2a. AIR QUALITY IMPACT (TTAL SITE)

2a.1 Introduction

2a.1.1.1 This section presents the requirements, methodology, equipment, criteria and protocols for the monitoring and audit of air quality impacts during the construction and operation phases of the Project.

2a.1.1.2 The objectives of the air quality monitoring include the following:-

- to identify the extent of construction dust and operational odour impacts;
- to determine the effectiveness of mitigation measures to control dust emission from activities during construction phase and odour control measures during operation phase;
- to audit the compliance of the Contractor with regard to dust control, contract conditions and the relevant dust impact criteria;
- to recommend further mitigation measures if found to be necessary; and
- to comply with action and limit levels for air quality as defined in this Manual.

2a.1.1.3 During construction phase of the Project, dust impacts would be the major air quality impacts. While during operation phase of the Project, stack emissions would be the key environmental issue. Apart from the stack emission, odour emission arising from the operation of the IWMF and its on-site wastewater treatment plant, the waste reception halls, the waste storage area, and the mechanical treatment plant would be another key environmental issue.

2a.2 Monitoring during Construction Phase

2a.2.1.1 With the implementation of practicable dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation, adverse construction dust impact at Air Sensitive Receivers (ASRs) is not expected during construction of the Project. In view of the large separation distance of the nearby ASRs from the Project Site, no dust monitoring is considered necessary. Yet, regular site environmental audits during the construction phase of the Project as described in **Section 12** of this Manual should be conducted to ensure that the recommended dust suppression measures are implemented properly.

2a.2.1.2 Mitigation measures for dust control have been recommended in the EIA Report and are listed below:-

- Use of regular watering, with complete coverage, to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather;
- Use of frequent watering for particularly dusty construction areas and areas close to ASRs;
- Side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this is not practicable owing to frequent usage, watering shall be applied to aggregate fines;
- Open stockpiles shall be avoided or covered. Where possible, prevent placing dusty material storage piles near ASRs;

- Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations;
- Establishment and use of vehicle wheel and body washing facilities at the exit points of the site;
- Provision of wind shield and dust extraction units or similar dust mitigation measures at the loading points, and use of water sprinklers at the loading area where dust generation is likely during the loading process of loose material, particularly in dry seasons / periods;
- Imposition of speed controls for vehicles on unpaved site roads. Ten kilometres per hour is the recommended limit;
- Where possible, routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs; and
- Instigation of an environmental auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise.

2a.2.1.3 The Contractor shall be responsible for the design and implementation of these measures.

2a.3 Monitoring during Operation Phase

2a.3.1 Stack Monitoring

2a.3.1.1 Monitoring of air quality parameters of concern due to stack emissions has to be conducted during operation phase of the Project in accordance with the requirements similar to those stipulated in the "A Guidance Note on the Best Practicable Means for Incinerator (Municipal Waste Incineration) BPM 12/1".

2a.3.1.2 The parameters for measurement and the analytical methods are listed in **Table 2a.1**. It should be noted that the proposed sampling methods below are for reference only and should be subject to the approval of EPD.

Table 2a.1 Analytical Parameters and Methodology

Parameters	**Method**
Dioxin and Furans	USEPA Method 23
HCl and HF	USEPA Method 26 A USEPA Method 13B sampling train
Heavy Metals Cd, Ti, Hg, Sb, As, Pb, Cr, Co, Cu, Mn, Ni and V – particulate and gaseous form	USEPA Method 29
Gaseous and vaporous organic substances	USEPA Method 18 USEPA Method 0031
Combustion Gases	
Carbon Dioxide	Fyrite analyser, Combustion analyser
Carbon Monoxide	Combustion Gas Analyser
NO_X/NO	USEPA Reference methods USEPA Method 7 and associated methods,

Parameters	**Method**
Oxygen	Combustion Gas Analyser (chemical cell and paramagnetic)
Sulphur dioxide and Sulphuric Acid Mist	USEPA Method 8
Particulate	ISO 9096, ASTM D3685-98, USEPA Method 17
Velocity and Volumetric Flow	ISO 10780 and ISO 9096

2a.3.1.3 Necessary monitoring equipment and techniques should be provided and used to demonstrate that the process is properly operated and the emissions can be minimized to meet the air pollution control requirements. The scope, manner and frequency of the monitoring should be sufficient for this purpose and will be determined by EPD. Monitoring results should be recorded in such manner specified by EPD. The record should be retained at the premises for a minimum of two years, or other period specified by EPD, after the date of last entry and be made available for examination as and when required by EPD.

