

**Chemical Waste Treatment Centre**  
**Operation Report**  
**Oct 99 - Dec 99**

**I. INTRODUCTION**

This Operation Report is prepared by EPD for the Environment and Planning Committee (EPC) of the Kwai Tsing District Board. It outlines the activities of the Chemical Waste Treatment Centre (CWTC) and provides a summary of environmental performance of the plant.

The environmental performance summary as shown in Section II of this report covers the result of environmental monitoring from October 99 to December 99.

**II. ENVIRONMENTAL PERFORMANCE SUMMARY**

Enviropace are required to undertake regular checks on environmental performance of the operation of the plant. These include the following:

- Effluent discharge monitoring
- Stack gas monitoring
- Stabilised residue monitoring

**Effluent Discharge**

Effluent from the CWTC treatment processes has to meet statutory and contractual discharge limits on pollutant concentration. Multiple processes are employed inside the CWTC to treat all liquid wastes to ensure a safe waste management system. These would facilitate immediate warning on any significant change detected in the composition of the effluent, such that prompt corrective response can be effected.

Effluent from the plant is discharged in batches. Each batch is sampled and analyzed, and discharges are permitted only if limits are met. Tables 1 to 3 show the summary of effluent quality from October 99 to December 99. No exceedances in effluent discharge limits were observed.

**Stack Gas**

Air emissions from the incineration system are closely monitored by a comprehensive management and monitoring programme to ensure that the system is operating safely and in an environmentally acceptable manner.

A continuous monitoring system on key parameters is installed in the incinerator stack to ensure combustion and air pollutant removal processes are functionally well. Furthermore, the incinerator is equipped with an automatic waste feed cut-off system. In the event that the continuous monitoring system picks up any

potential sign of exceedance of any of the control parameters, waste feed to the incinerator will be stopped automatically.

The result for Stack Gas Monitoring from October 99 to December 99 are attached in Tables 4 to 6 and compliance in all stack gas control parameters has been achieved.

### Stabilised Residue

All process residues at the CWTC are detoxified, chemically stabilized and physically immobilized to an environmentally benign state. Samples of the stabilized materials have to pass a series of analytical tests, proven to be innocuous before being sent to an off-site landfill for final disposal.

The summaries of result for Stabilized Residue from October 99 to December 99 are attached in Tables 7 to 9. All of the test parameters fell within the control limits and no exceedances occurred.

Table 1

Chemical Waste Treatment Centre  
Effluent Discharge Summary ( October 1999 )

Parameters	Control Limits	Result	Mean
pH	6-10	7.3 – 9.0	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 43.78	N/A
Total Phosphate (mg/l)	10	< 2	N/A
Total Sulphate (mg/l)	2000	539.29-1087	814.62
Total Sulphides (mg/l)	10	< 0.5	N/A
Total Cyanide (mg/l)	0.1	< 0.04	N/A
Total Suspended Solids (mg/l)	100	< 37.25	N/A
Oil and Grease (mg/l)	20	< 15	N/A
Total Phenols (mg/l)	0.5	< 0.3	N/A
Total Residual Chlorine (mg/l)	1	< 0.6	N/A
Anionic Detergents (mg/l)	15	< 3	N/A
Dissolved TOC (mg/l)	200	25.66 – 91.4	55.21
Temperature (°C)	43	31 – 40	N/A
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.25	N/A
Barium (mg/l)	5	< 1	
Cadmium (mg/l)	0.1	< 0.1	
Chromium (mg/l)	1	< 0.3	
Copper (mg/l)	2	< 1.1	
Lead (mg/l)	2	< 1	
Manganese (mg/l)	5	< 0.2	
Mercury (mg/l)	0.05	< 0.05	
Nickel (mg/l)	2	< 1	
Silver (mg/l)	2	< 0.54	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 7.28	
Boron (mg/l)	5	< 4.08	
Iron (mg/l)	10	< 2	

Parameters	Control Limits	Result	Mean
Pesticides :			
Aldrin (mg/l)	0.01	< 0.01	N/A
BHCS (mg/l)	0.01	< 0.01	
DDT (mg/l)	0.01	< 0.01	
Semi-volatile Compounds :			
Benzo (A) Pyrene (mg/l)	0.1	< 0.1	N/A
Volatile Compounds :			
1,1,1-Trichloroethane (mg/l)	0.05	< 0.05	N/A
Polychlorinated Biphenyls :			
Total PCBs (mg/l)	0.003	< 0.003	N/A
Radioactive Substances :			
Gross (pc/l)	10000	< 10000	N/A
Radium-226 (pc/l)	30	< 30	
Strontium-90 (pc/l)	100	< 100	

# Total toxic metals include: Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Silver, Tin, Zinc.

Table 2

Chemical Waste Treatment Centre  
Effluent Discharge Summary ( November 1999 )

