

Chemical Waste Treatment Centre
Monitoring Report
October 2002 - December 2002

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 2002 to December 2002.

II. ENVIRONMENTAL PERFORMANCE SUMMARY

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

- I Effluent discharge monitoring
- I Stack gas monitoring
- I 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 2002 to December 2002. 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 2002 to December 2002 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 2002 to December 2002 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 2002 ~

Parameters	Control Limits	Result	Mean *
PH	6-10 pH	7.2 – 8.7	7.99
Total Kjeldahl Nitrogen	100 mg/l	< 20.46 mg/l	20.03 mg/l
Total Phosphate	10 mg/l	< 1 mg/l	< 1 mg/l
Total Sulphate	2000 mg/l	212.63 – 1,566.13 mg/l	1,173.11 mg/l
Total Sulphides	10 mg/l	< 0.65 mg/l	0.51 mg/l
Total Cyanide	0.1 mg/l	< 0.073 mg/l	0.04 mg/l
Total Suspended Solids	100 mg/l	< 33.73 mg/l	19.72 mg/l
Oil and Grease	20 mg/l	< 16.03 mg/l	15.04 mg/l
Total Phenols	0.5 mg/l	< 0.37 mg/l	0.30 mg/l
Total Residual Chlorine	1 mg/l	< 0.6 mg/l	< 0.6 mg/l
Anionic Detergents	15 mg/l	< 2 mg/l	< 2 mg/l
Dissolved TOC	200 mg/l	10.00 – 130.10 mg/l	91.98 mg/l
Temperature	43°C	27 – 39 °C	32.56 °C
Floatable Substances	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic	2 mg/l	< 0.25 mg/l	< 0.25 mg/l
Barium	5 mg/l	< 1 mg/l	< 1 mg/l
Cadmium	0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l
Chromium	1 mg/l	< 0.3 mg/l	< 0.3 mg/l
Copper	2 mg/l	< 1.38 mg/l	0.56 mg/l
Lead	2 mg/l	< 1 mg/l	< 1 mg/l
Manganese	5 mg/l	< 0.2 mg/l	< 0.2 mg/l
Mercury	0.05 mg/l	< 0.05 mg/l	< 0.05 mg/l
Nickel	2 mg/l	< 1 mg/l	< 1 mg/l
Silver	2 mg/l	< 0.4 mg/l	< 0.4 mg/l
Tin	5 mg/l	< 1 mg/l	< 1 mg/l
Zinc	2 mg/l	< 1 mg/l	< 1 mg/l
Total Toxic Metals #	10 mg/l	< 7.68 mg/l	6.86 mg/l
Boron	5 mg/l	< 1.61 mg/l	1.13 mg/l
Iron	10 mg/l	< 2 mg/l	< 2 mg/l

