

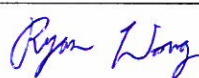
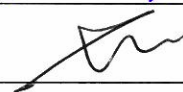
Architectural Services Department

Contract No.: SS T326

Environmental Team Consultancy during Tree Transplantation Work for the Reprovisioning of Cremators at Wo Hop Shek Crematorium

Baseline Monitoring Report

September 2009

	Name	Signature
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Version: Rev. 0 Date: 18 September 2009

The information contained in this report is, to the best of our knowledge, correct at the time of printing. The interpretation and recommendations in the report are based on our experience, using reasonable professional skill and judgment, and based upon the information that was available to us. These interpretations and recommendations are not necessarily relevant to any aspect outside the restricted requirements of our brief. This report has been prepared for the sole and specific use of our client and AECOM Environment accepts no responsibility for its use by others.

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Your reference:

Our reference: HKASD101/50/100153

Date: 18 September 2009

Attn.: Mr Andrew NAM / Ms Salina LEE

**BY FAX ONLY
(Fax no.: 2524 7981)**

Dear Sirs

Quotation Contract No. 9/2009/AB1
Provision of Cremators at Wo Hop Shek Crematorium - Independent Environmental Checker Service
Baseline Monitoring Report

We refer to the e-mail from your Environmental Team attached with a copy of the baseline monitoring report and their subsequent revision, we have no further comment and hereby, verify the report in accordance with Condition 5.3 of the Environmental Permit EP-329/2009.

Should you have any queries, please do not hesitate to contact the undersigned or our Ms Fiona Li on 2869 6018.

Yours faithfully
EDMS CONSULTING LTD

Andy W L Chung
Independent Environmental Checker

AC/jc

cc AECOM - Ms Edith Ng (Fax: 2891 0305)

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EXECUTIVE SUMMARY

The Project “Provision of Cremators at Wo Hop Shek Crematorium” (hereafter called “the Project”) seeks to re-provision four existing coffin cremators and one existing skeletal cremator in-situ and to provide four additional coffin / dual-purpose cremators by three phases at the same site.

In accordance with the Environmental Monitoring and Audit Manual (EM&A Manual) for the Project, baseline monitoring of air quality is required. This report presents the baseline monitoring results at A22a and A22b, the monitoring locations proposed in the EIA report.

The baseline monitoring of air quality was carried out between 19 August 2009 and 2 September 2009 at A22a and A22b. Air quality was recorded in terms of 1-hour Total Suspended Particulates (TSP) and 24-hour TSP. The weather during the monitoring period was mainly sunny with a few occasions of drizzles.

The averaged baseline 1-hour TSP level was $48.8\mu\text{g}/\text{m}^3$ at A22a and $46.8\mu\text{g}/\text{m}^3$ at A22b. The averaged 24-hour TSP was $42.0\mu\text{g}/\text{m}^3$ at A22a and $41.6\mu\text{g}/\text{m}^3$ at A22b.

1 INTRODUCTION

1.1 Background

- 1.1.1. The existing Wo Hop Shek Crematorium is located at Kiu Tau Road, North District. It consists of a coffin crematorium with two twin cremators. A skeletal cremator building with a single cremator operates nearby for the cremation of skeletal remains from burial. The skeletal cremator and the coffin cremators were commissioned in the 1960's and 1991 respectively.
- 1.1.2. As the five existing cremators are approaching the end of their serviceable life and to cope with the increasing demand of cremation services, the Food and Environmental Hygiene Department (FEHD) proposes to demolish the existing coffin crematorium and the skeletal cremator building and to construct in-situ a new crematorium in the same site.
- 1.1.3. The Project seeks to re-provision four existing coffin cremators and one existing skeletal cremator in-situ and to provide four additional coffin / dual-purpose cremators by three phases at the same site.
- 1.1.4. The Project is anticipated to complete in April 2012.
- 1.1.5. The Construction Programme of the Project is shown in Appendix A.
- 1.1.6. Architectural Services Department (ArchSD) acts as the work agent for the Food and Environmental Hygiene Department (FEHD) of the Project. AECOM Asia Company Limited was employed by Architectural Services Department, as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) works for the Project during tree transplanting work.
- 1.1.7. In accordance with the EM&A Manual of the Project, environmental baseline conditions were established by the ET prior to the commencement of construction of the Project.

1.2 Purpose of the Baseline Monitoring Report

- 1.2.1 The purpose of this report is to review the baseline conditions of the Project site and to establish baseline levels for air quality in accordance with the EM&A Manual. These levels would be used as the basis for assessing environmental impact and compliance during construction of the Project.
- 1.2.2 This baseline monitoring report presents the baseline monitoring requirements, methodologies and monitoring results of air quality conducted at 83 Wo Ka Lau Road (A22a) and 51D Wo Hop Shek San Tsuen (A22b).

