

**Chemical Waste Treatment Centre**  
**Monitoring Report**  
**July 2002 - September 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 July 2002 to September 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 July 2002 to September 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 July 2002 to September 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 July 2002 to September 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 ( July 2002 )

Parameters	Control Limits	Result	Mean *
PH	6-10 pH	6.8 – 9.6	8.06
Total Kjeldahl Nitrogen	100 mg/l	< 29.23 mg/l	20.45 mg/l
Total Phosphate	10 mg/l	< 1 mg/l	< 1 mg/l
Total Sulphate	2000 mg/l	302.77 – 1,150.31 mg/l	720.0 mg/l
Total Sulphides	10 mg/l	< 2.28 mg/l	0.56 mg/l
Total Cyanide	0.1 mg/l	< 0.05 mg/l	0.04 mg/l
Total Suspended Solids	100 mg/l	< 85.63 mg/l	38.10 mg/l
Oil and Grease	20 mg/l	< 17.65 mg/l	15.10 mg/l
Total Phenols	0.5 mg/l	< 0.44 mg/l	0.31 mg/l
Total Residual Chlorine	1 mg/l	< 0.62 mg/l	0.6 mg/l
Anionic Detergents	15 mg/l	< 2 mg/l	< 2 mg/l
Dissolved TOC	200 mg/l	26.33 – 102.10 mg/l	50.35 mg/l
Temperature	43	35 – 43	38.9
Floatable Substances	Not to be detected	Not detected	Not detected
<b>Toxic Metals :</b>			
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	< 1.96 mg/l	0.63 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	< 8.26 mg/l	6.93 mg/l
Boron	5 mg/l	< 1.76 mg/l	1.17 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	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 ( August 2002 )

Parameters	Control Limits	Result	Mean
PH	6-10 pH	6.8 – 9.1	7.99
Total Kjeldahl Nitrogen	100 mg/1	< 20 mg/1	<20 mg/1
Total Phosphate	10 mg/1	< 1 mg/1	< 1 mg/1
Total Sulphate	2000 mg/1	231.15 – 1,223.32mg/1	815.44 mg/1
Total Sulphides	10 mg/1	< 0.5 mg/1	< 0.5 mg/1
Total Cyanide	0.1 mg/1	< 0.04 mg/1	< 0.04 mg/1
Total Suspended Solids	100 mg/1	< 47.88 mg/1	30.26 mg/1
Oil and Grease	20 mg/1	< 15.66 mg/1	15.04 mg/1
Total Phenols	0.5 mg/1	< 0.33 mg/1	0.3 mg/1
Total Residual Chlorine	1 mg/1	< 0.6 mg/1	< 0.6 mg/1
Anionic Detergents	15 mg/1	< 2 mg/1	< 2 mg/1
Dissolved TOC	200 mg/1	15.49 – 82.48 mg/1	41.86 mg/1
Temperature	43	33 – 43	38
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	< 0.7 mg/1	0.51 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 mg/1	6.81 mg/1
Boron	5 mg/1	< 2.39 mg/1	1.43 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	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 ( September 2002 )

Parameters	Control Limits	Result	Mean
PH	6-10 pH	7.1 – 9.1	8.1
Total Kjeldahl Nitrogen	100 mg/l	< 54.22 mg/l	27.45 mg/l
Total Phosphate	10 mg/l	< 1 mg/l	< 1 mg/l
Total Sulphate	2000 mg/l	275.32 – 1,807.16 mg/l	1,200.27mg/l
Total Sulphides	10 mg/l	< 0.5 mg/l	< 0.5 mg/l
Total Cyanide	0.1 mg/l	< 0.093 mg/l	0.04 mg/l
Total Suspended Solids	100 mg/l	< 33.10 mg/l	18.92 mg/l
Oil and Grease	20 mg/l	< 16.11 mg/l	15.06 mg/l
Total Phenols	0.5 mg/l	< 0.43 mg/l	0.32 mg/l
Total Residual Chlorine	1 mg/l	< 0.66 mg/l	0.6 mg/l
Anionic Detergents	15 mg/l	< 2 mg/l	< 2 mg/l
Dissolved TOC	200 mg/l	16.57 – 101.55 mg/l	64.52 mg/l
Temperature	43	30 – 41	35.8
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	< 1.06 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	< 1.16 mg/l	0.62 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	< 7.46 mg/l	6.92 mg/l
Boron	5 mg/l	< 1.97 mg/l	1.37 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	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 ( July 2002 )

Parameters	Control Limits (mg/m <sup>3</sup> )	Result (mg/m <sup>3</sup> )	Mean (mg/m <sup>3</sup> )
Particulates	75	0.9 – 2.6	1.6
Chlorine and Compounds (as Cl <sub>2</sub> )	100	< 3.9	< 3.7
Fluorine and Compounds (as HF)	25	< 0.4	< 0.4
Hydrogen Sulphide	5	Not detected	Not detected
Acidity (as Sulphuric Acid)	100	11.9 – 15.9	13.9
Sulphur Dioxide	750	122.1 – 127.8	125.0
Hydrochloric Acid	38	< 9.7	7.1
Total Phosphorus (as P)	7.5	< 0.561	< 0.555
Hydrogen Fluoride	7.5	< 0.9	< 0.8
Hydrogen Bromide	7.5	< 0.8	< 0.8
Toxic Metals I :			
Mercury	3	< 0.008	< 0.007
Cadmium	3	< 0.047	< 0.047
Antimony	3	< 0.474	< 0.469
Toxic Metals II :			
Lead	10	< 0.561	< 0.555
Copper	10	< 0.065	< 0.064
Arsenic	10	< 0.006	< 0.006
Nickel	10	< 0.112	< 0.111
Chromium	10	< 0.047	< 0.047
Total of Toxic Metals I & II	10	< 1.319	< 1.306
Dioxin (Monthly)	0.1 ng/m <sup>3</sup>	0.0024 ng/m <sup>3</sup>	0.0024 ng/m <sup>3</sup>