Parameters	Control Limits	Result	Mean
pH	6-10	6.8 – 9.3	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 55.23	N/A
Total Phosphate (mg/l)	10	< 2	N/A
Total Sulphate (mg/l)	2000	90.93-890.8	594.23
Total Sulphides (mg/l)	10	< 1.3	N/A
Total Cyanide (mg/l)	0.1	< 0.05	N/A
Total Suspended Solids (mg/l)	100	< 48.38	N/A
Oil and Grease (mg/l)	20	< 15.66	N/A
Total Phenols (mg/l)	0.5	< 0.31	N/A
Total Residual Chlorine (mg/l)	1	< 0.6	N/A
Anionic Detergents (mg/l)	15	< 3	N/A
Dissolved TOC (mg/l)	200	< 86.31	N/A
Temperature (°C)	43	28 –41.5	N/A
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.25	N/A
Barium (mg/l)	5	< 1	
Cadmium (mg/l)	0.1	< 0.1	
Chromium (mg/l)	1	< 0.3	
Copper (mg/l)	2	< 1.28	
Lead (mg/l)	2	< 1	
Manganese (mg/l)	5	< 0.2	
Mercury (mg/l)	0.05	< 0.05	
Nickel (mg/l)	2	< 1.02	
Silver (mg/l)	2	< 0.51	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 7.58	
Boron (mg/l)	5	< 2.72	
Iron (mg/l)	10	< 2	

Parameters	Control Limits	Result	Mean
Pesticides :			
Aldrin (mg/l)	0.01	< 0.01	N/A
BHCS (mg/l)	0.01	< 0.01	
DDT (mg/l)	0.01	< 0.01	
Semi-volatile Compounds :			
Benzo (A) Pyrene (mg/l)	0.1	< 0.1	N/A
Volatile Compounds :			
1,1,1-Trichloroethane (mg/l)	0.05	< 0.05	N/A
Polychlorinated Biphenyls :			
Total PCBs (mg/l)	0.003	< 0.003	N/A
Radioactive Substances :			
Gross (pc/l)	10000	< 10000	N/A
Radium-226 (pc/l)	30	< 30	
Strontium-90 (pc/l)	100	< 100	

# Total toxic metals include: Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Silver, Tin, Zinc.

Table 3

Chemical Waste Treatment Centre  
Effluent Discharge Summary ( December 1999 )

Parameters	Control Limits	Result	Mean
pH	6-10	6.5 - 9.8	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 33.47	N/A
Total Phosphate (mg/l)	10	< 1	N/A
Total Sulphate (mg/l)	2000	159-891	583.56
Total Sulphides (mg/l)	10	< 0.5	N/A
Total Cyanide (mg/l)	0.1	< 0.04	N/A
Total Suspended Solids (mg/l)	100	< 83	N/A
Oil and Grease (mg/l)	20	< 19.43	N/A
Total Phenols (mg/l)	0.5	< 0.39	N/A
Total Residual Chlorine (mg/l)	1	< 0.6	N/A
Anionic Detergents (mg/l)	15	< 3	N/A
Dissolved TOC (mg/l)	200	25.25-82.71	51
Temperature (°C)	43	21.84 – 39	N/A
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.22	N/A
Barium (mg/l)	5	< 1	
Cadmium (mg/l)	0.1	< 0.1	
Chromium (mg/l)	1	< 0.3	
Copper (mg/l)	2	< 1.78	
Lead (mg/l)	2	< 1	
Manganese (mg/l)	5	< 0.2	
Mercury (mg/l)	0.05	< 0.05	
Nickel (mg/l)	2	< 1	
Silver (mg/l)	2	< 0.45	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 7.93	
Boron (mg/l)	5	< 2.25	
Iron (mg/l)	10	< 2	

Parameters	Control Limits	Result	Mean
Pesticides :			
Aldrin (mg/l)	0.01	< 0.01	N/A
BHCS (mg/l)	0.01	< 0.01	
DDT (mg/l)	0.01	< 0.01	
Semi-volatile Compounds :			
Benzo (A) Pyrene (mg/l)	0.1	< 0.1	N/A
Volatile Compounds :			
1,1,1-Trichloroethane (mg/l)	0.05	< 0.05	N/A
Polychlorinated Biphenyls :			
Total PCBs (mg/l)	0.003	< 0.003	N/A
Radioactive Substances :			
Gross (pc/l)	10000	< 10000	N/A
Radium-226 (pc/l)	30	< 30	
Strontium-90 (pc/l)	100	< 100	

# Total toxic metals include: Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Silver, Tin, Zinc.



Table 4

Chemical Waste Treatment Centre  
Stack Gas Monitoring Summary ( October 1999 )