2 AIR QUALITY MONITORING

2.1 Monitoring Requirements

- 2.1.1 In accordance with the EM&A Manual, baseline monitoring of 1-hour and 24-hour TSP levels shall be carried out at the two designated monitoring locations for at least 14 consecutive days prior to the commencement of the major construction works.

2.2 Monitoring Equipment

- 2.2.1 24-hour TSP air quality monitoring was performed using High Volume Sampler (HVS) located at each designated monitoring station. The HVS meets all the requirements of the EM&A Manual. Portable direct reading dust meters were used to carry out the 1-hour TSP monitoring. Weather Monitor was used to collect wind data for reference. Brand and model of the equipment is given in Table 2.1.

Table 2.1 Air Quality Monitoring Equipment

Equipment	Brand and Model
Portable direct reading dust meter (1-hour TSP)	Sibata Digital Dust Monitor (Model No. LD-3)
High Volume Sampler (24-hour TSP)	Tisch Total Suspended Particulate Mass Flow Controlled High Volume Air Sampler (Model No. TE-5170)
Wind Station (Wind speed and wind direction)	Davis Weather Monitor II

2.3 Monitoring Locations

- 2.3.1 Both monitoring stations (i.e. A22a and A22b) were set up at the proposed locations in accordance with EM&A Manual. Figure 2.1 shows the locations of monitoring stations A22a and A22b. Table 2.2 describes the details of the two monitoring stations.

Table 2.2 Locations of Air Quality Monitoring Stations

ID	Location	Monitoring Station
A22a	83 Wo Ka Lau Road	Ground floor within the front gate of the premises
A22b	51D Wo Hop Shek San Tsuen	Ground Floor of House 51D Boundary Wall of Wo Hop Shek San Tsuen

2.4 Monitoring Parameters, Frequency and Duration

- 2.4.1 Table 2.3 summarizes the monitoring parameters, frequency and duration of baseline TSP monitoring.

Table 2.3 Air Quality Monitoring Parameters, Frequency and Duration

Monitoring Station	Parameter	Frequency and Duration
A22a & A22b	1-hour TSP	3 times (at three consecutive hours) per day while the highest dust impact was expected, for 14 days
	24-hour TSP	Daily, for 14 days

2.4.2 For 83 Wo Ka Lau Road (A22a) and 51D Wo Hop Shek San Tsuen (A22b), baseline air quality monitoring was conducted from 19 August 2009 to 2 September 2009 for consecutive 14 days.

2.5 Monitoring Methodology

2.5.1 24-hour TSP Monitoring

- (a) The HVS was installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVS.
 - (i) A horizontal platform with appropriate support to secure the sampler against gusty wind was provided.
 - (ii) The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
 - (iii) A minimum of 2 meters separation from walls, parapets and penthouse for rooftop sampler.
 - (iv) No furnace or incinerator flues nearby.
 - (v) Airflow around the sampler was unrestricted.
 - (vi) Permission was obtained to set up the samplers and access to the monitoring stations.
 - (vii) A secured supply of electricity was obtained to operate the samplers.
 - (viii) The sampler was located more than 20 meters from any dripline.
 - (ix) Any wire fence and gate, required to protect the sampler, did not obstruct the monitoring process.
 - (x) Flow control accuracy was kept within $\pm 2.5\%$ deviation over 24-hour sampling period.
- (b) Preparation of Filter Papers
 - (i) Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
 - (ii) All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ± 3 °C; the relative humidity (RH) was < 50% and not variable by more than $\pm 5\%$. A convenient working RH was 40%.
 - (iii) All filter papers were prepared and analysed by ALS Technichem (HK) Pty Ltd., which is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes.
- (c) Field Monitoring
 - (i) The power supply was checked to ensure the HVS works properly.
 - (ii) The filter holder and the area surrounding the filter were cleaned.
 - (iii) The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
 - (iv) The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
 - (v) The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied was sufficient to avoid air leakage at the edges.
 - (vi) Then the shelter lid was closed and was secured with the aluminum strip.
 - (vii) The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
 - (viii) A new flow rate record sheet was set into the flow recorder.
 - (ix) On site temperature and atmospheric pressure readings were taken and the flow rate of the HVS was checked and adjusted at around 1.1 m³/min, and complied with the range specified in the EM&A Manual (i.e. 0.6-1.7 m³/min).
 - (x) The programmable digital timer was set for a sampling period of 24 hrs, and the starting time, weather condition and the filter number were recorded.
 - (xi) The initial elapsed time was recorded.

- (xii) At the end of sampling, on site temperature and atmospheric pressure readings were taken and the final flow rate of the HVS was checked and recorded.
- (xiii) The final elapsed time was recorded.
- (xiv) The sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
- (xv) It was then placed in a clean plastic envelope and sealed.
- (xvi) All monitoring information was recorded on a standard data sheet.
- (xvii) Filters were then sent to ALS Technichem (HK) Pty Ltd. for analysis.

