

Waste Disposal (Amendment) Bill 2005 Dioxin Emissions

Introduction

This note provides supplementary information on the specific issues on dioxin emissions raised by Members at the first meeting of the Bills Committee held on 8 July 2005.

Dioxin Emission Control and Monitoring Mechanism of CWTC

2. The Chemical Waste Treatment (CWTC) at Tsing Yi is designed to treat chemical wastes, and is fully equipped to prevent formation of dioxins during incineration and to minimize dioxin emissions to the atmosphere. The CWTC is required to meet the stringent dioxin emission standard of 0.1 ng I-TEQ/metre³ which is amongst the most stringent standards adopted in the world as compared to similar facilities in other countries¹.

3. Dioxins are formed during incomplete combustion of materials containing organic matters and chlorine and are also produced by natural processes such as forest fires and volcanic eruption. Dioxins can be destroyed at high temperature but they may be reformed at 400°C to 200°C. Hence, comprehensive emission control measures have been adopted by the CWTC operator, including –

- (a) The rotary kiln operates at above 1,000°C.
- (b) The secondary chamber operates at 1,100°C – 1,250°C which can retain the flue gas for more than 2 seconds so as to disintegrate dioxins.

¹ 1 nanogramme (ng) = 10⁻⁹ gramme. The emission standards adopted by some other economies are, European Union :0.1 ng I-TEQ/m³, Singapore: 0.1 – 0.5 ng I-TEQ/m³, Japan: 0.1 – 5.0 ng I-TEQ/m³ and the US: 0.1 – 2.3 ng I-TEQ/m³.

- (c) The flue gas is cooled abruptly to below 200°C to prevent dioxin reformation.
- (d) The gas cleaning system has two independent activated carbon injection systems, spray dry absorber and fabric filter bag and is designed to remove the remaining contaminants in the gas before emission into the air.

4. Continuous monitoring of some key parameters (carbon monoxide and temperature) in the stack gas is adopted by the CWTC operator to closely monitor the condition of incineration. The feeding of waste into the incinerator will be cut off automatically if these parameters deviate from the pre-set limits.

Latest data on dioxin emissions at CWTC

5. In 2004, the average dioxin level in the stack gas of the CWTC is 0.0054 ng I-TEQ/ m³, which is much lower than our emission standard of 0.1 ng I-TEQ/m³. The monitoring results of dioxin emission of the CWTC are summarized in Annex I.

6. Apart from continuous monitoring of the stack emissions of the CWTC, dioxin level in the ambient air is also recorded every month at the Cheung Ching Estate of Tsing Yi. Dioxin level is also monitored at two of the EPD's air monitoring stations in Tsuen Wan and Central/Western districts. The monitoring results as summarized in Annex I show that the dioxin level in the ambient air of Tsing Yi is comparable to those of the Central/Western and Tsuen Wan Districts. The results of the dioxin measurements are available on EPD's website². The monitoring results of the CWTC and the monitoring station at the Cheung Ching Estate are submitted to the Kwai Tsing District Council on a quarterly basis.

² <http://www.epd-asg.gov.hk/english/report/report.php> & http://www.epd.gov.hk/epd/english/environmentinhk/waste/data/data_cwtc.html

7. Between November 2004 and March 2005, a total of 78.8 tonnes of dioxin residues generated from the Penny's Bay Disneyland Project were disposed of at the CWTC in four batches. During the incineration of the dioxins residues, the stack gas of the CWTC, the ambient air in the nearby Tsing Yi and Kwai Chung, and the incinerator ash were closely monitored by an independent expert assessor (IEA)³ to measure the dioxin level. All these results have been uploaded onto the website of the Civil Engineering and Development Department (CEDD)⁴. The monitoring results are summarized in Annex II.

8. The results obtained by the IEA illustrate that the concentrations of dioxins in the stack emission of the CWTC were far below the prevailing international standard for incinerator dioxin emission of 0.1 ng I-TEQ/m³. The dioxin content of the ash was far below the most commonly acceptable soil contamination criteria of 1000 ng I-TEQ/ kg, and the dioxin level of the ambient air was also low. The IEA concluded that the use of CWTC was both a safe and effective way to dispose of dioxin-containing residues without imposing additional load to the environment.

Tolerable Daily Intake of Dioxin

9. According to the World Health Organisation (WHO), the United Nations Environment Programme and the European Union, 90-98% of human exposure to dioxins is through food consumption. The WHO recommends a Tolerable Daily Intake (TDI) of 1 to 4 TEQ pg per kg⁵ of body weight per day. The TDI represents a tolerable daily intake for life-time exposure for an individual, and occasional short-term exceedance above the TDI would have no health consequences provided that the average intake over long periods is not exceeded. In other words, for a person weighing 70 kg, as long as his average

³ The independent expert assessor is Professor Jonathan Wong of the Baptist University.

