

Hip Hing Joint Venture

Hong Kong Convention and
Exhibition Centre Expansion
Project: *3rd Operational Phase*
Monthly Environmental Monitoring
and Audit Report

October 2010

Environmental Resources Management

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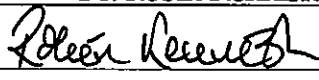
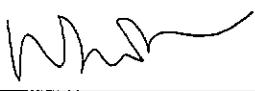
ENVIRONMENTAL MONITORING &
AUDIT REPORT

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Exhibition Centre Expansion
Project: *3rd Operational Phase*
Monthly Environmental Monitoring
and Audit Report

October 2010

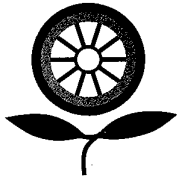
Reference 0050690

For and on behalf of ERM-Hong Kong, Limited
Approved by: <u>Dr. Robin Kennish</u>
Signed: <u></u>
Position: <u>Director</u>
Certified by: <u></u>
(Environmental Team Leader - Winnie Ko)
Date: <u>18 October 2010</u>

This report has been prepared by ERM Hong-Kong, Limited with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



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19 October 2010

Maunsell Consultants Asia Ltd
Grand Central Plaza, Tower 2
138 Shatin Rural Committee Road
Shatin, N.T., Hong Kong

Attn: Ms Marian Kwok
Senior Project Manager

Dear Ms Kwok,

**Hong Kong Convention and Exhibition Centre Expansion Project:
3rd Operational Phase Monthly Environmental Monitoring and Audit Report
(Environmental Permit No.: EP-239/2006/B)**

With reference to the captioned document concerning the operational phase EM&A received from the ET on 18 October 2010, we are pleased to provide our verification for the document pursuant to condition 3 of the Environmental Permit (EP) No. EP-239/2006/B.

Yours faithfully,
Nature & Technologies (HK) Limited

Ir Dr Gabriel C K Lam
Independent Environmental Checker

- cc: - Hong Kong Trade Development Council (Attn: Mr. K. F. Chan)
- Hip Hing Ngo Kee Joint Venture (Attn: Mr. Eric Lau & Mr. William Tam)
- ERM (Attn: Ms. Winnie Ko)

CONTENTS

	<i>EXECUTIVE SUMMARY</i>	<i>I</i>
<i>1</i>	<i>INTRODUCTION</i>	<i>1</i>
<i>1.1</i>	<i>PURPOSE OF THE REPORT</i>	<i>1</i>
<i>1.2</i>	<i>STRUCTURE OF THE REPORT</i>	<i>1</i>
<i>2</i>	<i>PROJECT INFORMATION</i>	<i>3</i>
<i>2.1</i>	<i>BACKGROUND</i>	<i>3</i>
<i>2.2</i>	<i>LOCATION OF PROJECT</i>	<i>4</i>
<i>2.3</i>	<i>PROJECT ORGANISATION</i>	<i>4</i>
<i>2.4</i>	<i>STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS</i>	<i>4</i>
<i>3</i>	<i>ENVIRONMENTAL MONITORING METHODOLOGY</i>	<i>5</i>
<i>3.1</i>	<i>AIR QUALITY MONITORING</i>	<i>5</i>
<i>4</i>	<i>IMPLEMENTATION STATUS ON ENVIRONMENTAL PROTECTION REQUIREMENTS</i>	<i>8</i>
<i>5</i>	<i>MONITORING RESULTS</i>	<i>9</i>
<i>6</i>	<i>ENVIRONMENTAL NON-CONFORMANCE</i>	<i>11</i>
<i>7</i>	<i>FUTURE KEY ISSUES</i>	<i>12</i>
<i>7.1</i>	<i>KEY ISSUES FOR THE COMING MONTH</i>	<i>12</i>
<i>7.2</i>	<i>MONITORING SCHEDULE FOR THE COMING MONTHS</i>	<i>12</i>
<i>8</i>	<i>REVIEW OF THE EM&A DATA AND EIA PREDICTIONS</i>	<i>13</i>
<i>8.1</i>	<i>AIR QUALITY</i>	<i>13</i>
<i>8.2</i>	<i>CONCLUSION OF REVIEW</i>	<i>13</i>
<i>9</i>	<i>CONCLUSIONS</i>	<i>14</i>

LIST OF TABLES

Table 2.1	Summary of Environmental Licensing, Notification and Permit Status
Table 3.1	Air Monitoring Stations
Table 3.2	TSP Monitoring Parameter and Frequency
Table 3.3	Action and Limit Levels for NO ₂
Table 3.4	NO ₂ Monitoring Equipment
Table 8.1	Comparison of NO ₂ Concentration predicted in the EIA, Tunnel Air Quality Guidelines and the Air Quality Monitoring Results

LIST OF ANNEXES

Annex A	Location of Project
Annex B	Project Organization Chart and Contact Detail
Annex C	Location of NO ₂ Quality Monitoring Station
Annex D	Monitoring Schedule for the Reporting Period and the Following Month
Annex E	Calibration Certificates for NO ₂ Analyzer, Flow Meter and Certificates for Calibration Gas
Annex F	Event / Action Plans for Air Quality Monitoring
Annex G	NO ₂ Monitoring Results

EXECUTIVE SUMMARY

The operational phase air quality monitoring for Hong Kong Convention and Exhibition Centre Expansion Project (EIAO Register No: AEIAR-100/2006) commenced on 6 July 2010. This is the third Environmental Monitoring and Audit (EM&A) report presenting the EM&A work carried out during the period from 1 to 30 September 2010 in accordance with the EM&A Manual.

