

Chemical Waste Treatment Centre
Operation Report
Jan94 - Mar 94

I. INTRODUCTION

This Operation Report is prepared by EPD for the Environment and Planning Committee (EPC) of the Kwai Tsing District Board. 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 January 94 to March 94.

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 very strict discharge limits on pollutant concentration. Multiple processes are employed inside the CWTC to treat all liquid wastes to ensure a safe waste management system. Continuous automatic monitoring of pH, temperature and flow rate are conducted to 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 January 94 to March 94. 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 January 94 to March 94 are attached in Tables 4 to 6 and compliance in all stack gas control parameters has been achieved.

Stabilised Residue

All solid wastes and 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 January 94 to March 94 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 (January 1994)

Parameters	Control Limits	Result	Mean
pH	6-10	7 - 9.8	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 85.4	N/A
Total Phosphate (mg/l)	10	< 8	N/A
Total Sulphate (mg/l)	2000	30.3 – 1665.9	997.7
Total Sulphides (mg/l)	10	< 4.54	N/A
Total Cyanide (mg/l)	0.1	< 0.09	N/A
Total Suspended Solids (mg/l)	100	3.4 – 80	22.1
Oil and Grease (mg/l)	20	< 19.4	N/A
Total Phenols (mg/l)	0.5	< 0.498	N/A
Total Residual Chlorine (mg/l)	1	< 0.95	N/A
Anionic Detergents (mg/l)	15	< 2	N/A
Temperature (°C)	43	18 – 24	N/A
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.5	N/A
Barium (mg/l)	5	< 1	
Cadmium (mg/l)	0.1	< 0.1	
Chromium (mg/l)	1	< 0.1	
Copper (mg/l)	2	< 1.96	
Lead (mg/l)	2	< 1	
Manganese (mg/l)	5	< 0.5	
Mercury (mg/l)	0.05	< 0.05	
Nickel (mg/l)	2	< 1	
Silver (mg/l)	2	< 1	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 10	
Boron (mg/l)	5	< 4.8	
Iron (mg/l)	10	< 5	

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 (February 1994)

Parameters	Control Limits	Result	Mean
pH	6-10	6 – 9.6	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 80.4	N/A
Total Phosphate (mg/l)	10	< 8	N/A
Total Sulphate (mg/l)	2000	624.4 – 1300.8	952.6
Total Sulphides (mg/l)	10	< 1	N/A
Total Cyanide (mg/l)	0.1	< 0.07	N/A
Total Suspended Solids (mg/l)	100	10.1 – 96	27.56
Oil and Grease (mg/l)	20	< 19.87	N/A
Total Phenols (mg/l)	0.5	< 0.4	N/A
Total Residual Chlorine (mg/l)	1	< 0.8	N/A
Anionic Detergents (mg/l)	15	< 2	N/A
Temperature (°C)	43	18 – 23.4	N/A
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.5	N/A
Barium (mg/l)	5	< 1	
Cadmium (mg/l)	0.1	< 0.1	
Chromium (mg/l)	1	< 0.1	
Copper (mg/l)	2	< 1	
Lead (mg/l)	2	< 1	
Manganese (mg/l)	5	< 0.5	
Mercury (mg/l)	0.05	< 0.05	
Nickel (mg/l)	2	< 1	
Silver (mg/l)	2	< 1	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 10	
Boron (mg/l)	5	0.5 – 3.1	1.47
Iron (mg/l)	10	< 5	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 3

Chemical Waste Treatment Centre
Effluent Discharge Summary (March 1994)

Parameters	Control Limits	Result	Mean
pH	6-10	6 – 9.7	N/A
Total Kjeldahl Nitrogen (mg/l)	100	< 80	N/A
Total Phosphate (mg/l)	10	< 8	N/A
Total Sulphate (mg/l)	2000	601.2 – 1400.9	986.6
Total Sulphides (mg/l)	10	< 7.43	N/A
Total Cyanide (mg/l)	0.1	< 0.09	N/A
Total Suspended Solids (mg/l)	100	6.6 – 99.6	28.3
Oil and Grease (mg/l)	20	< 18.5	N/A
Total Phenols (mg/l)	0.5	< 0.465	N/A
Total Residual Chlorine (mg/l)	1	< 0.8	N/A
Anionic Detergents (mg/l)	15	< 2	N/A
Temperature (°C)	43	18 – 23	N/A
Floatable Substances (mg/l)	Not to be detected	Not detected	Not detected
Toxic Metals :			
Arsenic (mg/l)	2	< 0.5	N/A
Barium (mg/l)	5	< 1	
Cadmium (mg/l)	0.1	< 0.1	
Chromium (mg/l)	1	< 0.2	
Copper (mg/l)	2	< 1.7	
Lead (mg/l)	2	< 1	
Manganese (mg/l)	5	< 0.56	
Mercury (mg/l)	0.05	< 0.05	
Nickel (mg/l)	2	< 1	
Silver (mg/l)	2	< 1	
Tin (mg/l)	5	< 1	
Zinc (mg/l)	2	< 1	
Total Toxic Metals # (mg/l)	10	< 10	
Boron (mg/l)	5	< 4.47	
Iron (mg/l)	10	< 8.47	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 4

