

Chemical Waste Treatment Centre

Monitoring Report

January 2017

I. INTRODUCTION

This Operation Report is prepared by EPD for the Community Affairs 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.

II. ENVIRONMENTAL PERFORMANCE SUMMARY

CWTC is 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

The environmental performance summary as shown in Section III of this report covers the result of environmental monitoring in January 2017. During this month there have been no exceedances of the regulatory control limits. For detailed test results of effluent discharge, stack gas and stabilised residues, please refer to Table 1-3 respectively.

III. THE ENVIRONMENTAL MONITORING RESULTS

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.

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.

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.

Table 1

Chemical Waste Treatment Centre
Effluent Discharge Summary (January 2017)

| Parameters | Control Limits | Range | Mean | Compliance (Y/N) |
|--|----------------|----------------|-------|------------------|
| pH | 6-10 | 7.6 - 8.8 | 8.0 | Y |
| Total Kjeldahl Nitrogen (mg/l) | 100 | <30 - 67 | 45 | Y |
| Total Phosphate (mg/l) | 10 | <2 | <2 | Y |
| Total Sulphate (mg/l) | 2,000 | 470 - 663 | 571 | Y |
| Total Sulphides (mg/l) | 10 | <0.5 | <0.5 | Y |
| Total Cyanide (mg/l) | 0.1 | <0.040 - 0.041 | 0.040 | Y |
| Total Suspended Solids (mg/l) | 100 | <15 | <15 | Y |
| Oil and Grease (mg/l) | 20 | <10 | <10 | Y |
| Total Phenols (mg/l) | 0.5 | <0.3 | <0.3 | Y |
| Total Residual Chlorine (mg/l) | 1 | <0.6 | <0.6 | Y |
| Detergents (mg/l) | 15 | <7 | <7 | Y |
| Chemical Oxygen Demand (mg/l) | 2,000 | 345 - 580 | 459 | Y |
| Dissolved TOC (mg/l) | 200 | <20 - 31 | 26 | Y |
| Temperature (°C) | 43 | 22 - 23 | 22 | Y |
| Floatable Substances (mg/l) # | - | - | - | - |
| Toxic Metals : | | | | |
| Arsenic (mg/l) | 2 | <0.4 | <0.4 | Y |
| Barium (mg/l) | 5 | <1.0 - 1.0 | 1.0 | Y |
| Cadmium (mg/l) | 0.1 | <0.1 | <0.1 | Y |
| Chromium (mg/l) | 1 | <0.3 | <0.3 | Y |
| Copper (mg/l) | 2 | <0.5 | <0.5 | Y |
| Lead (mg/l) | 2 | <1 | <1 | Y |
| Manganese (mg/l) | 5 | <0.2 | <0.2 | Y |
| Mercury (mg/l) | 0.05 | <0.05 | <0.05 | Y |
| Nickel (mg/l) | 2 | <1 | <1 | Y |
| Silver (mg/l) | 2 | <0.4 | <0.4 | Y |
| Tin (mg/l) | 5 | <1 | <1 | Y |
| Zinc (mg/l) | 2 | <1 | <1 | Y |
| Total Toxic Metals ^{###} (mg/l) | 10 | <7.0 | <7.0 | Y |
| Boron (mg/l) | 5 | <1.0 - 1.8 | 1.3 | Y |
| Iron (mg/l) | 10 | <2 | <2 | Y |

| Parameters | Control Limits | Range | Mean | Compliance (Y/N) |
|--|----------------|--------|--------|------------------|
| Pesticides : | | | | |
| Aldrin (mg/l) | 0.01 | <0.01 | <0.01 | Y |
| BHCS (mg/l) | 0.01 | <0.01 | <0.01 | Y |
| DDT (mg/l) | 0.01 | <0.01 | <0.01 | Y |
| Semi-volatile Compounds : | | | | |
| Benzo (A) Pyrene (mg/l) | 0.1 | <0.06 | <0.06 | Y |
| Volatile Compounds : | | | | |
| 1,1,1-Trichloroethane (mg/l) | 0.05 | <0.025 | <0.025 | Y |
| Polychlorinated Biphenyls : | | | | |
| Total PCBs (mg/l) | 0.003 | <0.003 | <0.003 | Y |
| Radioactive Substances [#] | - | - | - | - |

According to the revised Waste Disposal Licence requirements (August 2016), analysis on Floatable Substances & Radioactive Substances are not normally required and hence no such measurements were made.

Total toxic metals include: Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Mercury, Nickel, Silver, Tin, Zinc.

