

Chemical Waste Treatment Centre
Operation Report
Oct 01 - Dec 01

I. INTRODUCTION

This Operation Report is prepared by EPD for the Planning and Environmental Protection Committee of the Kwai Tsing District Council. 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 2001 to December 2001.

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 2001 to December 2001. 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 2001 to December 2001 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 2001 to December 2001 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 2001)

Parameters	Control Limits	Result	Mean
pH	6-10	6.7 – 9.2	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 20.0	N/A
Total Phosphate (mg/l)	10	< 1	N/A
Total Sulphate (mg/l)	2000	308.94 – 924.72	636.83
Total Sulphides (mg/l)	10	< 1.43	N/A
Total Cyanide (mg/l)	0.1	< 0.04	N/A
Total Suspended Solids (mg/l)	100	< 37.85	N/A
Oil and Grease (mg/l)	20	< 18.73	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	< 2	N/A
Dissolved TOC (mg/l)	200	29.79 – 160.18	79.02
Temperature (°C)	43	22.4 – 42	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	< 1.73	
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	< 0.4	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 8.03	
Boron (mg/l)	5	< 1.25	
Iron (mg/l)	10	< 2	N/A

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 2001)

Parameters	Control Limits	Result	Mean
pH	6-10	7.0 – 8.9	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 20	N/A
Total Phosphate (mg/l)	10	< 1	N/A
Total Sulphate (mg/l)	2000	503.61 – 1,837.16	1,126.04
Total Sulphides (mg/l)	10	< 0.5	N/A
Total Cyanide (mg/l)	0.1	< 0.047	N/A
Total Suspended Solids (mg/l)	100	< 29.702	N/A
Oil and Grease (mg/l)	20	< 17.698	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	< 2	N/A
Dissolved TOC (mg/l)	200	18.84 – 159.42	76.89
Temperature (°C)	43	27 – 42	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	< 0.863	
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	< 0.4	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 7.163	
Boron (mg/l)	5	< 1.811	
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 2001)

Parameters	Control Limits	Result	Mean
pH	6-10	7.2 – 9.1	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 20	N/A
Total Phosphate (mg/l)	10	< 1	N/A
Total Sulphate (mg/l)	2000	326.79 – 1,383.79	896.29
Total Sulphides (mg/l)	10	< 0.5	N/A
Total Cyanide (mg/l)	0.1	< 0.03	N/A
Total Suspended Solids (mg/l)	100	< 53.557	N/A
Oil and Grease (mg/l)	20	< 15.584	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	< 2	N/A
Dissolved TOC (mg/l)	200	22.14 – 158.97	72.88
Temperature (°C)	43	24 – 40.4	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	< 0.667	
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	< 0.4	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 6.967	
Boron (mg/l)	5	< 1.677	
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 2001)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	1.3 – 2.5	2.0
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 3.8	N/A
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.4	N/A
Hydrogen Sulphide (mg/m ³)	5	Not detected	N/A
Acidity (as Sulphuric Acid) (mg/m ³)	100	13.0 – 17.7	14.8
Sulphur Dioxide (mg/m ³)	750	71.8 – 548.5	278.4
Hydrochloric Acid (mg/m ³)	38	< 10.1	N/A
Total Phosphorus (as P) (mg/m ³)	7.5	< 0.688	N/A
Hydrogen Fluoride (mg/m ³)	7.5	< 0.8	N/A
Hydrogen Bromide (mg/m ³)	7.5	< 0.8	N/A
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.007	N/A
Cadmium (mg/m ³)	3	< 0.058	
Antimony (mg/m ³)	3	< 0.578	
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.688	N/A
Copper (mg/m ³)	10	< 0.080	
Arsenic (mg/m ³)	10	< 0.007	
Nickel (mg/m ³)	10	< 0.138	
Chromium (mg/m ³)	10	< 0.058	
Total of Toxic Metals I & II (mg/m ³)	10	< 1.611	N/A
Dioxin (ng/m ³)	0.1	Note 1	Note 1

Note: (1) Dioxin sample collected on 31 Oct 01 was void because of the sample preparation problem. Make up sample was taken on 8 Nov 01.