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

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 2002 ~

Parameters	Control Limits	Result	Mean
PH	6-10 pH	7.5 – 9.0	8.06
Total Kjeldahl Nitrogen	100 mg/1	< 34.05 mg/1	< 20.73 mg/1
Total Phosphate	10 mg/1	< 1 mg/1	< 1 mg/1
Total Sulphate	2000 mg/1	701.63 – 1,946.43mg/1	1,270.09mg/1
Total Sulphides	10 mg/1	< 0.5 mg/1	< 0.5 mg/1
Total Cyanide	0.1 mg/1	< 0.06 mg/1	0.04 mg/1
Total Suspended Solids	100 mg/1	< 40.46 mg/1	18.89 mg/1
Oil and Grease	20 mg/1	< 18.45 mg/1	15.38 mg/1
Total Phenols	0.5 mg/1	< 0.3 mg/1	< 0.3 mg/1
Total Residual Chlorine	1 mg/1	< 0.78 mg/1	0.61 mg/1
Anionic Detergents	15 mg/1	< 2 mg/1	< 2 mg/1
Dissolved TOC	200 mg/1	31.37 – 174.94 mg/1	114.56 mg/1
Temperature	43 °C	26.77 – 37 °C	30.7 °C
Floatable Substances	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic	2 mg/1	< 0.25 mg/1	< 0.25 mg/1
Barium	5 mg/1	< 1 mg/1	< 1 mg/1
Cadmium	0.1 mg/1	< 0.1 mg/1	< 0.1 mg/1
Chromium	1 mg/1	< 0.3 mg/1	< 0.3 mg/1
Copper	2 mg/1	< 1.52 mg/1	0.58 mg/1
Lead	2 mg/1	< 1 mg/1	< 1 mg/1
Manganese	5 mg/1	< 0.2 mg/1	< 0.2 mg/1
Mercury	0.05 mg/1	< 0.05 mg/1	< 0.05 mg/1
Nickel	2 mg/1	< 1 mg/1	< 1 mg/1
Silver	2 mg/1	< 0.4 mg/1	< 0.4 mg/1
Tin	5 mg/1	< 1 mg/1	< 1 mg/1
Zinc	2 mg/1	< 1 mg/1	< 1 mg/1
Total Toxic Metals #	10 mg/1	< 7.82 mg/1	6.88 mg/1
Boron	5 mg/1	< 2.62 mg/1	1.51 mg/1
Iron	10 mg/1	< 2 mg/1	< 2 mg/1

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

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 2002 ~

Parameters	Control Limits	Result	Mean
PH	6-10 pH	7.4 – 9.1	8.30
Total Kjeldahl Nitrogen	100 mg/l	< 64.05 mg/l	26.72 mg/l
Total Phosphate	10 mg/l	< 1 mg/l	< 1 mg/l
Total Sulphate	2000 mg/l	685.93 – 1,978.79 mg/l	1,275.55 mg/l
Total Sulphides	10 mg/l	< 1.72 mg/l	0.54 mg/l
Total Cyanide	0.1 mg/l	< 0.04 mg/l	< 0.04 mg/l
Total Suspended Solids	100 mg/l	< 35.50 mg/l	17.20 mg/l
Oil and Grease	20 mg/l	< 16.77 mg/l	15.06 mg/l
Total Phenols	0.5 mg/l	< 0.37 mg/l	0.30 mg/l
Total Residual Chlorine	1 mg/l	< 0.6 mg/l	< 0.6 mg/l
Anionic Detergents	15 mg/l	< 2 mg/l	< 2 mg/l
Dissolved TOC	200 mg/l	22.49 – 168.30 mg/l	75.57 mg/l
Temperature	43°C	20 – 39 °C	29.81 °C
Floatable Substances	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic	2 mg/l	< 0.25 mg/l	< 0.25 mg/l
Barium	5 mg/l	< 1 mg/l	1 mg/l
Cadmium	0.1 mg/l	< 0.1 mg/l	< 0.1 mg/l
Chromium	1 mg/l	< 0.3 mg/l	< 0.3 mg/l
Copper	2 mg/l	< 1.51 mg/l	0.56 mg/l
Lead	2 mg/l	< 1 mg/l	< 1 mg/l
Manganese	5 mg/l	< 0.2 mg/l	< 0.2 mg/l
Mercury	0.05 mg/l	< 0.05 mg/l	< 0.05 mg/l
Nickel	2 mg/l	< 1 mg/l	< 1 mg/l
Silver	2 mg/l	< 0.4 mg/l	< 0.4 mg/l
Tin	5 mg/l	< 1 mg/l	< 1 mg/l
Zinc	2 mg/l	< 1 mg/l	< 1 mg/l
Total Toxic Metals #	10 mg/l	< 7.81 mg/l	6.86 mg/l
Boron	5 mg/l	< 3.28 mg/l	1.54 mg/l
Iron	10 mg/l	< 2 mg/l	< 2 mg/l