2a.3.1.4 On-line monitoring and periodic measurement shall be carried out and the results shall be properly recorded. Evidence should be provided to demonstrate quality assurance procedures are in place to ensure all monitoring results are sufficiently accurate and reliable. Calibration on the monitoring equipment has to be done by means of parallel measurements with the reference methods as agreed by EPD. The requirements of the on-line monitoring and periodic measurement are provided in the following sections.

On-line Monitoring

2a.3.1.5 Continuous monitoring of the in-stack exhaust gas and the process shall be carried out. The continuous monitoring data should be transmitted instantaneously to EPD by telemetry system in such manner and format agreed with EPD. The parameters to be continuously monitored are listed below:-

In-stack Exhaust Gas Continuous Monitoring

- nitrogen oxides
- hydrogen chloride
- hydrogen fluoride
- sulphur dioxide
- opacity
- gaseous and vaporous organic substances
- carbon monoxide
- oxygen
- pressure
- temperature
- water vapour content (The continuous measurement of the water vapour content should not be required if the sampled exhaust gas is dried before the emissions are analysed.)

Process Continuous Monitoring

- temperature and oxygen content of the gas at the appropriate location(s) in the combustion chamber to demonstrate the compliance of the requirements set out in paragraphs 4.3.1 to 4.3.4 of EPD's Guidance Note on the Best Practicable Means for Incinerators (Municipal Waste Incineration) BPM 12/1
- temperature of the gas at the appropriate location(s) in the chimney to demonstrate that the exit temperature of the exhaust gas from the chimney of the incineration process is not less than 80ºC at full load condition
- other essential operating parameter(s) which may affect the performance of air pollution control measures

Periodic Measurement

2a.3.1.6 To confirm that the levels of dioxin and heavy metals are being adequately controlled, periodic measurements shall be made.

2a.3.1.7 The sampling frequency will be determined by EPD. All measurement results should be recorded, processed and presented in a summary report as agreed by EPD. The report should be submitted to EPD without delay after the source sampling(s) as required is/are completed.

2a.3.2 Odour Monitoring

2a.3.2.1 To determine the effectiveness of the proposed odour mitigation measures and to ensure the odour impacts arising from the operation of the IWMF and the waste reception halls, the waste storage area and mechanical treatment plant meeting the air pollution control requirements, odour monitoring shall be conducted. Odour monitoring involves odour patrols conducted by an odour patrol team. The odour patrol team will patrol and sniff along an odour patrol route along the IWMF site boundary. The implementation of the odour monitoring shall be subject to the prevailing weather forecast condition and no odour monitoring should be carried out during rainy day.

2a.3.2.2 The odour patrol team shall be comprised of at least two independent trained personnel / competent persons, who should pass a set of screening tests and fulfil the following requirements:-

- have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725);
- be at least 16 years of age and willing and able to follow instructions;
- be free from any respiratory illnesses;
- not allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 min before and during odour patrol;
- take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics; and
- not communicate with each other about the results of their choices.

2a.3.2.3 The independent trained personnel / competent persons should use their noses (olfactory sensors) to sniff odours at different locations. The main odour emission sources and the areas to be affected by the odour nuisance shall be identified. During the patrol, the

sequence should generally start from less odorous locations to stronger odorous locations.

2a.3.2.4 The perceived odour intensity is divided into 5 levels. **Table 2a.2** describes the odour intensity for different levels.