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (January 1994)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	1.4 – 3.7	2.55
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 3.0	N/A
Fluorine and Compounds (as HF) (mg/m ³)	25	< 0.3	N/A
Hydrogen Sulphide (mg/m ³)	5	Not detected	N/A
Acidity (as Sulphuric Acid) (mg/m ³)	100	8.5 – 9.6	9.1
Sulphur Dioxide (mg/m ³)	750	12.3 – 19.2	15.8
Hydrochloric Acid (mg/m ³)	38	12.1 – 12.8	12.5
Total Phosphorus (as P) (mg/m ³)	7.5	< 1.34	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	< 0.004	N/A
Cadmium (mg/m ³)	3	< 0.027	
Antimony (mg/m ³)	3	< 0.268	
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.268	N/A
Copper (mg/m ³)	10	< 0.268	
Arsenic (mg/m ³)	10	< 0.001	
Nickel (mg/m ³)	10	< 0.268	
Chromium (mg/m ³)	10	< 0.027	
Total of Toxic Metals I & II (mg/m ³)	10	< 1.130	N/A
Dioxin (ng/m ³)	0.1	0.09	N/A

Table 5

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (February 1994)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	0.2 – 1.5	0.73
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 4.2	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	0.3 – 10.5	3.7
Sulphur Dioxide (mg/m ³)	750	1.1 – 7.3	3.0
Hydrochloric Acid (mg/m ³)	38	5.9 – 12.6	8.65
Total Phosphorus (as P) (mg/m ³)	7.5	< 1.563	N/A
Hydrogen Fluoride (mg/m ³)	7.5	< 1.0	N/A
Hydrogen Bromide (mg/m ³)	7.5	< 1.0	N/A
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.002	N/A
Cadmium (mg/m ³)	3	< 0.031	
Antimony (mg/m ³)	3	< 0.312	
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.312	N/A
Copper (mg/m ³)	10	< 0.312	
Arsenic (mg/m ³)	10	< 0.024	
Nickel (mg/m ³)	10	< 0.312	
Chromium (mg/m ³)	10	< 0.031	
Total of Toxic Metals I & II (mg/m ³)	10	< 1.314	N/A
Dioxin (ng/m ³)	0.1	0.0144 – 0.0266	0.0205

Table 6

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (March 1994)

Parameters	Control Limits	Result	Mean
Particulates (mg/m ³)	75	0.4 – 2.1	1.45
Chlorine and Compounds (as Cl ₂) (mg/m ³)	100	< 4.2	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	1.4 – 7.1	4.03
Sulphur Dioxide (mg/m ³)	750	9.3 – 203.7	88.9
Hydrochloric Acid (mg/m ³)	38	1.6 – 5.4	4.13
Total Phosphorus (as P) (mg/m ³)	7.5	< 2.996	N/A
Hydrogen Fluoride (mg/m ³)	7.5	< 0.9	N/A
Hydrogen Bromide (mg/m ³)	7.5	< 0.9	N/A
Toxic Metals I :			
Mercury (mg/m ³)	3	< 0.002	N/A
Cadmium (mg/m ³)	3	< 0.029	
Antimony (mg/m ³)	3	< 0.293	
Toxic Metals II :			
Lead (mg/m ³)	10	< 0.293	N/A
Copper (mg/m ³)	10	< 0.293	
Arsenic (mg/m ³)	10	< 0.003	
Nickel (mg/m ³)	10	< 0.293	
Chromium (mg/m ³)	10	< 0.029	
Total of Toxic Metals I & II (mg/m ³)	10	< 1.232	N/A
Dioxin (ng/m ³)	0.1	0.0048	N/A

Table 7

Chemical Waste Treatment Centre
Stabilised Materials Summary (January 1994)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	11.3 – 13.1	N/A
% Solids (%)	30 (lower limit)	72.4 - 100	86.1
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.1	
Total Chromium (ppm)	10	< 1	
Copper (ppm)	-	< 5.1	
Nickel (ppm)	-	< 1	
Lead (ppm)	-	< 1.3	
Zinc (ppm)	-	< 1	
Total of copper, nickel, lead, zinc (ppm)	25	< 8.1	
Iron (ppm)	20	< 5	N/A
Sulphide (ppm)	10	< 5	N/A
Ammoniacal Nitrogen (ppm)	10	< 5.1	N/A
Cyanide (ppm)	5	< 5	N/A
Section B			
Volatile Organic Contents (ppm)	5000	< 15	N/A
Total Organic Halides (ppm)	10	< 4.16	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 (February 1994)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	11.58 – 12.85	N/A
% Solids (%)	30 (lower limit)	69.2 – 100	91.4
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.1	
Total Chromium (ppm)	10	< 1.4	
Copper (ppm)	-	< 5.4	
Nickel (ppm)	-	< 1	
Lead (ppm)	-	< 14.6	
Zinc (ppm)	-	< 1	
Total of copper, nickel, lead, zinc (ppm)	25	< 17.6	
Iron (ppm)	20	< 5	N/A
Sulphide (ppm)	10	< 5	N/A
Ammoniacal Nitrogen (ppm)	10	< 3.1	N/A
Cyanide (ppm)	5	< 5	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 (March 1994)

Parameters	Control Limits	Result	Mean
Section A			
pH (water)	8 (lower limit)	8.82 – 12.94	N/A
% Solids (%)	30 (lower limit)	36.6 – 100	89
Toxic Metals :			
Cadmium (ppm)	0.5	< 0.5	N/A
Mercury (ppm)	0.1	< 0.1	
Total Chromium (ppm)	10	< 5.6	
Copper (ppm)	-	< 4.3	
Nickel (ppm)	-	< 1	
Lead (ppm)	-	< 6.5	
Zinc (ppm)	-	< 3.9	
Total of copper, nickel, lead, zinc (ppm)	25	< 10.2	
Iron (ppm)	20	< 5	N/A
Sulphide (ppm)	10	< 5	N/A
Ammoniacal Nitrogen (ppm)	10	< 8.5	N/A
Cyanide (ppm)	5	< 5	N/A
Section B			
Volatile Organic Contents (ppm)	5000	< 84	N/A
Total Organic Halides (ppm)	10	< 3.1	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