Table 2

Chemical Waste Treatment Centre
Stack Gas Monitoring Summary (January 2017)

| Parameters | Control Limits (Emission Rate) ⁽¹⁾ | Range | Mean | Compliance (Y/N) |
|---|--|---------------|---------------------|---------------------|
| (a) 30 minute average results ⁽²⁾ | | | | |
| Particulates (kg/0.5h) | 0.58 | 0.00 - 0.02 | 0.00 | Y |
| Sulphur Dioxide (kg/0.5h) | 3.86 | 0.00 – 1.54 | 0.14 | Y |
| Hydrogen Chloride (kg/0.5h) | 1.16 | 0.00 - 0.27 | 0.02 | Y |
| Hydrogen Fluoride (kg/0.5h) | 0.08 | 0.00 - 0.00 | 0.00 | Y |
| Nitrogen oxides (as NO ₂) (kg/0.5h) | 7.71 | 0.79 – 3.48 | 1.56 | Y |
| Total organic carbon (kg/0.5h) | 0.39 | 0.00 - 0.08 | 0.00 | Y |
| Carbon Monoxide (kg/0.5h) | 1.93 | 0.00 - 1.09 | 0.09 | Y |
| (b) Daily average results ⁽³⁾ | | | | |
| Particulates (kg/day) | 9.25 | 0.03 - 0.13 | 0.08 | Y |
| Sulphur Dioxide (kg/day) | 46.27 | 3.26 – 16.34 | 6.81 | Y |
| Hydrogen Chloride (kg/day) | 9.25 | 0.20 - 3.10 | 0.95 | Y |
| Hydrogen Fluoride (kg/day) | 0.93 | 0.00 - 0.00 | 0.00 | Y |
| Nitrogen oxides (as NO ₂) (kg/day) | 185.06 | 58.13 – 84.82 | 73.32 | Y |
| Total organic carbon (kg/day) | 9.25 | 0.08 - 0.26 | 0.18 | Y |
| Carbon Monoxide (kg/day) | 46.27 | 0.58 – 8.31 | 4.19 | Y |
| (c) Other results | | | | |
| Parameters | Control Limits (Emission Rate) ⁽¹⁾ | Result | Compliance (Y/N) | |
| Chlorine and Compounds (as Cl ₂) (kg/h) | 0.93 | 0.04 | Y | |
| Fluorine and Compounds (as HF) (kg/h) | 0.73 | <0.004 | Y | |
| Acidity (as Sulphuric Acid) (kg/h) | 1.45 | 0.25 | Y | |
| Total Phosphorus (as P) (kg/h) | 0.21 | <0.006 | Y | |
| Hydrogen Bromide and Bromine (kg/h) | 0.19 | <0.005 | Y | |

| Parameters | Control Limits (Emission Rate) ⁽¹⁾ | Result | Compliance (Y/N) |
|---|--|---------|---------------------|
| Toxic Metals I ⁽⁴⁾ : | | | |
| Total of Toxic Metal I (kg/h) | 0.0019 | <0.0003 | Y |
| Toxic Metals II ⁽⁵⁾ : | | | |
| Arsenic (kg/h) | 0.0023 | <0.0001 | Y |
| Total of Toxic Metal II (kg/h) | 0.019 | <0.0020 | Y |
| Mercury (kg/h) | 0.0019 | <0.0001 | Y |
| Dioxin (ng/h) | 2,891 | 57.9 | Y |

Remark:

- (1) The basis of reporting of stack gas monitoring data has changed from “concentration-limit” to “emission-rate” starting from April 2016.
- (2) 30 minute average results from CEMS in the sampling month
- (3) Daily average results from CEMS in the sampling month
- (4) Toxic metal I include : cadmium and thallium
- (5) Toxic metal II include : antimony, arsenic, lead, chromium, cobalt, copper, manganese, nickel and vanadium
- (6) The results of the measurements are standardized at the reference conditions of 273K, 101.3 kPa, 11% oxygen, dry gas.

Table 3

Chemical Waste Treatment Centre
Stabilised Materials Summary (January 2017)

| Parameters | Control Limits | Range | Mean | Compliance (Y/N) |
|---|------------------|----------------|-------|------------------|
| Section A | | | | |
| pH (water) | 8 (lower limit) | 12.4 - 12.7 | 12.5 | Y |
| % Solids | 30 (lower limit) | 62 - 91 | 77.0 | Y |
| Toxic Metals : | | | | |
| Cadmium (ppm) | 0.5 | <0.5 | <0.5 | Y |
| Mercury (ppm) | 0.1 | <0.020 - 0.028 | 0.020 | Y |
| Total Chromium (ppm) | 10 | <0.5 | <0.5 | Y |
| Copper (ppm) | - | <0.5 - 3.8 | 0.8 | - |
| Nickel (ppm) | - | <0.5 | <0.5 | - |
| Lead (ppm) | - | <1.0 - 5.0 | 1.2 | - |
| Zinc (ppm) | - | <0.50 - 1.90 | 0.57 | - |
| Total of copper, nickel, lead, zinc (ppm) | 25 | <2.5 - 7.9 | 3.0 | Y |
| Iron (ppm) | 20 | <1 | <1 | Y |
| Sulphide (ppm) | 10 | <5 | <5 | Y |
| Ammoniacal Nitrogen (ppm) | 10 | <2.0 - 4.6 | 2.1 | Y |
| Cyanide (ppm) | 5 | <5 | <5 | Y |
| Section B | | | | |
| Volatile Organic Contents (ppm) | 5,000 | <15 | <15 | Y |
| Total Organic Halides | 10 | <5 | <5 | Y |
| Total Chlorophenols (ppm) | 2 | <2 | <2 | Y |
| Polychlorinated Biphenyls (ppm) | 1 | <1 | <1 | Y |
| TCDD equivalent (ITEF method) (ppb) | 1 | <1 | <1 | Y |