

**RESPONSE TO GREENPEACE COMMENTS ON THE ERM REPORT  
"AN ASSESSMENT OF DIOXIN EMISSIONS IN HONG KONG"**

**Summary**

- The estimates of likely total exposure to dioxins made by Greenpeace are lower than conservative estimates published in the ERM report.
- Both sets of estimates are below the WHO standard and hence are deemed acceptable, i.e. no adverse health effects are anticipated at present or in the future.
- The Greenpeace paper has incorrectly asserted that ambient levels in Hong Kong's urban environment are in excess of international standards. This inaccurate statement is based upon an error in Greenpeace's review of standards in the United States. Levels in Hong Kong are in fact well within standards used elsewhere.

## RESPONSE TO GREENPEACE COMMENTS ON THE ERM REPORT "AN ASSESSMENT OF DIOXIN EMISSIONS IN HONG KONG"

### Introduction

In April 2000, ERM submitted to the Government of the Hong Kong Special Administrative Region a report entitled *An Assessment of Dioxin Emissions in Hong Kong*. The report was released for public consultation on 17 April 2000. On 3 May 2000, ERM received preliminary comments on the ERM report prepared by Greenpeace.

ERM is pleased to note that Greenpeace's assessment of dioxin levels and potential exposure in Hong Kong is in broad agreement with the conclusions drawn in the report *An Assessment of Dioxin Emissions in Hong Kong*.

Greenpeace's estimate of the likely total exposure risk in Hong Kong is lower than the conservative, precautionary estimate developed by ERM in the study. When compared against the Tolerable Daily Intake for dioxins recommended by the World Health Organisation (WHO), Greenpeace's exposure estimate fully supports the conclusion of the ERM study, i.e., that current levels of exposure are within the WHO's recommended dioxin intake limits, and hence that adverse health effects do not arise from the CWTC, and are not anticipated to result from the development of the proposed waste incineration facilities.

The purpose of this note is to respond to the substantive issues raised by Greenpeace, and to correct certain technical inaccuracies and misinterpretations in their commentary.

### General Scope of the Report

In Section 2 of their commentary, Greenpeace is of the view that the ERM study is incomplete, i.e. that in addition to information on dioxin releases to atmosphere, the ERM study should also have estimated releases to land and water.

In the context of the present study, which specifically deals with the impacts of waste incineration facilities in Hong Kong, releases to land and water are not relevant. The CWTC does not discharge an effluent from the incinerator, and the proposed municipal waste incinerators are also to be designed so as not discharge effluent from the incineration process. The solid waste from these facilities will be stabilised prior to disposal in a lined, secure landfill site, as under the current arrangements for solids from the CWTC incinerator. A quality criterion on dioxin levels in ash is, and will continue to be, imposed.

In terms of potential health effects, only emissions to atmosphere from these facilities are of relevance, and hence form the focus of the ERM study.

### Dioxin Sources in Hong Kong

In Sections 3 and 4 of their commentary, Greenpeace states that ERM may have missed major sources of dioxin releases to air, and therefore the preliminary emissions inventory for Hong Kong has been underestimated.

It is most unlikely that ERM has missed any major **industrial** sources of dioxin emissions in Hong Kong, given that detailed industrial activity data were available to the Consultants. Regarding the adventitious sources such as **accidental fires**, listed in Table 1 of the Greenpeace commentary, ERM

has specifically noted the difficulty of estimating their emissions as data gaps in Section 3.3 of the report.

ERM has also emphasised that confirmatory monitoring should be performed on the activities/sources for which overseas emissions factors were applied, and that the preliminary study should then be revisited and updated.

### **Dioxins in Ambient Air in Hong Kong**

In Section 5 of their commentary, Greenpeace challenges ERM's statement that "*the urban ambient air data for Hong Kong [i.e. a median concentration of 0.1 pg I-TEQ/m<sup>3</sup>] generally falls within the range of concentrations measured at other locations*". This assertion is contrary to the data presented in Table 4.2b of the ERM report, which presents data for 9 countries. To support their assertion that Hong Kong levels are higher than elsewhere, Greenpeace draw on only two studies:

- (1) In the study by Hunt (1997), their average dioxin level in urban air in Phoenix, USA, of 0.25 pg I-TEQ/m<sup>3</sup> is influenced by traffic emissions, and is therefore not representative of metropolitan locations.
- (2) In the study by Lorber (1998), a value of 0.05 pg I-TEQ/m<sup>3</sup> is presented as an urban background level.