Environmental Monitoring and Audit Progress

Air Quality Monitoring

One-hour NO₂ monitoring was carried out continuously at the designated monitoring station (AM3) under the Atrium Link Extension during this reporting period.

Environmental Non-conformance

No environmental exceedance was recorded during this reporting period.

Future Key Issues

Emissions from vehicular exhaust on Convention Avenue, Expo Drive Central and Expo Drive East are expected to continue to influence the air quality under the ALE. NO₂ monitoring will be continued in October 2010.

1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) was appointed by Hip Hing Joint Venture as the Environmental Team (ET) for the operational phase Environmental Monitoring and Audit (EM&A) programme for Hong Kong Convention and Exhibition Centre Expansion Project (the Project).

1.1 PURPOSE OF THE REPORT

This is the third EM&A report for the operational phase. It summarises the results for air quality monitoring conducted under the Atrium Link Extension (ALE) of the Hong Kong Convention and Exhibition Centre (HKCEC) for the period of 1 to 30 September 2010.

1.2 STRUCTURE OF THE REPORT

The structure of the report is as follows:

Section 1 : **Introduction**

details the scope and structure of the report;

Section 2 : **Project Information**

summarises background and scope of the Project, project organisation and contact details during the reporting period;

Section 3 : **Environmental Monitoring Requirement**

summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels and Event / Action Plans;

Section 4 : **Implementation Status on Environmental Mitigation Measures**

summarises the implementation of environmental protection measures during the reporting period;

Section 5 : **Monitoring Results**

summarises the monitoring results obtained in the reporting period;

Section 6 : **Environmental Non-conformance**

summarises any environmental exceedance, environmental complaints and environmental summons received within the reporting period;

Section 7 : **Future Key Issues**

summarises the impact forecast and monitoring schedule for the next month;

Section 8 : **Review of EM&A Data and EIA Predictions**

compares and contrasts the EM&A data in the month with the EIA predictions and annotates with explanation for any discrepancies;
and

Section 9 : **Conclusion**

2.1

BACKGROUND

The Hong Kong Trade Development Council (HKTDC) expanded its existing facilities to provide additional space for Hong Kong's leading trade fairs to be held at the HKCEC. The Project is located in North Wan Chai and occupies the aerial space between Phase I and Phase II of the HKCEC. The new ALE spans across the water channel between Phase I and Phase II of the HKCEC to accommodate three main levels of Exhibition Hall Extensions. The level of the main roof of the Extension is similar in height to the podium roof of the Phase I building. A northern row of permanent supporting columns are located on land close to Expo Drive Central and similarly a southern row of columns land near to Convention Avenue. There are no permanent intermediate columns in the waterway.

The potential environmental impacts of the Project have been studied in the "Hong Kong Convention and Exhibition Centre, Atrium Link Extension – Environmental Impact Assessment Report" (EIAO Register No: AEIAR-100/2006)(the EIA Report). The EIA Report was approved on 21 April 2006 under the *Environmental Impact Assessment Ordinance* (EIAO). An Environmental Permit (EP-239/2006) for the works was granted on 12 May 2006. An application for variation of the Environmental Permit was made on 25 January 2007, an amended Environmental Permit (EP-239/2006/A) was granted on 12 February 2007. An application for further variation of the Environmental Permit was made on 18 April 2008, and an amended Environmental Permit (EP-239/2006/B) was granted on 12 May 2008. Under the requirements of Condition 3.1 of Environmental Permit EP-239/2006/B, an EM&A programme as set out in the EM&A Manual and its supplement is required to be implemented.

The EIA Study for the Project considered that vehicular exhaust emissions from the road traffic under the ALE may pose an air quality concern with the more confined conditions created by the ALE. Post-construction/operational phase monitoring of nitrogen dioxide (NO₂) under the ALE for six months was recommended.

All construction works at the ALE were completed in October 2009. A proposal for the NO₂ monitoring location (the Proposal) was submitted to Environmental Protection Department (EPD) on 18 November 2009 (HHJV Letter Ref No. AKWL:VCML:nlwy: 98705/EN100-797), which was approved via EPD's Letter Ref No. (3) in EP2/H5/A/14/Pt.11 on 11 December 2009. Owing to various technical issues encountered during the testing and commissioning of monitoring equipment, the NO₂ monitoring programme was only formally started on 6 July 2010.

A proposal for change of ET leader was submitted on 21 September 2010 to EPD (Ref No. 0050690_let_ETL_C_20100920.doc) and was verbally approved on 18 October 2010 without comments.

2.2 LOCATION OF PROJECT

The location of the Project is shown in *Annex A*.

2.3 PROJECT ORGANISATION

The Project organization chart and contact details are shown in *Annex B*.