⁴ <http://www.cedd.gov.hk/tc/topics/idcr/index.htm>

⁵ 1 picogramme (pg) = 10⁻¹² gramme.

intake over a long period does not exceed 70 TEQ pg per day, adverse health consequence is not expected, even if his daily intake of dioxins occasionally exceeds this limit.

Studies on dioxin levels in humans in Hong Kong

10. The concern over the effect of dioxins is their association with an increase in the risk of developing cancer. Dioxins increase the risk of cancer development in general but no particular cancer predominates. Cancers may be caused by multiple factors and different cancers may have different risk factors, e.g. lung cancer is associated with smoking, liver cancer is associated with hepatitis B, bowel cancer is associated with the diet. Old age is a common risk factor for most of the cancers. Exposure of human to excessive amount of dioxins during a number of industrial accidents in the past had been reported to cause skin lesions, liver damage and disturbance of the endocrine system.

11. A study on the level of dioxins in breast milk from nursing mothers was carried out by the University of Hong Kong and the Chinese University of Hong Kong in 2002. Dioxins are fat-soluble and dioxin levels in breast milk are comparable to levels accumulated in the fatty tissues of the body. Dioxin levels in breast milk were monitored to indicate the degree of exposure in the general population. The study was part of the WHO/EURO 3rd round dioxin exposure study and was carried out in 2002-03 in 26 countries and regions, including Hong Kong.

12. The findings indicated that the levels of dioxins in breast milk in Hong Kong were in the lower to middle range in the 26 countries and regions, and were lower than those observed in most of the participating European countries. Summary of the findings is published on ETWB's website⁶.

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http://www.etwb.gov.hk/boards_and_committees/ecfc/index02/list/list_59/index.aspx?langno=1&nodeid=

Cancer in different districts

13. The percentage of cancer registered deaths out of the total number of registered deaths in Kwai Tsing district, compared against the whole of the territory for the 10 years between 1994 and 2003 are as follows –

District	Year									
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Kwai Tsing	30.3	31.0	30.3	31.7	31.1	33.4	33.5	33.8	34.2	32.1
All Districts	31.2	31.3	31.6	32.3	32.7	32.9	33.0	34.2	34.0	31.6

(Units in the table in %)

These figures indicate that the cancer rates for Kwai Tsing residents are similar to those of the residents in all districts in Hong Kong.

Meeting with the Kwai Tsing District Council (K&T DC)

14. The Kwai Tsing District Council (K&T DC) passed a Motion “Kwai Tsing District Council strongly opposes the Government to transport clinical waste to Tsing Yi for incineration” at its meeting held on 14 Jul 2005.

15. Views from Members of the K&T DC expressed at the meeting are summarized below –

- (a) The Government should not dispose of all clinical wastes at Tsing Yi.
- (b) The CWTC should be relocated to another remote area.
- (c) Centralized treatment of clinical waste should be located far away from the residents.
- (d) The Government should explain the treatment proposal in detail to

K&T DC.

- (e) The Government should provide any new technical information to the K&T DC on the incineration of clinical waste since the K&T DC has new members.
- (f) The Government should brief the K&T DC on the overall strategy for the disposal of municipal solid waste.

16. As the K&T DC meeting on 14 July 2005 was not dedicated to discussion of the clinical waste control scheme, EPD representatives agreed to explain the scheme to the K&T DC again on another date to be fixed.

Environmental Protection Department

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Annex I

Dioxin concentration of CWTC's stack emission and ambient air for Tsing Yi, Tsuen Wan and Central/Western districts

Year	CWTC Stack Emission (ng I-TEQ/m ³)	Dioxin Concentration in Ambient Air (pg I-TEQ/m ³)		
		Tsing Yi	Tsuen Wan	Central/Western
2000	0.0081	0.053	0.061	0.051
2001	0.0075	0.069	0.055	0.046
2002	0.0073	0.044	0.063	0.057
2003	0.0159	0.059	0.071	0.066
2004	0.0054	0.069	0.055	0.073

Note: 1 nanogramme (ng) = 1000 picogramme (pg)

Monitoring results of the incineration of dioxin residue from Penny's Bay

Month of Incineration	Nov 2004	Jan 2005	Feb 2005	Mar 2005
Stack results ^(a) (ng I-TEQ /m ³)	0.0003	0.0004	0.00065	0.00004
Ambient air results (pg I-TEQ /m ³)	0.034 – 0.055	0.090 – 0.126	0.022 – 0.035	0.041 - 0.057
Ash ^(b) (ng I-TEQ /kg)	1.58	1.53	1.49	1.495

Note:

- (a) The emission standard for the stack gas is 0.1 ng I-TEQ / m³.
- (b) The disposal limit for ash is 1000 ng I-TEQ /kg.
- (c) 1 nanogramme (ng) = 1000 picogramme (pg).