

Chemical Waste Treatment Centre
Monitoring Report
July 2003 – September 2003

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 July 2003 to September 2003.

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 July 2003 to September 2003. 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 results for Stack Gas Monitoring from July 2003 to September 2003 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 July 2003 to September 2003 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 (July 2003)

Parameters	Control Limits	Result	Mean
pH	6-10	6.9 – 9.7	8.21
Total Kjeldahl Nitrogen (mg/l)	100	< 45.27	25.42
Total Phosphate (mg/l)	10	< 5.17	1.36
Total Sulphate (mg/l)	2000	789.06 – 1940.52	1459.42
Total Sulphides (mg/l)	10	< 0.51	0.5
Total Cyanide (mg/l)	0.1	< 0.046	0.04
Total Suspended Solids (mg/l)	100	< 17.79	15.24
Oil and Grease (mg/l)	20	< 16.14	15.05
Total Phenols (mg/l)	0.5	< 0.3	< 0.3
Total Residual Chlorine (mg/l)	1	< 0.6	< 0.6
Anionic Detergents (mg/l)	15	< 2	< 2
Dissolved TOC (mg/l)	200	32.00 – 100.97	70.59
Temperature (°C)	43	23.5 – 35	33.62
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.1	< 0.1
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	< 0.6	< 0.5
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	< 1.38	1.06
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	< 7.03	6.75
Boron (mg/l)	5	< 2.27	1.55
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 (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 (August 2003)

Parameters	Control Limits	Result	Mean
pH	6-10	7.6 – 8.9	8.23
Total Kjeldahl Nitrogen (mg/l)	100	< 54.13	33.69
Total Phosphate (mg/l)	10	< 1	< 1
Total Sulphate (mg/l)	2000	689.62 – 1962.87	1288.18
Total Sulphides (mg/l)	10	< 0.5	< 0.5
Total Cyanide (mg/l)	0.1	< 0.053	0.04
Total Suspended Solids (mg/l)	100	< 27.48	16.55
Oil and Grease (mg/l)	20	< 15.64	15.03
Total Phenols (mg/l)	0.5	< 0.38	0.3
Total Residual Chlorine (mg/l)	1	< 0.6	< 0.6
Anionic Detergents (mg/l)	15	< 2	< 2
Dissolved TOC (mg/l)	200	32.15 – 136.9	76.36
Temperature (°C)	43	25 – 36	33.43
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.1	< 0.1
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	< 1.01	0.55
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	< 1.52	1.03
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	< 7.65	6.78
Boron (mg/l)	5	< 3.15	1.88
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 (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 (September 2003)

Parameters	Control Limits	Result	Mean
pH	6-10	7.6 – 9.6	8.4
Total Kjeldahl Nitrogen (mg/l)	100	< 33	25.7
Total Phosphate (mg/l)	10	< 1	< 1
Total Sulphate (mg/l)	2000	247.7 – 1855.4	1380.8
Total Sulphides (mg/l)	10	< 0.5	< 0.5
Total Cyanide (mg/l)	0.1	< 0.04	< 0.04
Total Suspended Solids (mg/l)	100	< 27	17.9
Oil and Grease (mg/l)	20	< 17	15.1
Total Phenols (mg/l)	0.5	< 0.4	0.3
Total Residual Chlorine (mg/l)	1	< 0.61	0.6
Anionic Detergents (mg/l)	15	< 2.05	2.0
Dissolved TOC (mg/l)	200	30.1 – 115.4	77.7
Temperature (°C)	43	22 – 34	24.6
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.1	< 0.1
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	< 1.4	0.6
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	< 7.6	6.8
Boron (mg/l)	5	< 2.0	1.3
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 (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 (July 2003)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	4.7 – 12.3	8.0
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 3.8	< 3.4
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.4	< 0.4
Acidity (as Sulphuric Acid) (mg/m ³)	100	6.4 – 20.3	11.7
Sulphur Dioxide (mg/m ³)	750	< 298.2	180.0
Hydrochloric Acid (mg/m ³)	38	< 15.6	6.5
Total Phosphorus (as P) (mg/m ³)	7.5	< 0.645	< 0.604
Hydrogen Fluoride (mg/m ³)	7.5	< 1.0	< 0.9
Hydrogen Bromide (mg/m ³)	7.5	< 4.6	< 4.2
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.008	< 0.007
Cadmium (mg/m ³)	3	< 0.054	< 0.051
Antimony (mg/m ³)	3	< 0.544	< 0.510
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.645	< 0.604
Copper (mg/m ³)	10	< 0.075	< 0.070
Arsenic (mg/m ³)	10	< 0.006	< 0.006
Nickel (mg/m ³)	10	< 0.129	< 0.121
Chromium (mg/m ³)	10	< 0.054	< 0.051
Total of Toxic Metals I & II (mg/m ³)	10	< 1.515	< 1.421
Dioxin (ng/m ³)	0.1	0.0006	0.0006