2.4 STATUS OF ENVIRONMENTAL APPROVAL DOCUMENTS

A summary of the relevant permits, licences, and/or notifications on environmental protection for this Project since August 2006 is presented in *Table 2.1*.

Table 2.1 *Summary of Environmental Licensing, Notification and Permit Status*

Permit/ Licenses/ Notification	Reference	Validity Period	Remarks
Environmental Permit	EP-239/2006/B	Throughout the Contract	Environmental Permit (EP) EP-239/2006 granted originally on 12 May 2006. Since then the EP have been varied twice. The latest revised EP was issued on 12 May 2008
Proposal for Termination of Construction Phase EM&A Programme	-	-	Approved on 4 November 2009 by EPD.
Proposal for NO ₂ Monitoring Location during Initial Operational Phase	-	-	Approved on 11 December 2009 by EPD.

3.1 AIR QUALITY MONITORING

3.1.1 Monitoring Location

In accordance with the EM&A Manual, monitoring of NO₂ levels was conducted at the monitoring station described in *Table 3.1*. A map and a photograph showing the monitoring station are presented in *Annex C*. *Figure C1* in *Annex C* has been updated from the version provided in the Proposal as the revised figure indicates the correct proposed location for the NO₂ monitoring equipment setup.

Table 3.1 *Air Monitoring Stations*

Monitoring Station	Description
AM3	A location immediately north of Convention Avenue under the Atrium Link Extension

3.1.2 Monitoring Parameters, Frequency and Programme

Air quality monitoring was conducted in accordance with the requirements stipulated in the EM&A Manual (*Table 3.2*). The monitoring and equipment checking schedules for the reporting month and the upcoming month are shown in *Annex D*.

Table 3.2 *TSP Monitoring Parameter and Frequency*

Parameter	Frequency
1-hour NO ₂ monitoring	Continuous

3.1.3 Action and Limit Levels

The Action and Limit levels in the EM&A Manual were adopted and these are presented in *Table 3.3*.

Table 3.3 *Action and Limit Levels for NO₂*

Parameter	Air Monitoring Station	Action Level, µgm ⁻³	Limit Level, µgm ⁻³
1-hour NO ₂ monitoring	AM3	300	300

3.1.4 Monitoring Equipment

Continuous monitoring of 1-hour NO₂ levels was performed at the designated monitoring station using an automatic chemiluminescence NO/NO₂/NO_x analyzer with appropriate sampling inlets installed. The performance specification of the analyzer complies with the USEPA reference method in *US EPA Standard Title 40, Code of Federation Regulations Part 53 (USEPA ST 40 CFR 53)*. The sampling flow rate of the analyzer was checked with a portable flow

meter weekly. *Table 3.4* summarises the details of the equipment used for the monitoring.

Table 3.4 *NO₂ Monitoring Equipment*

Monitoring Station	Equipment	Model No.
AM3 (continuous 1-hr NO ₂)	Chemiluminescence NO/NO ₂ /NO _x Analyzer	Teledyne Instruments Model 200E
	DryCal Flow Meter	BIOS International DCL-M

3.1.5 *Monitoring Methodology*

Installation

The monitoring equipment was placed at a location underneath the ALE as presented in *Annex C*. The monitoring location was chosen so that:

- the monitoring equipment was clear from access to pump rooms, thereby minimizing obstruction to pump room maintenance operations; and
- the selected location was sufficiently close to the key source of emissions (NO₂ emission from road traffic) for obtaining representative monitoring data.

The overall setup of the monitoring station is as follows:

- The analyzer was placed in a lockable wooden enclosure to prevent tampering of the monitoring equipment;
- The air sampling inlet was mounted at a height of 2m above ground with a 1m minimum separation between the tip of the inlet and the side wall so that the air flow is free from physical obstruction;
- The air inlet was connected to the analyzer through a 1/4" teflon tubing with 47mm in-line particulate filter;
- An in-series external pump was provided for drawing in air; and,
- An air-conditioner is installed for the wooden enclosure to maintain the optimal temperature (<32°C) for the operation of the analyzer.

Field Monitoring

- NO, NO_x and NO₂ concentrations (5-min average concentrations) were calculated and logged automatically at 5-minute intervals on a continuous basis;
- The logged data were downloaded on a weekly basis for further analyses; and
- In the event of a zero drift beyond ±15 ppb and/or a span drift beyond ±15%, the data obtained before and after the particular zero/span check

would be flagged and excluded from the calculation of the reported 1-hour NO₂ averages. The analyzer will subsequently be re-calibrated as soon as the extraordinary data drift is identified.

3.1.6 *Maintenance and Calibration*

The analyzer and its associated accessories were maintained in good working condition. The operating temperature of the equipment set was maintained below 32°C with an exhaust fan and an air-conditioner. The in-line particulate filter was also replaced bi-weekly to avoid blockage of the air inlet.

The flow rate of the analyzer was verified on a weekly basis by a portable flow meter. Zero check was performed automatically by the analyzer at 00:00 hours each day for 15 to 20 minutes, and three 5-minute average “zero” readings will be measured to validate the “zero” reading recorded by the analyzer. Span check for NO₂ was also conducted immediately following the zero check with the built-in permeation tube of the analyzer for 15 to 20 minutes, and three 5-minute average “span” readings will also be measured for checking against the drift limits.