Parameters	Control Limits	Result	Mean
Particulates (mg/m <sup>3</sup> )	75	0.2 – 2.2	1.3
Chlorine and Compounds (as Cl <sub>2</sub> ) (mg/m <sup>3</sup> )	100	< 4.1	N/A
Fluorine and Compounds (as HF) (mg/m <sup>3</sup> )	25	< 0.4	N/A
Hydrogen Sulphide (mg/m <sup>3</sup> )	5	1.6 – 2.1	1.85
Acidity (as Sulphuric Acid) (mg/m <sup>3</sup> )	100	18.9 – 30.3	26.43
Sulphur Dioxide (mg/m <sup>3</sup> )	750	60.2 – 598.5	304.65
Hydrochloric Acid (mg/m <sup>3</sup> )	38	6.7 – 25	14.9
Total Phosphorus (as P) (mg/m <sup>3</sup> )	7.5	< 0.692	N/A
Hydrogen Fluoride (mg/m <sup>3</sup> )	7.5	< 0.9	N/A
Hydrogen Bromide (mg/m <sup>3</sup> )	7.5	< 0.9	N/A
Toxic Metals I :			
Mercury (mg/m <sup>3</sup> )	3	< 0.007	N/A
Cadmium (mg/m <sup>3</sup> )	3	< 0.058	
Antimony (mg/m <sup>3</sup> )	3	< 0.583	
Toxic Metals II :			
Lead (mg/m <sup>3</sup> )	10	< 0.692	N/A
Copper (mg/m <sup>3</sup> )	10	< 0.080	
Arsenic (mg/m <sup>3</sup> )	10	< 0.007	
Nickel (mg/m <sup>3</sup> )	10	< 0.138	
Chromium (mg/m <sup>3</sup> )	10	< 0.058	
Total of Toxic Metals I & II (mg/m <sup>3</sup> )	10	< 1.625	N/A
Dioxin (ng/m <sup>3</sup> )	0.1	0.0095	N/A

Table 5

Chemical Waste Treatment Centre  
Stack Gas Monitoring Summary ( November 1999 )

Parameters	Control Limits	Result	Mean
Particulates (mg/m <sup>3</sup> )	75	0.2 – 3.5	2.23
Chlorine and Compounds (as Cl <sub>2</sub> ) (mg/m <sup>3</sup> )	100	< 4.5	N/A
Fluorine and Compounds (as HF) (mg/m <sup>3</sup> )	25	< 0.5	N/A
Hydrogen Sulphide (mg/m <sup>3</sup> )	5	1.2 – 1.4	1.3
Acidity (as Sulphuric Acid) (mg/m <sup>3</sup> )	100	12.5 – 25.8	19.97
Sulphur Dioxide (mg/m <sup>3</sup> )	750	54.7 – 265.1	126.87
Hydrochloric Acid (mg/m <sup>3</sup> )	38	< 23.2	N/A
Total Phosphorus (as P) (mg/m <sup>3</sup> )	7.5	< 0.673	N/A
Hydrogen Fluoride (mg/m <sup>3</sup> )	7.5	< 0.9	N/A
Hydrogen Bromide (mg/m <sup>3</sup> )	7.5	< 0.9	N/A
Toxic Metals I :			
Mercury (mg/m <sup>3</sup> )	3	< 0.008	N/A
Cadmium (mg/m <sup>3</sup> )	3	< 0.057	
Antimony (mg/m <sup>3</sup> )	3	< 0.566	
Toxic Metals II :			
Lead (mg/m <sup>3</sup> )	10	< 0.673	N/A
Copper (mg/m <sup>3</sup> )	10	< 0.078	
Arsenic (mg/m <sup>3</sup> )	10	< 0.007	
Nickel (mg/m <sup>3</sup> )	10	< 0.135	
Chromium (mg/m <sup>3</sup> )	10	< 0.057	
Total of Toxic Metals I & II (mg/m <sup>3</sup> )	10	< 1.578	N/A
Dioxin (ng/m <sup>3</sup> )	0.1	0.0035	N/A

Table 6

Chemical Waste Treatment Centre  
Stack Gas Monitoring Summary ( December 1999 )