Table 5

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

Parameters	Control Limits (mg/m <sup>3</sup> )	Result (mg/m <sup>3</sup> )	Mean (mg/m <sup>3</sup> )
Particulates	75	1.3 – 13.0	4.8
Chlorine and Compounds (as Cl <sub>2</sub> )	100	< 3.6	< 3.4
Fluorine and Compounds (as HF)	25	< 0.4	< 0.4
Hydrogen Sulphide	5	Not detected	Not detected
Acidity (as Sulphuric Acid)	100	14.7 – 23.6	20.8
Sulphur Dioxide	750	134.8 – 240.7	195.9
Hydrochloric Acid	38	<11.3	6.7
Total Phosphorus (as P)	7.5	< 0.613	< 0.550
Hydrogen Fluoride	7.5	< 0.9	< 0.8
Hydrogen Bromide	7.5	< 0.9	< 0.8
Toxic Metals I :			
Mercury	3	< 0.007	< 0.007
Cadmium	3	< 0.052	< 0.047
Antimony	3	< 0.517	< 0.464
Toxic Metals II :			
Lead	10	< 0.613	< 0.550
Copper	10	< 0.071	< 0.064
Arsenic	10	< 0.006	< 0.006
Nickel	10	< 0.123	< 0.110
Chromium	10	< 0.052	< 0.047
Total of Toxic Metals I & II	10	< 1.439	< 1.292
Dioxin (Monthly)	0.1 ng/m <sup>3</sup>	0.0005 ng/m <sup>3</sup>	0.0005 ng/m <sup>3</sup>

Table 6

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

Parameters	Control Limits (mg/m <sup>3</sup> )	Result (mg/m <sup>3</sup> )	Mean (mg/m <sup>3</sup> )
Particulates	75	1.5 – 2.5	1.8
Chlorine and Compounds (as Cl <sub>2</sub> )	100	< 3.7	< 3.4
Fluorine and Compounds (as HF)	25	< 0.4	< 0.4
Hydrogen Sulphide	5	2.1	2.1
Acidity (as Sulphuric Acid)	100	5.7 – 50.3	21.8
Sulphur Dioxide	750	< 69.5	33.6
Hydrochloric Acid	38	< 7.3	5.3
Total Phosphorus (as P)	7.5	< 0.563	< 0.548
Hydrogen Fluoride	7.5	< 0.9	< 0.8
Hydrogen Bromide	7.5	< 0.8	< 0.8
Toxic Metals I :			
Mercury	3	< 0.007	< 0.007
Cadmium	3	< 0.048	< 0.046
Antimony	3	< 0.476	< 0.463
Toxic Metals II :			
Lead	10	< 0.563	< 0.548
Copper	10	< 0.065	< 0.063
Arsenic	10	< 0.006	< 0.005
Nickel	10	< 0.135	< 0.119
Chromium	10	< 0.053	< 0.049
Total of Toxic Metals I & II	10	< 1.325	< 1.300
Dioxin (Monthly)	0.1 ng/m <sup>3</sup>	0.0146 ng/m <sup>3</sup>	0.0146 ng/m <sup>3</sup>

Table 7

Chemical Waste Treatment Centre  
Stabilised Materials Summary ( July 2002 )

Parameters	Control Limits (ppm)	Result (ppm)	Mean (ppm)
Section A			
pH (water)	8 (lower limit)	11.04 – 12.87	12.16
% Solids	30 (lower limit)	49.73 – 99.35	66.77
Toxic Metals :			
Cadmium	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.03	0.02
Total Chromium	10	< 0.6	0.5
Copper	-	< 11.49	1.5
Nickel	-	< 3.6	0.56
Lead	-	< 7.76	1.08
Zinc	-	< 1.93	0.52
Total of copper, nickel, lead, zinc	25	< 16.58	3.65
Iron	20	< 3.55	1.02
Sulphide	10	< 1	< 1
Ammoniacal Nitrogen	10	< 7.56	1.45
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 ( August 2002 )

Parameters	Control Limits (ppm)	Result (ppm)	Mean (ppm)
Section A			
pH (water)	8 (lower limit)	11.52 – 12.69	12.32
% Solids	30 (lower limit)	48.45 – 89.91	67.49
Toxic Metals :			
Cadmium	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.02	< 0.02
Total Chromium	10	< 2.32	0.51
Copper	-	< 7.98	1.98
Nickel	-	< 1.26	0.51
Lead	-	< 13.76	1.18
Zinc	-	< 7.5	0.57
Total of copper, nickel, lead, zinc	25	< 15.43	4.24
Iron	20	< 5.82	1.07
Sulphide	10	< 1	< 1
Ammoniacal Nitrogen	10	< 5.66	1.7
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 ( September 2002 )

Parameters	Control Limits (ppm)	Result (ppm)	Mean (ppm)
Section A			
pH (water)	8 (lower limit)	11.45 – 12.61	12.27
% Solids	30 (lower limit)	46.40 – 92.22	62.51
Toxic Metals :			
Cadmium	0.5	< 0.5	< 0.5
Mercury	0.1	< 0.02	< 0.02
Total Chromium	10	< 1.32	0.51
Copper	-	< 8.29	2.39
Nickel	-	< 1.71	0.52
Lead	-	< 17.94	2.28
Zinc	-	< 7.14	0.89
Total of copper, nickel, lead, zinc	25	< 21.07	6.09
Iron	20	< 8.76	1.19
Sulphide	10	< 1	< 1
Ammoniacal Nitrogen	10	< 9.85	2.29
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