As indicated above, the air flow rate of the analyzer was checked on a weekly basis and maintained at 500±50 cm³/s as per specification in the equipment operation manual by the portable flow meter. Standard nitrogen oxide gases with concentrations of 0 ppb and 400 ppb were used for calibrating the analyzer on 3 September 2010. The analyzer calibration records, the certificates for calibration gas and the calibration certificate for the portable flow meter are provided in *Annex E*. The next equipment calibration is scheduled on 15 October 2010.

Shipment of the mass-flow controllers for multi-point check of analyzer is still pending at the time this report is prepared. Multi-point check of analyzer is currently scheduled to be implemented in mid-October to ensure compliance with calibration requirements in USEPA ST 40 CFR 53. Monitoring data acquired in this reporting month will also be reviewed against the multi-point calibration check results and adjusted if proved to be necessary in the future. The values will also be checked against the limit level for NO₂ for any exceedances occurred, especially for high NO₂ readings recorded in September 2010.

3.1.7 *Event Action Plan*

The Event / Action Plan (EAP) for operational phase air quality monitoring is presented in *Annex F*.

IMPLEMENTATION STATUS ON ENVIRONMENTAL PROTECTION REQUIREMENTS

The environmental concern that led to the requirement for the operational phase EM&A programme is only related to the potential air quality impacts from vehicular exhaust emissions under the ALE. In this regard, the Contractor has relocated the fresh air intakes as per the recommendations of the EIA Report and the relevant EP condition. The other requirement that is relevant in this respect is the six-month NO₂ monitoring under the ALE, which has commenced since 6 July 2010 and is the subject of this report.

Continuous NO₂ monitoring was carried out at the designated monitoring station during the reporting period. The monitoring results for 1-hour NO₂ monitoring were below both the Action and Limit Levels. All monitoring data acquired by the analyzer were considered valid as zero/span drift was within the acceptable bounds presented in *Section 3.1.5*. The weekly flow checks confirmed that the sampling flow rate was generally maintained within the acceptable range. The NO₂ monitoring results and a summary of the zero-span check and sampling flow check are provided in *Annex G*. In addition, the monitoring results can also be found at the web-site (<http://www.hkcecema.com/index.html>). The local NO₂ levels near the monitoring station are mainly influenced by vehicular exhaust emissions along Convention Avenue, Expo Drive East and Expo Drive Central.

A downward drift in span check reading was observed starting from early August 2010. The same downward drift was not observed for zero check, suggesting that the downward drift was caused by the span source. A manual span check with the standard 400ppb gas was subsequently implemented on 27 August 2010. The resulting span reading demonstrated that the negative drift was less than 5% from the standard concentration (400ppb NO) set during calibration. Inspections of the analyzer were conducted and no apparent faulty component could be identified. Based on the above, it was concluded that the anomaly would most likely be related to faults in the permeation tube used for generating automatic span gas and replacement of the permeation tube would be a reasonable remedial action ⁽¹⁾. With reference to the QA Handbook ⁽²⁾, zero/span check should at least be implemented on a bi-weekly basis. As an interim practice, the automatic zero check and span check with permeation tube will continue to be implemented on a daily basis. In addition, a manual span check with standard 400ppb NO gas will be conducted weekly to ensure span drift is within the acceptable limits stated in the QA Handbook. The manual span check was conducted on 3, 10, 17, 24 and 30 September 2010 and the span gas readings were 371, 391, 381, 361 and 374 ppb NO, which falls within the acceptable range of $\pm 15\%$ from 400ppb NO and suggested the monitoring data was valid. As such, no re-calibration was immediately necessary and the next analyzer calibration will be conducted as previously scheduled on 15 October 2010.

Negative readings were recorded on 20 September 2010 at multiple periods in between 0200 hours and 1500 hours. These readings were flagged and omitted from calculation of hourly NO₂ averages. On-site inspection of analyzer on 24 September 2010 did not reveal the cause of this observation.

(1) It has been confirmed with the supplier that no stock is available for permeation tube, and the order for a new permeation tube regularly requires a 9 to 11 weeks turnover period. Replacement of permeation tube will be conducted by ET as soon as practicable.

(2) Quality Assurance Handbook for Air Pollution Measurement Systems Volume II – Ambient Air Quality Monitoring Program, United States Environmental Protection Agency

While the supplier suggests such observation could be caused by sudden fluctuation of voltage input for the analyzer, no similar observations were made in the remaining monitoring period. This might suggest the incident is an isolated event. A more detailed maintenance of equipment will be arranged in the future should similar incidents continue to arise in the remaining monitoring period.

The ET will continue to monitor the trend of zero/span check and sampling flow rate closely to ensure valid data are collected and presented over the monitoring period.

No exceedance of the Action and Limit Levels of 1-hour NO₂ was recorded at the designated monitoring station under the ALE during this reporting period.

7 *FUTURE KEY ISSUES*

7.1 *KEY ISSUES FOR THE COMING MONTH*

Emissions from vehicular exhaust on Convention Avenue, Expo Drive Central and Expo Drive East are expected to continue to influence the air quality under the ALE. NO₂ monitoring will be continued in the coming month.