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

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 2002 ~

Parameters	Control Limits (mg/m ³)	Result (mg/m ³)	Mean (mg/m ³)
Particulates	75	2.1 – 3.2	2.6
Chlorine and Compounds (as Cl ₂)	100	< 3.0	< 3.0
Fluorine and Compounds (as HF)	25	< 0.3	< 0.3
Hydrogen Sulphide	5	0.9	0.9
Acidity (as Sulphuric Acid)	100	< 20.7	8.6
Sulphur Dioxide	750	< 88.0	40.1
Hydrochloric Acid	38	< 10.8	6.4
Total Phosphorus (as P)	7.5	< 0.649	< 0.591
Hydrogen Fluoride	7.5	< 0.9	< 0.9
Hydrogen Bromide	7.5	< 4.2	< 4.1
Toxic Metals I :			
Mercury	3	< 0.007	< 0.007
Cadmium	3	< 0.055	< 0.050
Antimony	3	< 0.548	< 0.499
Toxic Metals II :			
Lead	10	< 0.649	< 0.591
Copper	10	< 0.075	< 0.068
Arsenic	10	< 0.006	< 0.006
Nickel	10	< 0.130	< 0.118
Chromium	10	< 0.055	< 0.050
Total of Toxic Metals I & II	10	< 1.525	< 1.389
Dioxin (Monthly)	0.1 ng/m ³	0.0024 ng/m ³	0.0024 ng/m ³

Table 5

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary ~ November 2002 ~

Parameters	Control Limits (mg/m ³)	Result (mg/m ³)	Mean (mg/m ³)
Particulates	75	0.5 – 2.5	1.6
Chlorine and Compounds (as Cl ₂)	100	< 3.7	< 3.5
Fluorine and Compounds (as HF)	25	< 0.4	< 0.4
Hydrogen Sulphide	5	0.3	0.3
Acidity (as Sulphuric Acid)	100	2.6 – 25.0	14.3
Sulphur Dioxide	750	< 152.4	71.2
Hydrochloric Acid	38	< 9.2	5.5
Total Phosphorus (as P)	7.5	< 0.529	< 0.497
Hydrogen Fluoride	7.5	< 0.9	< 0.8
Hydrogen Bromide	7.5	< 4.5	< 4.1
Toxic Metals I :			
Mercury	3	< 0.008	< 0.007
Cadmium	3	< 0.045	< 0.042
Antimony	3	< 0.447	< 0.420
Toxic Metals II :			
Lead	10	< 0.529	< 0.497
Copper	10	< 0.061	< 0.057
Arsenic	10	< 0.005	< 0.005
Nickel	10	< 0.113	< 0.103
Chromium	10	< 0.047	< 0.043
Total of Toxic Metals I & II	10	< 1.246	< 1.173
Dioxin (Monthly)	0.1 ng/m ³	0.0005 ng/m ³	0.0005 ng/m ³

Table 6

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (December 2002)

Parameters	Control Limits (mg/m ³)	Result (mg/m ³)	Mean (mg/m ³)
Particulates	75	0.6 – 5.9	3.1
Chlorine and Compounds (as Cl ₂)	100	< 4.5	< 3.8
Fluorine and Compounds (as HF)	25	< 0.5	< 0.4
Hydrogen Sulphide	5	Not detected	Not detected
Acidity (as Sulphuric Acid)	100	4.2 – 10.8	8.4
Sulphur Dioxide	750	< 101.2	60.3
Hydrochloric Acid	38	5.1 – 10.9	6.9
Total Phosphorus (as P)	7.5	< 0.676	< 0.582
Hydrogen Fluoride	7.5	< 0.9	< 0.9
Hydrogen Bromide	7.5	< 4.5	< 4.3
Toxic Metals I :			
Mercury	3	< 0.008	< 0.007
Cadmium	3	< 0.057	< 0.049
Antimony	3	< 0.570	< 0.491
Toxic Metals II :			
Lead	10	< 0.676	< 0.582
Copper	10	< 0.078	< 0.067
Arsenic	10	< 0.007	< 0.006
Nickel	10	< 0.135	< 0.116
Chromium	10	< 0.057	< 0.049
Total of Toxic Metals I & II	10	< 1.587	< 1.368
Dioxin (Monthly)	0.1 ng/m ³	0.0026 ng/m ³	0.0026 ng/m ³

