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:

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

Parameters	Control Limits	Result	Mean
Pesticides：			
Aldrin (mg/l)	0.01	＜0.01	＜0.01
BHCS (mg/l)	0.01	＜0.01	＜0.01
DDT (mg/l)	0.01	＜0.01	＜0.01
Semi-volatile Compounds：			
Benzo (A) Pyrene (mg/l)	0.1	＜0.1	＜0.1
Volatile Compounds：			
1,1,1-Trichloroethane (mg/l)	0.05	＜0.05	＜0.05
Polychlorinated Biphenyls：			
Total PCBs (mg/l)	0.003	＜0.003	＜0.003
Radioactive Substances：			
Gross β (pc/l)	10000	＜10000	＜10000
Radium-226 (pc/l)	30	＜30	＜30
Strontium-90 (pc/l)	100	＜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 2002）

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

Parameters	Control Limits	Result	Mean
Pesticides：			
Aldrin (mg/l)	0.01	＜0.01	＜0.01
BHCS (mg/l)	0.01	＜0.01	＜0.01
DDT (mg/l)	0.01	＜0.01	＜0.01
Semi-volatile Compounds：			
Benzo (A) Pyrene (mg/l)	0.1	＜0.1	＜0.1
Volatile Compounds：			
1,1,1-Trichloroethane (mg/l)	0.05	＜0.05	＜0.05
Polychlorinated Biphenyls：			
Total PCBs (mg/l)	0.003	＜0.003	＜0.003
Radioactive Substances：			
Gross β (pc/l)	10000	＜10000	＜10000
Radium-226 (pc/l)	30	＜30	＜30
Strontium-90 (pc/l)	100	＜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 2002）

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

Parameters	Control Limits	Result	Mean
Pesticides：			
Aldrin (mg/l)	0.01	＜0.01	＜0.01
BHCS (mg/l)	0.01	＜0.01	＜0.01
DDT (mg/l)	0.01	＜0.01	＜0.01
Semi-volatile Compounds：			
Benzo (A) Pyrene (mg/l)	0.1	＜0.1	＜0.1
Volatile Compounds：			
1,1,1-Trichloroethane (mg/l)	0.05	＜0.05	＜0.05
Polychlorinated Biphenyls：			
Total PCBs (mg/l)	0.003	＜0.003	＜0.003
Radioactive Substances：			
Gross β (pc/l)	10000	＜10000	＜10000
Radium-226 (pc/l)	30	＜30	＜30
Strontium-90 (pc/l)	100	＜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 2002）

Parameters	Control Limits	Result	Mean
Particulates (mg/m^3)	75	2.1 – 3.2	2.6
Chlorine and Compounds (as Cl_2) (mg/m^3)	100	＜3.0	＜3.0
Fluorine and Compounds (as HF) (mg/m^3)	25	＜0.3	＜0.3
Hydrogen Sulphide (mg/m^3)	5	0.9	0.9
Acidity (as Sulphuric Acid) (mg/m^3)	100	＜20.7	8.6
Sulphur Dioxide (mg/m^3)	750	＜88.0	40.1
Hydrochloric Acid (mg/m^3)	38	＜10.8	6.4
Total Phosphorus (as P) (mg/m^3)	7.5	＜0.649	＜0.591
Hydrogen Fluoride (mg/m^3)	7.5	＜0.9	＜0.9
Hydrogen Bromide (mg/m^3)	7.5	＜4.2	＜4.1
Toxic Metals I :			
Mercury (mg/m^3)	3	＜0.007	＜0.007
Cadmium (mg/m^3)	3	＜0.055	＜0.050
Antimony (mg/m^3)	3	＜0.548	＜0.499
Toxic Metals II :			
Lead (mg/m^3)	10	＜0.649	＜0.591
Copper (mg/m^3)	10	＜0.075	＜0.068
Arsenic (mg/m^3)	10	＜0.006	＜0.006
Nickel (mg/m^3)	10	＜0.130	＜0.118
Chromium (mg/m^3)	10	＜0.055	＜0.050
Total of Toxic Metals I & II (mg/m^3)	10	＜1.525	＜1.389
Dioxin (ng/m^3)	0.1	0.0024	0.0024

Table 5

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

Parameters	Control Limits	Result	Mean
Particulates (mg/m^3)	75	0.5 – 2.5	1.6
Chlorine and Compounds (as Cl_2) (mg/m^3)	100	＜3.7	＜3.5
Fluorine and Compounds (as HF) (mg/m^3)	25	＜0.4	＜0.4
Hydrogen Sulphide (mg/m^3)	5	0.3	0.3
Acidity (as Sulphuric Acid) (mg/m^3)	100	2.6 – 25.0	14.3
Sulphur Dioxide (mg/m^3)	750	＜152.4	71.2
Hydrochloric Acid (mg/m^3)	38	＜9.2	5.5
Total Phosphorus (as P) (mg/m^3)	7.5	＜ 0.529	＜ 0.497
Hydrogen Fluoride (mg/m^3)	7.5	＜0.9	＜0.8
Hydrogen Bromide (mg/m^3)	7.5	＜4.5	＜4.1
Toxic Metals I :			
Mercury (mg/m^3)	3	＜0.008	＜0.007
Cadmium (mg/m^3)	3	＜0.045	＜0.042
Antimony (mg/m^3)	3	＜0.447	＜0.420
Toxic Metals II :			
Lead (mg/m^3)	10	＜0.529	＜0.497
Copper (mg/m^3)	10	＜0.061	＜0.057
Arsenic (mg/m^3)	10	＜0.005	＜0.005
Nickel (mg/m^3)	10	＜0.113	＜0.103
Chromium (mg/m^3)	10	＜0.047	＜0.043
Total of Toxic Metals I & II (mg/m^3)	10	＜1.246	＜1.173
Dioxin (ng/m^3)	0.1	0.0005	0.0005