(d) Maintenance and Calibration

- (i) The HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
- (ii) HVSs were calibrated using TE-5025A Calibration Kit prior to the commencement of baseline monitoring.
- (iii) Calibration certificate of the TE-5025A Calibration Kit and the HVSs are provided in Appendix B.

2.5.2 1-hour TSP Monitoring

(a) Measuring Procedures

The measuring procedures of the 1-hour dust meter were in accordance with the Manufacturer's Instruction Manual as follows:

- (i) Turn the power on.
- (ii) Close the air collecting opening cover.
- (iii) Push the "TIME SETTING" switch to [BG]
- (iv) Push "START/STOP" switch to perform background measurement for 6 seconds.
- (v) Turn the knob at SENSI ADJ position to insert the light scattering plate.
- (vi) Leave the equipment for 1 minute upon "SPAN CHECK" is indicated in the display.
- (vii) Push "START/STOP" switch to perform automatic sensitivity adjustment. This measurement takes 1 minute.
- (viii) Pull out the knob and return it to MEASURE position.
- (ix) Push the "TIME SETTING" switch the time set in the display to 3 hours.
- (x) Lower down the air collection opening cover.
- (xi) Push "START/STOP" switch to start measurement.

(b) Maintenance and Calibration

- (i) The 1-hour TSP meter was calibrated at 1-year intervals against a continuous particulate TEOM Monitor, Series 1400ab. Calibration certificates of the Laser Dust Monitors are provided in Appendix B.

2.5.3 Wind data

- (a) In order to collect information of wind speed and wind direction near the air quality monitoring stations, a wind monitoring station was setup at the rooftop of the premises at 83 Wo Ka Lau Road (A22a), so that they are clear of obstructions of turbulence caused by the buildings in the vicinity. The settings and parameters of the weather monitor are as follows:
 - (i) Data logging interval: 30 minutes
 - (ii) Wind Speed: in the unit of m/s; and
 - (iii) Wind Direction: divided into 16 sectors of 22.5 degrees each.

2.6 Results and Observations

- 2.6.1 The baseline monitoring was carried out from 20 August 2009 to 2 September 2009 for 1-hr TSP and from 19 August 2009 to 1 September 2009 for 24-hr TSP, during which, the weather was mainly sunny. Major activities on the site during the monitoring period were tree felling, hoarding erection, temporary site office erection and operation of the existing skeletal cremator. Major dust sources were from nearby traffic emissions.
- 2.6.2 The baseline monitoring results for 1-hour TSP and 24-hour TSP are summarized in Table 2.4 and 2.5 respectively. Detailed air quality monitoring results are presented in Appendix C.

Table 2.4 Summary of 1-hour TSP Baseline Monitoring Results

	A22a	A22b
Maximum ($\mu\text{g}/\text{m}^3$)	97.7	71.9
Minimum ($\mu\text{g}/\text{m}^3$)	22.0	19.4
Average ($\mu\text{g}/\text{m}^3$)	48.8	46.8

Table 2.5 Summary of 24-hour TSP Baseline Monitoring Results

	A22a	A22b
Maximum ($\mu\text{g}/\text{m}^3$)	83.8	87.6
Minimum ($\mu\text{g}/\text{m}^3$)	19.5	14.4
Average ($\mu\text{g}/\text{m}^3$)	42.0	41.6

- 2.6.3 Wind speed and wind direction collected by the wind monitoring station are presented in Appendix D.

2.7 Action and Limit Levels

- 2.7.1 The air quality monitoring results, in terms of 1-hour TSP and 24-hour TSP, were below the Limit Level set out in the Air Quality Objective (AQO) at both monitoring locations.
- 2.7.2 The Action and Limit Levels for air quality impact monitoring were based on the criteria adopted from the EM&A Manual as presented in Table 2.6.

Table 2.6 Derivation of Action and Limit Levels for Air Quality

Parameter	Action Level	Limit Level
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$, Action level = (average of baseline level * 1.3 + Limit level)/2 For baseline level $> 384 \mu\text{g}/\text{m}^3$, Action level = Limit level	500
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$, Action level = (average of baseline level * 1.3 + Limit level)/2 For baseline level $> 200 \mu\text{g}/\text{m}^3$, Action level = Limit level	260

- 2.7.3 Table 2.7 shows the derived Action and Limit Levels for air quality impact monitoring for the Project.

Table 2.7 Action and Limit Levels for Air Quality

Parameter	Monitoring Station	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
1-hour TSP	A22a	281.7	500.0
	A22b	280.4	500.0
24-hour TSP	A22a	157.3	260.0
	A22b	157.0	260.0

3 CONCLUSION

- 3.1.1 Baseline air quality monitoring was carried out between 19 August 2009 and 2 September 2009 at the 2 monitoring locations proposed in the EM&A Manual. Action and Limit Levels for air quality at each location were derived from the baseline monitoring results.
- 3.1.2 During the Construction Phase of the Project, the Contractor shall implement the mitigation measures recommended in the EM&A Manual to minimize the environmental impact on the sensitive receivers.