Table 7

Chemical Waste Treatment Centre
Stabilised Materials Summary (October 2002)

Parameters	Control Limits (ppm)	Result (ppm)	Mean (ppm)
Section A			
pH (water)	8 (lower limit)	12.28 – 12.75	12.52
% Solids	30 (lower limit)	43.44 – 93.62	63.90
Toxic Metals :			
Cadmium	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.02	< 0.02
Total Chromium	10	< 1.82	0.51
Copper	—	< 6.33	3.16
Nickel	—	< 1.54	0.55
Lead	—	< 12.02	1.71
Zinc	—	< 4.8	0.81
Total of copper, nickel, lead, zinc	25	< 14.46	6.22
Iron	20	< 1	< 1
Sulphide	10	< 1	< 1
Ammoniacal Nitrogen	10	< 8.9	2.53
Cyanide	5	< 1	< 1
Section B			
Volatile Organic Contents	5000	< 15	< 15
Total Organic Halides	10	< 2	< 2
Total Chloro Phenols	2	< 2	< 2
Polychlorinated Biphenyls	1	< 1	< 1
TCDD equivalent (ITEF method)	1 ppb	< 1 ppb	< 1 ppb

Table 8

Chemical Waste Treatment Centre
Stabilised Materials Summary ~ November 2002 ~

Parameters	Control Limits (ppm)	Result (ppm)	Mean (ppm)
Section A			
pH (water)	8 (lower limit)	11.71 – 12.79	12.42
% Solids	30 (lower limit)	48.10 – 95.41	60.37
Toxic Metals :			
Cadmium	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.05	0.02
Total Chromium	10	< 1.36	0.51
Copper	—	< 7.22	2.06
Nickel	—	< 1.88	0.56
Lead	—	< 18.72	1.46
Zinc	—	< 1.16	0.51
Total of copper, nickel, lead, zinc	25	< 20.22	4.6
Iron	20	< 1	< 1
Sulphide	10	< 1	< 1
Ammoniacal Nitrogen	10	< 9.81	4.02
Cyanide	5	< 1	< 1
Section B			
Volatile Organic Contents	5000	< 15	< 15
Total Organic Halides	10	< 2	< 2
Total Chloro Phenols	2	< 2	< 2
Polychlorinated Biphenyls	1	< 1	< 1
TCDD equivalent (ITEF method)	1 ppb	< 1 ppb	< 1 ppb

Table 9

Chemical Waste Treatment Centre
Stabilised Materials Summary (December 2002)

Parameters	Control Limits (ppm)	Result (ppm)	Mean (ppm)
Section A			
pH (water)	8 (lower limit)	12.35 – 12.87	12.58
% Solids	30 (lower limit)	45.21 – 97.26	68.84
Toxic Metals :			
Cadmium	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.02	< 0.02
Total Chromium	10	< 0.85	0.51
Copper	—	< 6.57	2.63
Nickel	—	< 1.22	0.54
Lead	—	< 7.83	1.38
Zinc	—	< 6.43	0.68
Total of copper, nickel, lead, zinc	25	< 12.42	5.23
Iron	20	< 1	< 1
Sulphide	10	< 1	< 1
Ammoniacal Nitrogen	10	< 9.4	3.08
Cyanide	5	< 1	< 1
Section B			
Volatile Organic Contents	5000	< 15	< 15
Total Organic Halides	10	< 2	< 2
Total Chloro Phenols	2	< 2	< 2
Polychlorinated Biphenyls	1	< 1	< 1
TCDD equivalent (ITEF method)	1 ppb	< 1 ppb	< 1 ppb