Table 6

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

Parameters	Control Limits	Result	Mean
Particulates (mg/m^3)	75	0.6 – 5.9	3.1
Chlorine and Compounds (as Cl_2) (mg/m^3)	100	＜ 4.5	＜3.8
Fluorine and Compounds (as HF) (mg/m^3)	25	＜0.5	＜0.4
Hydrogen Sulphide (mg/m^3)	5	Not detected	Not detected
Acidity (as Sulphuric Acid) (mg/m^3)	100	4.2 – 10.8	8.4
Sulphur Dioxide (mg/m^3)	750	＜ 101.2	60.3
Hydrochloric Acid (mg/m^3)	38	5.1 – 10.9	6.9
Total Phosphorus (as P) (mg/m^3)	7.5	＜0.676	＜0.582
Hydrogen Fluoride (mg/m^3)	7.5	＜0.9	＜0.9
Hydrogen Bromide (mg/m^3)	7.5	＜4.5	＜4.3
Toxic Metals I :			
Mercury (mg/m^3)	3	＜0.008	＜0.007
Cadmium (mg/m^3)	3	＜0.057	＜0.049
Antimony (mg/m^3)	3	＜0.570	＜0.491
Toxic Metals II :			
Lead (mg/m^3)	10	＜0.676	＜0.582
Copper (mg/m^3)	10	＜0.078	＜0.067
Arsenic (mg/m^3)	10	＜0.007	＜0.006
Nickel (mg/m^3)	10	＜0.135	＜0.116
Chromium (mg/m^3)	10	＜0.057	＜0.049
Total of Toxic Metals I & II (mg/m^3)	10	＜1.587	＜1.368
Dioxin (ng/m^3)	0.1	0.0026	0.0026

Table 7

Chemical Waste Treatment Centre
Stabilised Materials Summary（October 2002）

Parameters	Control Limits	Result	Mean
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 (ppm)	0.5	＜0.5	＜0.5
Mercury (ppm)	0.1	＜0.02	＜0.02
Total Chromium (ppm)	10	＜1.82	0.51
Copper (ppm)	—	＜6.33	3.16
Nickel (ppm)	—	＜1.54	0.55
Lead (ppm)	—	＜12.02	1.71
Zinc (ppm)	—	＜4.8	0.81
Total of copper, nickel, lead, zinc (ppm)	25	＜14.46	6.22
Iron (ppm)	20	＜1	＜1
Sulphide (ppm)	10	＜1	＜1
Ammoniacal Nitrogen (ppm)	10	＜8.9	2.53
Cyanide (ppm)	5	＜1	＜1
Section B			
Volatile Organic Contents (ppm)	5000	＜15	＜15
Total Organic Halides (ppm)	10	＜2	＜2
Total Chloro Phenols (ppm)	2	＜2	＜2
Polychlorinated Biphenyls (ppm)	1	＜1	＜1
TCDD equivalent (ITEF method) (ppb)	1	＜1	＜1

Table 8

Chemical Waste Treatment Centre
Stabilised Materials Summary（November 2002）

Parameters	Control Limits	Result	Mean
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 (ppm)	0.5	＜0.5	＜0.5
Mercury (ppm)	0.1	＜0.05	0.02
Total Chromium (ppm)	10	＜1.36	0.51
Copper (ppm)	—	＜7.22	2.06
Nickel (ppm)	—	＜1.88	0.56
Lead (ppm)	—	＜18.72	1.46
Zinc (ppm)	—	＜1.16	0.51
Total of copper, nickel, lead, zinc (ppm)	25	＜20.22	4.6
Iron (ppm)	20	＜1	＜1
Sulphide (ppm)	10	＜1	＜1
Ammoniacal Nitrogen (ppm)	10	＜9.81	4.02
Cyanide (ppm)	5	＜1	＜1
Section B			
Volatile Organic Contents (ppm)	5000	＜15	＜15
Total Organic Halides (ppm)	10	＜2	＜2
Total Chloro Phenols (ppm)	2	＜2	＜2
Polychlorinated Biphenyls (ppm)	1	＜1	＜1
TCDD equivalent (ITEF method) (ppb)	1	＜1	＜1

Table 9

Chemical Waste Treatment Centre
Stabilised Materials Summary（December 2002）

Parameters	Control Limits	Result	Mean
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 (ppm)	0.5	＜0.5	＜0.5
Mercury (ppm)	0.1	＜0.02	＜0.02
Total Chromium (ppm)	10	＜0.85	0.51
Copper (ppm)	—	＜6.57	2.63
Nickel (ppm)	—	＜1.22	0.54
Lead (ppm)	—	＜7.83	1.38
Zinc (ppm)	—	＜6.43	0.68
Total of copper, nickel, lead, zinc (ppm)	25	＜12.42	5.23
Iron (ppm)	20	＜1	＜1
Sulphide (ppm)	10	＜1	＜1
Ammoniacal Nitrogen (ppm)	10	＜9.4	3.08
Cyanide (ppm)	5	＜1	＜1
Section B			
Volatile Organic Contents (ppm)	5000	＜15	＜15
Total Organic Halides (ppm)	10	＜2	＜2
Total Chloro Phenols (ppm)	2	＜2	＜2
Polychlorinated Biphenyls (ppm)	1	＜1	＜1
TCDD equivalent (ITEF method) (ppb)	1	＜1	＜1