Parameters	Control Limits	Result	Mean
Particulates (mg/m <sup>3</sup> )	75	1.6 – 2.2	1.9
Chlorine and Compounds (as Cl <sub>2</sub> ) (mg/m <sup>3</sup> )	100	< 4.7	N/A
Fluorine and Compounds (as HF) (mg/m <sup>3</sup> )	25	< 0.5	N/A
Hydrogen Sulphide (mg/m <sup>3</sup> )	5	Not detected	N/A
Acidity (as Sulphuric Acid) (mg/m <sup>3</sup> )	100	6.9 – 7.8	7.35
Sulphur Dioxide (mg/m <sup>3</sup> )	750	< 41	N/A
Hydrochloric Acid (mg/m <sup>3</sup> )	38	26.1 – 30.5	28.3
Total Phosphorus (as P) (mg/m <sup>3</sup> )	7.5	< 0.628	N/A
Hydrogen Fluoride (mg/m <sup>3</sup> )	7.5	< 1	N/A
Hydrogen Bromide (mg/m <sup>3</sup> )	7.5	< 1	N/A
Toxic Metals I :			
Mercury (mg/m <sup>3</sup> )	3	< 0.008	N/A
Cadmium (mg/m <sup>3</sup> )	3	< 0.053	
Antimony (mg/m <sup>3</sup> )	3	< 0.529	
Toxic Metals II :			
Lead (mg/m <sup>3</sup> )	10	< 0.628	N/A
Copper (mg/m <sup>3</sup> )	10	< 0.073	
Arsenic (mg/m <sup>3</sup> )	10	< 0.006	
Nickel (mg/m <sup>3</sup> )	10	< 0.126	
Chromium (mg/m <sup>3</sup> )	10	< 0.053	
Total of Toxic Metals I & II (mg/m <sup>3</sup> )	10	< 1.474	N/A
Dioxin (ng/m <sup>3</sup> )	0.1	0.0018	N/A

Table 7

Chemical Waste Treatment Centre  
Stabilised Materials Summary ( October 1999 )

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	10.59 – 12.77	N/A
% Solids (%)	30 (lower limit)	39.37 – 86.3	64.86
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.02	
Total Chromium (ppm)	10	< 0.5	
Copper (ppm)	-	< 8.55	
Nickel (ppm)	-	< 0.5	
Lead (ppm)	-	< 18.55	
Zinc (ppm)	-	< 3.10	
Total of copper, nickel, lead, zinc (ppm)	25	< 22.01	
Iron (ppm)	20	< 1.29	N/A
Sulphide (ppm)	10	< 5	N/A
Ammoniacal Nitrogen (ppm)	10	< 2.81	N/A
Cyanide (ppm)	5	< 5	N/A
Section B			
Volatile Organic Contents (ppm)	5000	< 15	N/A
Total Organic Halides (ppm)	10	< 3.37	N/A
Total Chloro Phenols (ppm)	2	< 2	N/A
Polychlorinated Biphenyls (ppm)	1	< 1	N/A
TCDD equivalent (ITEF method) (ppb)	1	< 1	N/A

Table 8

Chemical Waste Treatment Centre  
Stabilised Materials Summary ( November 1999 )

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	11.33–12.93	N/A
% Solids (%)	30 (lower limit)	49.81-100	65.45
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.02	
Total Chromium (ppm)	10	< 0.5	
Copper (ppm)	-	< 8.45	
Nickel (ppm)	-	< 0.5	
Lead (ppm)	-	< 10.18	
Zinc (ppm)	-	< 1.31	
Total of copper, nickel, lead, zinc (ppm)	25	< 13.4	
Iron (ppm)	20	< 15.92	N/A
Sulphide (ppm)	10	< 5	N/A
Ammoniacal Nitrogen (ppm)	10	< 8.89	N/A
Cyanide (ppm)	5	< 5	N/A
Section B			
Volatile Organic Contents (ppm)	5000	< 15	N/A
Total Organic Halides (ppm)	10	< 2	N/A
Total Chloro Phenols (ppm)	2	< 2	N/A
Polychlorinated Biphenyls (ppm)	1	< 1	N/A
TCDD equivalent (ITEF method) (ppb)	1	< 1	N/A

Table 9

Chemical Waste Treatment Centre  
Stabilised Materials Summary ( December 1999 )

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	9.5–12.85	N/A
% Solids (%)	30 (lower limit)	48.06-93.72	65.46
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.02	
Total Chromium (ppm)	10	< 0.5	
Copper (ppm)	-	< 7.1	
Nickel (ppm)	-	< 7.7	
Lead (ppm)	-	< 9.9	
Zinc (ppm)	-	< 17.3	
Total of copper, nickel, lead, zinc (ppm)	25	< 21.3	
Iron (ppm)	20	< 5.7	N/A
Sulphide (ppm)	10	< 5	N/A
Ammoniacal Nitrogen (ppm)	10	< 5.25	N/A
Cyanide (ppm)	5	< 5	N/A
Section B			
Volatile Organic Contents (ppm)	5000	< 15	N/A
Total Organic Halides (ppm)	10	< 5.26	N/A
Total Chloro Phenols (ppm)	2	< 2	N/A
Polychlorinated Biphenyls (ppm)	1	< 1	N/A
TCDD equivalent (ITEF method) (ppb)	1	< 1	N/A