7.2 *MONITORING SCHEDULE FOR THE COMING MONTHS*

NO₂ monitoring will be conducted continuously in October 2010. The air flow rate of the analyzer will also be checked on a weekly basis. The schedules for NO₂ monitoring schedule and sampler air flow rate check are presented in *Annex D*.

8.1 AIR QUALITY

During the initial operational phase of the Project, the environmental setting is expected to be similar to those stated in the interim scenario (without WDII and CWB Projects) for quantitative assessment of NO₂ concentration of the approved EIA Report. The monitoring results in the reporting month were compared against the interim NO₂ concentrations predicted in the approved EIA and the criteria for NO₂ concentration in the Air Quality Objective and the Tunnel Air Quality Guidelines. (Table 8.1).

Table 8.1 Comparison of NO₂ Concentration predicted in the EIA, Tunnel Air Quality Guidelines and the Air Quality Monitoring Results

Monitoring Station	Corresponding Location in EIA	NO ₂ concentration in EIA, µgm ⁻³		Air Quality Objective and Tunnel Air Quality Guidelines, µgm ⁻³	Average 1-hour NO ₂ measured, µgm ⁻³	
		Normal Hours	Peak Hours		Standard	Average
AM3	Convention Avenue	146	183	300 (a) / 1,800 (b)	75.9	11.9 – 295.1

Notes:

- (a) 1-hour Air Quality Objective for NO₂
- (b) 5-minutes Tunnel Air Quality Criteria in for NO₂.

The monitoring results show that the average NO₂ levels recorded are below those predicted in the approved EIA Report, the criterion in the AQO and the criterion in the Tunnel Air Quality guidelines. In addition, the fresh air intakes under the ALE have been relocated to the rooftop during the construction phase of the Project as per the requirements in Section 3.61 of the approved EIA Report and Condition 2.9 of EP-239/2006/B. Based on the above, no adverse air quality impacts are expected on occupants of Hong Kong Convention and Exhibition Centre Phase I, Renaissance Harbour View Hotel and Grand Hyatt Hotel.

8.2 CONCLUSION OF REVIEW

The EIA predictions and the monitoring results since the commencement of operational monitoring programme have been reviewed. The EIA concluded that the Project would not cause adverse impacts to the environment, and the monitoring results also indicated that the operation of the Project has not caused adverse impacts to the environment. Recommendations given in the EIA are also considered to be adequate and effective for minimising the environmental impacts.

CONCLUSIONS

The Environmental Monitoring and Audit (EM&A) Report presents the operational phase air quality monitoring conducted during the period from 1 to 30 September 2010 in accordance with the EM&A Manual and the requirements under EP-239/2006/B.

No exceedance of the Action and Limit Levels of 1-hour NO₂ was recorded at the designated monitoring station during this reporting period.