Table 5

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (August 2003)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	2.5 – 7.8	4.4
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 3.9	< 3.7
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.4	< 0.4
Acidity (as Sulphuric Acid) (mg/m ³)	100	12.7 – 19.2	15.8
Sulphur Dioxide (mg/m ³)	750	23.9 – 325.2	167.8
Hydrochloric Acid (mg/m ³)	38	< 5.8	4.6
Total Phosphorus (as P) (mg/m ³)	7.5	< 0.675	< 0.625
Hydrogen Fluoride (mg/m ³)	7.5	< 0.9	< 0.9
Hydrogen Bromide (mg/m ³)	7.5	< 4.5	< 4.2
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.009	< 0.008
Cadmium (mg/m ³)	3	< 0.057	< 0.053
Antimony (mg/m ³)	3	< 0.569	< 0.527
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.675	< 0.625
Copper (mg/m ³)	10	< 0.078	< 0.073
Arsenic (mg/m ³)	10	< 0.007	< 0.006
Nickel (mg/m ³)	10	< 0.135	< 0.125
Chromium (mg/m ³)	10	< 0.057	< 0.053
Total of Toxic Metals I & II (mg/m ³)	10	< 1.585	< 1.469
Dioxin (ng/m ³)	0.1	0.0801	0.0801

Table 6

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (September 2003)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	0.6 – 8.0	4.7
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 4.0	< 3.8
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.4	< 0.4
Acidity (as Sulphuric Acid) (mg/m ³)	100	9.2 – 31.9	17.6
Sulphur Dioxide (mg/m ³)	750	24.1 – 443.7	241.8
Hydrochloric Acid (mg/m ³)	38	< 4.6	< 4.2
Total Phosphorus (as P) (mg/m ³)	7.5	< 0.645	< 0.628
Hydrogen Fluoride (mg/m ³)	7.5	< 1.0	< 0.9
Hydrogen Bromide (mg/m ³)	7.5	< 4.6	< 4.2
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.007	< 0.007
Cadmium (mg/m ³)	3	< 0.054	< 0.053
Antimony (mg/m ³)	3	< 0.545	< 0.529
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.645	< 0.628
Copper (mg/m ³)	10	< 0.075	< 0.073
Arsenic (mg/m ³)	10	< 0.006	< 0.006
Nickel (mg/m ³)	10	< 0.129	< 0.126
Chromium (mg/m ³)	10	< 0.054	< 0.053
Total of Toxic Metals I & II (mg/m ³)	10	< 1.516	< 1.474
Dioxin (ng/m ³)	0.1	0.0774	0.0774

Table 7

Chemical Waste Treatment Centre
Stabilised Materials Summary (July 2003)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	12.42 – 12.82	12.61
% Solids (%)	30 (lower limit)	49.06 – 81.34	65.40
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.02	< 0.02
Total Chromium (ppm)	10	< 0.62	0.50
Copper (ppm)	-	< 4.89	2.41
Nickel (ppm)	-	< 0.5	< 0.5
Lead (ppm)	-	< 13.17	2.50
Zinc (ppm)	-	< 3.19	0.78
Total of copper, nickel, lead, zinc (ppm)	25	< 19.04	6.18
Iron (ppm)	20	< 1.14	< 1
Sulphide (ppm)	10	< 1	< 1
Ammoniacal Nitrogen (ppm)	10	< 7.71	2.06
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 (August 2003)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	11.05 – 12.71	12.46
% Solids (%)	30 (lower limit)	47.00 – 96.58	64.56
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	< 0.5
Mercury (ppm)	0.1	< 0.02	< 0.02
Total Chromium (ppm)	10	< 2.14	0.52
Copper (ppm)	-	< 4.95	2.81
Nickel (ppm)	-	< 0.5	< 0.5
Lead (ppm)	-	< 23.39	3.93
Zinc (ppm)	-	< 3.35	1.42
Total of copper, nickel, lead, zinc (ppm)	25	< 24.89	8.66
Iron (ppm)	20	< 1	< 1
Sulphide (ppm)	10	< 1	< 1
Ammoniacal Nitrogen (ppm)	10	< 7.76	2.38
Cyanide (ppm)	5	< 1	< 1
Section B			
Volatile Organic Contents (ppm)	5000	< 15	< 15
Total Organic Halides (ppm)	10	< 3.42	2.05
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 (September 2003)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	11.4 – 12.7	12.5
% Solids (%)	30 (lower limit)	47 – 85.63	64.94
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	< 0.5
Mercury (ppm)	0.1	< 0.02	< 0.02
Total Chromium (ppm)	10	< 0.75	0.50
Copper (ppm)	-	< 5.7	3.42
Nickel (ppm)	-	< 2.3	0.52
Lead (ppm)	-	< 18	4.12
Zinc (ppm)	-	< 3.6	0.72
Total of copper, nickel, lead, zinc (ppm)	25	< 24	8.85
Iron (ppm)	20	< 1	< 1
Sulphide (ppm)	10	< 1	< 1
Ammoniacal Nitrogen (ppm)	10	< 9.7	2.65
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