal changes in population densities (Defra, 2004). We agree with this criticism and also note the lack of control data, and the complex analysis. We are unable to draw any conclusions from the study.

6. Viel et al. (2000) examined the spatial distribution of soft-tissue sarcomas and non-Hodgkin's lymphoma during the period 1980 to 1995 around a MSWI in Besancon (France). The authors report that the incinerator opened in 1971, before the current EU emission limits were in place. The first time that the concentration of PCDDs and PCDFs of an exhaust gas was measured at this

¹ The specific toxic equivalence factor to be used for each congener is defined in the WID. These are usually referred to as I-TEQs.

² The mass, expressed in terms of certain specific parameters, concentration and/or level of an emission, which may not be exceeded during one or more periods of time.

incinerator was in December 1997 when was found to be 16.3 ng I-TEQ/m³ in total. The authors found highly significant clusters of STS and NHL ($p = 0.004$ and $p = 0.0003$, respectively) at the same location, which included the area around the MSWI. We note that the paper made no adjustments for socioeconomic confounding. Furthermore, these results are not consistent with the results of the more detailed epidemiological study by Elliott et al (1996), which did not find any association between soft-tissue sarcoma or non-Hodgkin's lymphoma and distance of residence from municipal solid waste incinerators. Floret et al. (2003) carried out a population-based case-control study on the population living around the MSWI in Besancon, focusing on NHL. The study used cancer incidence data from the period 1980 to 1995 and the data were adjusted for a wide range of socioeconomic characteristics. The authors reported that the risk of developing NHL was 2.3 times higher (95% CI 1.4-3.8) among individuals living in the area with the highest modelled average ground-level PCDD and PCDF concentrations than among those living in the area with the lowest concentrations.

7. A case control study by Comba et al (2003) evaluated the association between the incidence of soft tissue sarcoma in Mantua, Northern Italy between 1989 and 1998 and residence near an incinerator of industrial waste. They reported a significant increase in the risk of soft tissue sarcomas associated with living within a 2 kilometre radius of the incinerator; the odds ratio associated with residence within 2 km, standardised by age and sex, was 31.4 (95% CI: 5.6 – 176.1), based on five exposed cases. At greater distances, the risk rapidly decreased and showed a fluctuation around the null value of 1. Zambon et al. (2007) evaluated sarcoma risk in relation to the environmental pollution caused by PCDD and PCDF emissions from waste incinerators and industrial sources of airborne PCDDs and PCDFs within the Province of Venice. The study used cancer incidence data from the period 1990 to 1996 and residential history was reconstructed from 1960 to the date of diagnosis. Risk of sarcoma increased in relation to both the duration and the extent of exposure and was statistically significant in the group with the longest period and highest level of exposure (OR 3.30, 95% CI: 1.24 - 8.76). In both sexes, risks increased in relation to the level of exposure but reached statistical significance only in women (OR 2.41, 95% CI: 1.04 - 5.59, $P < 0.04$). In the most exposed cases, there was a significant risk excess for connective and other soft tissue cancers (International Classification of Disease ICD-IX 171) with an OR = 3.27 (95% CI: 1.35 - 7.93). In both these studies, no adjustments were made for confounding factors and the strength of association was poor.

8. A further study by Viel et al (2008) examined the association between PCDDs and PCDFs emitted from the MSWI in Besancon and the incidence of invasive breast cancer between 1996 to 2002 among women living in the area 'under direct influence' of the facility. Average estimated ground level exposures to PCDDs and PCDFs were modelled, as before. The age distribution at diagnosis for all breast cases combined showed a bimodal pattern with incidence peaks near ages 50 and 70 years. Among women aged less than 60 years old, no increased or decreased risk was found for any PCDD and PCDF exposure category. Conversely, for ages 60 years and over,

women living in the highest exposed zone were 0.31 times less likely (95% CI, 0.08–0.89) to develop invasive breast carcinoma than women living in the very low emission area, with no relative risk estimate different from 1.0 for the other PCDD and PCDF risk categories.

9. In summary, we consider that, on balance, these studies indicate that there is possibly some evidence of a positive association between the incidence of certain cancers and residence near a MSWI at the higher levels of emissions in the past. However, they offer no support for an association at current levels of emissions. Overall, we are reassured that the new data do not raise any concerns about the current situation and therefore there is no need to change the advice given in the previous statement in 2000.

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