Annex A

Location of Project

Key

 Atrium Link Extension

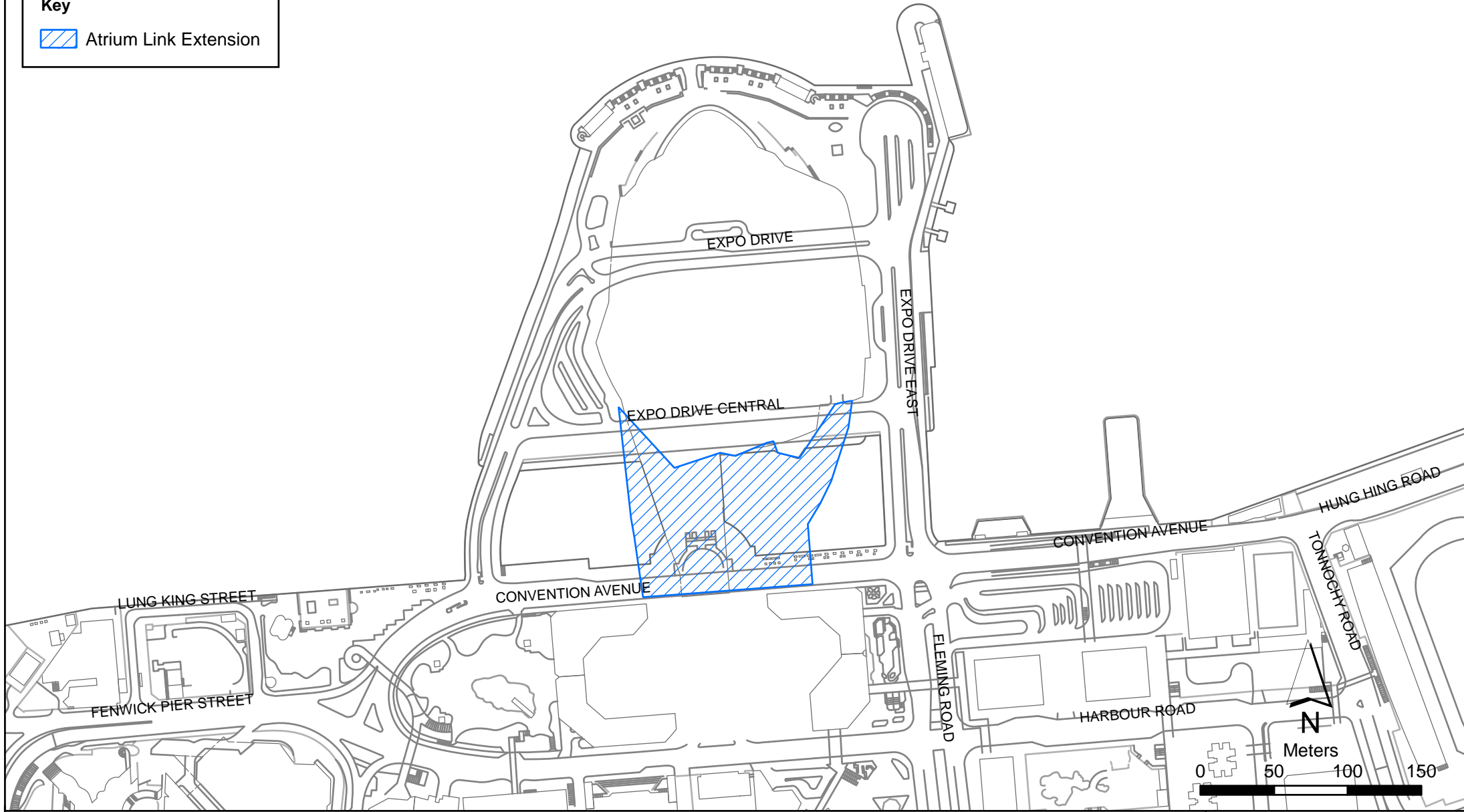


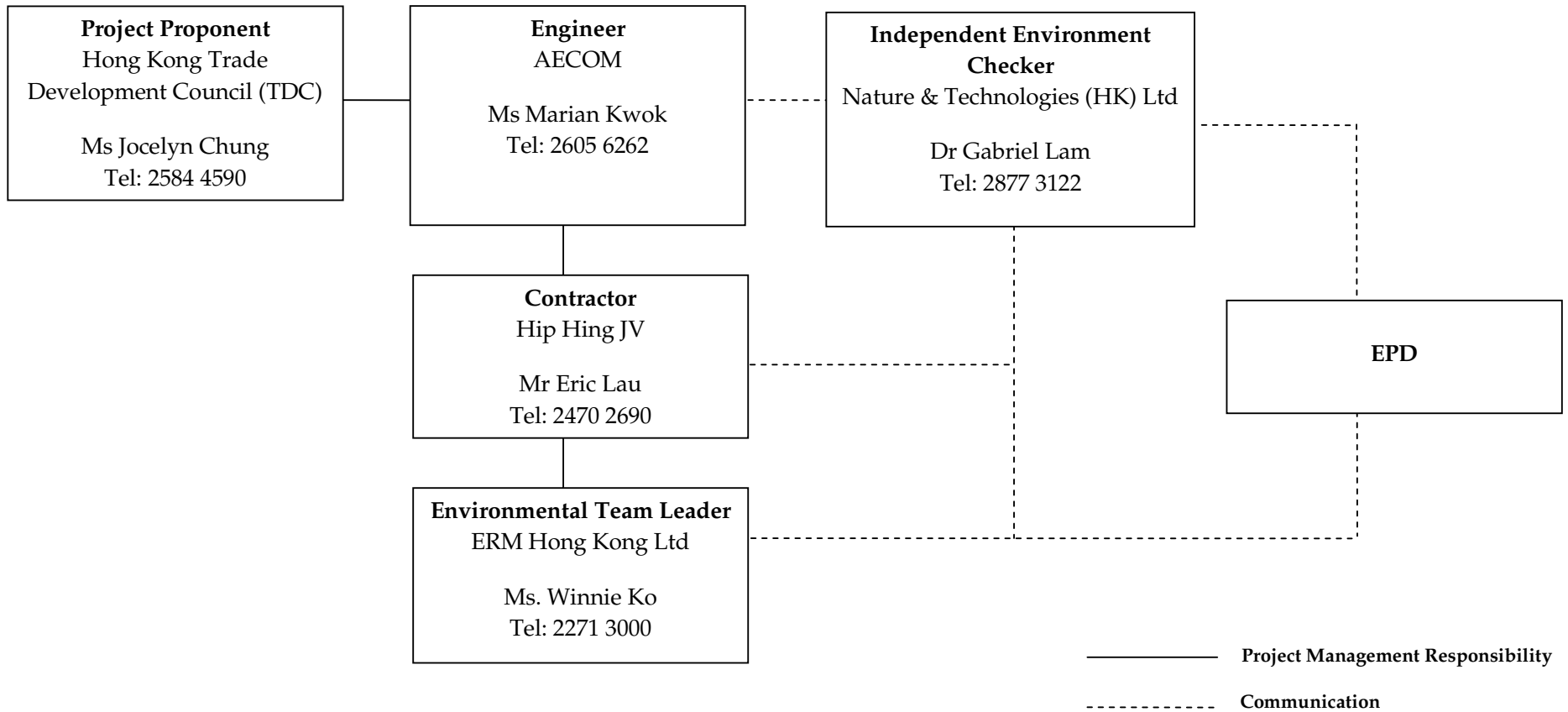
Figure A1

Location of Atrium Link Extension

Annex B

Project Organization Chart and Contact Detail

Project Organization (with contact details)