In response, ERM provides the following additional information:

- (1) The two urban ambient air sampling locations in Hong Kong (Central/Western and Tsuen Wan) are both influenced by traffic emissions, a situation which is truly representative of urban exposure in Hong Kong. Therefore, it is entirely appropriate to compare a traffic-impacted urban air sample from Hong Kong with a traffic-impacted urban air sample from the US. When this comparison is made, the range of measurements in Hong Kong fall well within the range of measurements in Phoenix.
- (2) In the study by Lorber, urban air samples were limited to measurements at two locations in Columbus, Ohio, in the months of March/April 1994, and June 1995. An average dioxin concentration of 0.05 pg I-TEQ/m<sup>3</sup> was obtained. The Hong Kong data comprises three full sets of annual data on a monthly basis. Allowing for some displacement of the seasons, the mid-year period in Hong Kong (April/May/June) is also characterised by air concentrations in the order of 0.05 pg I-TEQ/m<sup>3</sup>.

When correctly compared on a like-for-like basis, there appear to be no significant differences between the urban air quality in the US and that of Hong Kong.

### **Air Quality Standards in Pennsylvania and Massachusetts**

In Section 5 of their commentary, Greenpeace claims that the States of Pennsylvania and Massachusetts "**have adopted ambient air standards of 0.030 pg I-TEQ/m<sup>3</sup> and 0.045 pg I-TEQ/m<sup>3</sup> respectively**".

This statement is incorrect. In line with States such as Connecticut, the above ambient air concentrations represent the **maximum additional ambient air impact** that an incinerator in these States is permitted to contribute to the background environment.

**In contrast, each of the proposed municipal waste incineration facilities in Hong Kong is expected to contribute a maximum of 0.001 pg I-TEQ/m<sup>3</sup> to background air levels. This increment is 30 times lower than the lowest increment allowed in these States.**

### **Dioxin Exposure of the Citizens of Hong Kong**

In Section 6 of their commentary, Greenpeace anticipates that ERM's estimate of the dietary intake of dioxins in Hong Kong (105 pg I-TEQ/day or 1.5 pg I-TEQ/kg body weight/day for a 70 kg individual) may well be an over-estimate, and that the true exposure may be closer to 0.3-0.6 pg I-TEQ/kg body weight/day.

In response, ERM confirms that in allowing for uncertainties, a conservative, precautionary approach was deliberately taken in arriving at a preliminary dioxin intake estimate for Hong Kong, of 1.5 pg I-TEQ/kg body weight/day. This is noted as such in Table 4.3c of the ERM report.

ERM then doubled this intake in order to allow for the presence of additional, dioxin-like substances in the environment, ultimately to obtain a **conservative intake estimate for Hong Kong of 3 pg TEQ/kg body weight/day**, expressed in WHO units. ERM compared this estimate against the **WHO Tolerable Daily Intake (TDI) for dioxins, of 1-4 pg/kg body weight/day**, and concluded that since the intake estimate fell within the TDI range, no adverse effects were anticipated from current exposure.

Crucially, since the operation of each of the proposed municipal waste incinerators would have contributed a maximum of an additional 1% to the ambient background level of dioxins, the dioxin intake would be raised from **3 pg TEQ/kg body weight/day to 3.03 pg TEQ/kg body weight/day** assuming both inhalation and local dietary exposure, an increase that ERM viewed as not representing a significant increase, and still within the WHO recommended intake range.

Taking the dioxin intake estimate of Greenpeace (**0.3-0.6 pg I-TEQ/kg body weight/day**) and doubling these values to allow for other dioxin-like substances, Greenpeace would estimate the dioxin exposure in Hong Kong to be closer to **0.6-1.2 pg TEQ/kg body weight/day** assuming both inhalation and local dietary exposure, which falls within and indeed below the lower end of the TDI range of WHO. The proposed new incineration facilities would increase this exposure by a maximum of 1%, i.e. to **0.606-1.212 pg TEQ/kg body weight/day**, which again represents a marginal increase with no anticipated adverse health effects, relative to the TDI range recommended by the WHO.

It is heartening that two independent and separate studies have arrived at the same overall conclusions. Indeed, adopting the Greenpeace estimate for dioxin exposure in Hong Kong results in a greater margin of safety.