Table 5

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (November 2001)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	0.2 – 3.0	1.9
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 4.3	N/A
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.5	N/A
Hydrogen Sulphide (mg/m ³)	5	Not detected	N/A
Acidity (as Sulphuric Acid) (mg/m ³)	100	5.6 – 15.6	10.1
Sulphur Dioxide (mg/m ³)	750	14.4 – 83.3	44.5
Hydrochloric Acid (mg/m ³)	38	< 6.1	N/A
Total Phosphorus (as P) (mg/m ³)	7.5	< 0.605	N/A
Hydrogen Fluoride (mg/m ³)	7.5	< 0.9	N/A
Hydrogen Bromide (mg/m ³)	7.5	< 0.8	N/A
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.008	N/A
Cadmium (mg/m ³)	3	< 0.051	
Antimony (mg/m ³)	3	< 0.511	
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.605	N/A
Copper (mg/m ³)	10	< 0.070	
Arsenic (mg/m ³)	10	< 0.006	
Nickel (mg/m ³)	10	< 0.121	
Chromium (mg/m ³)	10	< 0.051	
Total of Toxic Metals I & II (mg/m ³)	10	< 1.422	N/A
Dioxin (ng/m ³)	0.1	0.0005 – 0.0007	0.0006

Table 6

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (December 2001)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	2.4 – 3.7	3.1
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 3.8	N/A
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.4	N/A
Hydrogen Sulphide (mg/m ³)	5	Not detected	N/A
Acidity (as Sulphuric Acid) (mg/m ³)	100	15.8 – 23.7	18.6
Sulphur Dioxide (mg/m ³)	750	79.1 – 218.3	139.1
Hydrochloric Acid (mg/m ³)	38	< 6.8	N/A
Total Phosphorus (as P) (mg/m ³)	7.5	< 0.633	N/A
Hydrogen Fluoride (mg/m ³)	7.5	< 0.9	N/A
Hydrogen Bromide (mg/m ³)	7.5	< 1.3	N/A
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.009	N/A
Cadmium (mg/m ³)	3	< 0.053	
Antimony (mg/m ³)	3	< 0.534	
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.633	N/A
Copper (mg/m ³)	10	< 0.073	
Arsenic (mg/m ³)	10	< 0.006	
Nickel (mg/m ³)	10	< 0.127	
Chromium (mg/m ³)	10	< 0.053	
Total of Toxic Metals I & II (mg/m ³)	10	< 1.489	N/A
Dioxin (ng/m ³)	0.1	0.0039	N/A

Table 7

Chemical Waste Treatment Centre
Stabilised Materials Summary (October 2001)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	10.34 – 12.75	N/A
% Solids (%)	30 (lower limit)	43.69 – 96.43	70.44
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.07	
Total Chromium (ppm)	10	< 0.5	
Copper (ppm)	-	< 14.536	
Nickel (ppm)	-	< 2.307	
Lead (ppm)	-	< 20.139	
Zinc (ppm)	-	< 10.65	
Total of copper, nickel, lead, zinc (ppm)	25	< 23.905	
Iron (ppm)	20	< 2.708	N/A
Sulphide (ppm)	10	< 1	N/A
Ammoniacal Nitrogen (ppm)	10	< 7.44	N/A
Cyanide (ppm)	5	< 1	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 8

Chemical Waste Treatment Centre
Stabilised Materials Summary (November 2001)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	10.91 – 12.78	N/A
% Solids (%)	30 (lower limit)	47.56 – 89.73	63.95
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.0252	
Total Chromium (ppm)	10	< 1.504	
Copper (ppm)	-	< 7.117	
Nickel (ppm)	-	< 5.26	
Lead (ppm)	-	< 18.65	
Zinc (ppm)	-	< 16.244	
Total of copper, nickel, lead, zinc (ppm)	25	< 24.618	
Iron (ppm)	20	< 1	N/A
Sulphide (ppm)	10	< 1	N/A
Ammoniacal Nitrogen (ppm)	10	< 9.06	N/A
Cyanide (ppm)	5	< 1	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 2001)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	11.81 – 12.85	N/A
% Solids (%)	30 (lower limit)	47.59 – 97.82	68.21
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.04977	
Total Chromium (ppm)	10	< 0.5	
Copper (ppm)	-	< 13.14	
Nickel (ppm)	-	< 1.493	
Lead (ppm)	-	< 14.931	
Zinc (ppm)	-	< 2.535	
Total of copper, nickel, lead, zinc (ppm)	25	< 18.168	
Iron (ppm)	20	< 1.11	N/A
Sulphide (ppm)	10	< 1	N/A
Ammoniacal Nitrogen (ppm)	10	< 6.52	N/A
Cyanide (ppm)	5	< 3.443	N/A
Section B			
Volatile Organic Contents (ppm)	5000	< 15	N/A
Total Organic Halides (ppm)	10	< 2	N/A
Total Chloro Phenols	2	< 2	N/A
Polychlorinated Biphenyls (ppm)	1	< 1	N/A
TCDD equivalent (ITEF method) (ppb)	1	< 1	N/A