Annex C

Location of NO₂ Monitoring Station

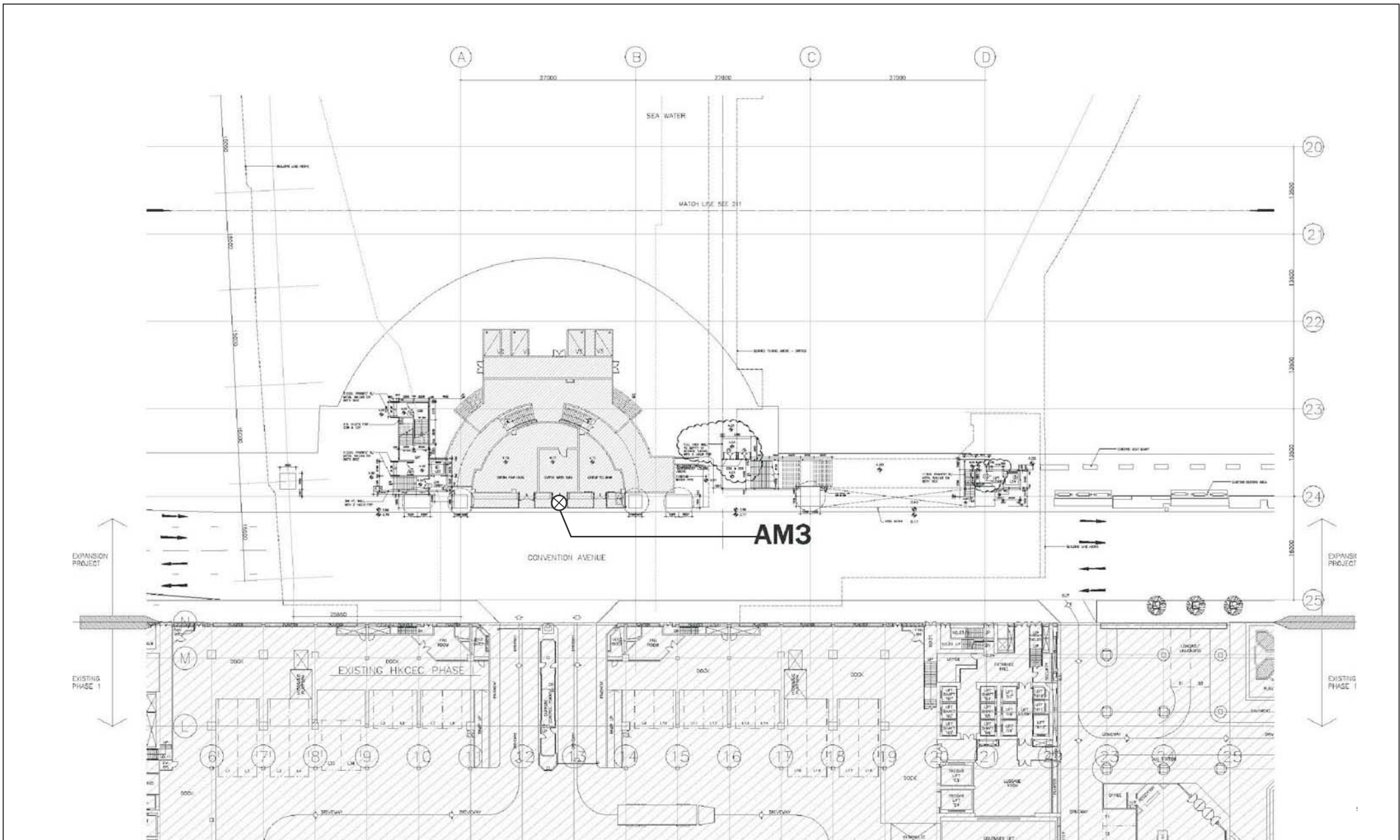


Figure C1

Location of NO₂ Monitoring Station

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DATE: 06/08/2010

Environmental
Resources
Management



APPEARANCE OF NO₂ MONITORING STATION



NO₂ Monitoring Station (AM3)

Annex D

Monitoring Schedule for the Reporting Period and Next Month

**Hong Kong Convention and Exhibition Centre, Atrium Link Extension
Operational Phase Air Quality Monitoring Schedule - September 2010**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1-Sep	2-Sep	3-Sep	4-Sep
			24-hour monitoring	24-hour monitoring	2-point calibration Manual span check 24-hour monitoring Flow check	24-hour monitoring
5-Sep	6-Sep	7-Sep	8-Sep	9-Sep	10-Sep	11-Sep
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	Manual Span Check 24-hour monitoring Replace filter Flow check	24-hour monitoring
12-Sep	13-Sep	14-Sep	15-Sep	16-Sep	17-Sep	18-Sep
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring Flow check Manual Span Check	24-hour monitoring
19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	Manual Span Check 24-hour monitoring replace filter Flow check	24-hour monitoring
26-Sep	27-Sep	28-Sep	29-Sep	30-Sep		
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	Manual Span Check 24-hour monitoring flow check		