Table 2a.2 Odour Intensity Level

Level	Odour Intensity
0	Not detected. No odour perceived or an odour so weak that it cannot be easily characterised or described
1	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong identifiable, likely to have odour nuisance
4	Extreme severe odour, and unacceptable odour level

2a.3.2.5 The independent trained personnel / competent persons shall record the findings including date and time, weather condition (e.g. sunny, fine, cloudy, and rainy), odour intensity, odour nature and possible odour sources, local wind speed, and wind direction at each location. In addition, some relevant meteorological data such as daily average temperature, and daily average humidity on the day of odour patrol shall be obtained from the nearest Hong Kong Observatory station for reference.

2a.3.2.6 Odour patrols will be conducted in summer (i.e. from July to September). In the first 2 operational years of the IWMF, monthly odour patrols shall be conducted. Odour patrols shall be carried out during daytime and evening / night time when the IWMF and its waste reception halls, the waste storage area and the mechanical treatment plant are operated under normal operating condition.

2a.3.2.7 The need to continue the odour patrol after the end of the 2-year monitoring period would depend on the monitoring results and should be agreed with EPD. If the level of odour intensity at any sniffing location is higher than 1 due to potential odour emission from the IWMF and its waste reception halls, the waste storage area and the mechanical treatment plant in two consecutive months, the odour patrol programme would be extended until the level of odour intensity (that is determined to be due to potential odour emission from the IWMF or the associated facilities) at all the sniffing locations have dropped to 0 in three consecutive months.

2a.3.2.8 **Table 2a.3** shows the action level and limit level to be used for odour patrol. Should any exceedance of the action and limit levels occurs, actions in accordance with the event and action plan in **Table 2a.4** should be carried out.

Table 2a.3 Action and Limit Levels for Odour Nuisance

Parameter	Action Level	Limit Level
Odour Nuisance (from odour patrol)	When one documented compliant are received(1), or Odour Intensity of 2 is measured from odour patrol.	Two or more documented complaints are received(1) within a week; or Odour intensity of 3 or above is measured from odour patrol.

Note: Once the compliant is received by the Project Proponent (EPD), the Project Proponent shall investigate and verify the complaint whether it is related to the potential odour emission from the IWMF and associated facilities.

Table 2a.4 Event and Action Plan for Odour Monitoring

EVENT	ACTION	
	Person-in-charge of Odour Monitoring	**Project Proponent**[1]
ACTION LEVEL		
Exceedance of action level (Odour Patrol)	1. Identify source/reason of exceedance; 2. Repeat odour patrol to confirm finding.	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 week; 2. Rectify any unacceptable practice; 3. Implement more mitigation measures if necessary; 4. Inform EPD.
Exceedance of action level (Odour Complaints)	1. Identify source/reason of exceedance; 2. Carry out odour patrol to determinate odour intensity.	1. Carry out investigation and verify the complaint whether it is related to potential odour emission from the IWMF; 2. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 week; 3. Rectify any unacceptable practice; 4. Implement more mitigation measures if necessary; 5. Inform EPD.
LIMIT LEVEL		
Exceedance of Limit level	1. Identify source/reason of exceedance; 2. Inform EPD; 3. Repeat odour patrol to confirm findings; 4. Increase odour patrol frequency to bi-weekly; 5. Assess effectiveness of remedial action and keep EPD informed of the results; 6. If exceedance stops, cease additional odour patrol.	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 week; 2. Rectify any unacceptable practice; 3. Formulate remedial actions; 4. Ensure remedial actions properly implemented; 5. If exceedance continues, consider what more/enhanced mitigation measures should be implemented; 6. Inform EPD.

2a.3.2.9 In the event when an odour compliant is received, Project Proponent should liaise with the complainant and register the complaint. The compliant register is to record detailed information regarding the odour compliant so as to facilitate the investigation work. The registration should contain, but not be limited to the following information:-

- Location of where the odour nuisance occurred;
- Date and time of the complaint and the nuisance event;
- Description of the complaint, i.e. the type and characteristics of the odour; and an indication of the odour strength (highly offensive/offensive/slightly offensive/just continuously detectable /intermittently detectable);
- Meteorological conditions from the nearest HK Observatory station at the time of complaint; and

[1] Project Proponent will identify an implementation agent.

- Name and contact information of the complainant.