**Hong Kong Convention and Exhibition Centre, Atrium Link Extension
Operational Phase Air Quality Monitoring Schedule - October 2010**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Oct	2-Oct
					24-hour monitoring	24-hour monitoring
3-Oct	4-Oct	5-Oct	6-Oct	7-Oct	8-Oct	9-Oct
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	Manual span check 24-hour monitoring Flow check Replace filter	24-hour monitoring
10-Oct	11-Oct	12-Oct	13-Oct	14-Oct	15-Oct	16-Oct
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	2-point calibration 24-hour monitoring Flow check Manual span check	24-hour monitoring
17-Oct	18-Oct	19-Oct	20-Oct	21-Oct	22-Oct	23-Oct
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring Multi-point calibration check (tentative)	Manual Span Check 24-hour monitoring Replace filter Flow check	24-hour monitoring
24-Oct	25-Oct	26-Oct	27-Oct	28-Oct	29-Oct	30-Oct
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring Flow check Manual span check	24-hour monitoring
31-Oct						
24-hour monitoring						

Annex E

Calibration Certificates for
NO₂ Analyzer, Flow Meter
and Certificates for
Calibration Gas

Calibration Certificate

General

Location:	Atrium Link
Calibration Date:	3rd September 2010
*Calibration Period:	17:00 - 17:45
Conducted by:	William Lai

* Including administration time

Equipment

Testing gas used:	Nitrogen Oxide, NO
Temperature:	26.7 (°C)

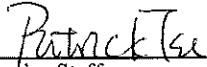
Calibration Result

No.	Time Stamp	Type & Standard	Quantity (ppb)	Stability (ppm)	Result
1	3 Sept 2010 17:24	Pure (0 ppb) ± 15 ppb[1] =	0.0214	0.1436	(PASS)
2	3 Sept 2010 17:35	NO (400 ppb) ± 15 % [1] =	373.9056	0.7236	(PASS)

*NO Slope [2]: 1.1823

* The NO Slope acceptable limit should be within 1.000 ± 0.300 .

Coordinated By:


Senior Staff

Coordinated and Conducted By:


Staff in charge



Reference:

[1] Page2, 2.3.5, 2.3 QA & QC Procedure, Method Statement Report - NO2 Monitoring underneath Atrium Link Extension

[2] "NO SLOPE" Function, Table 10-6: Calibration Data Quality Evaluation, P.197, 10.6 Calibration Quality Analysis, M200E Nox Analyzer Technical Manual

TEST REPORT

APPLICANT: Cinotech Solution Limited
1710, Technology Park,
18 On Lai Street,
Shatin, N.T.
Cinotech Solution Limited

Test Report No.:	11603
Date of Issue:	2010-07-09
Date Received:	2010-07-06
Date Tested:	2010-07-08
Date Completed:	2010-07-08
Next Due Date:	2011-07-08

ATTN: Mr. William Lai

Page: 1 of 1

Certificate of Calibration

Item for calibration:

Description	: Flow meter
Manufacturer	: Bios International
Model No.	: DCL-M
Serial No.	: 109999

Test conditions:

Room Temperatre	: 23 degree Celsius
Relative Humidity	: 56%

Test Specifications:

Performance checking of the flowrate around 100mL/min, 500mL/min and 800mL/min.

Methodology:

The flow meter is tested by comparing it to calibrated flowmeter (E348). High-purity nitrogen gas and flowcontroller are used as source of the gas flow. Records of the testing flowmeter and calibrated flowmeter are as following table.

Results:

E348	DCL-M	% Diff	Acceptable Criteria	Result
Instrument reading (mL/min)	Instrument reading (mL/min)			
114.5	114.7	0.17	+ 3%	Pass
521.3	519.4	-0.36	+ 3%	Pass
780.6	773.1	-0.96	+ 3%	Pass

PREPARED AND CHECKED BY:

For and On Behalf of **WELLAB Ltd.**


PATRICK TSE
Laboratory Manager

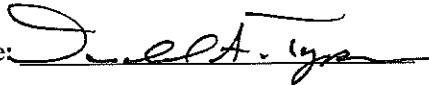


CERTIFICATE OF ANALYSIS

Customer Name:	Cinotech Consultants Ltd	Cylinder Number:	CC87834
Stock or Analyzer Tag Number:	N/A	Product Class:	Primary NIST Standard
Customer Reference:	PO-10008	Cylinder - Contents ¹ :	140 CF @ 2000 PSI
MESA Reference:	107693	Cylinder-CGA:	A030-HP-SS/660
Date of Certification:	6/22/2010	Analysis Method:	Process Analyzers
Recommended Shelf Life:	1 Year	Preparation Method:	Gravimetric

Component*	Requested Concentration ²	Reported Concentration ^{2,3}
Nitric Oxide	400ppb	400±20ppb
Nitrogen Dioxide		<2ppb
Nitrogen	Balance	Balance

*Ref to SRM 2627a

Authorized Signature: 

1. The fill pressure shown on the COA is as originally quoted. The fill pressure measured by the customer may differ from the fill pressure originally quoted due to temperature effects, compressibility of the individual components when blended together in the cylinder, gauge accuracy or reduction in content volume before shipping as a result of samples withdrawn for laboratory QC necessary to ensure product quality.
2. Unless otherwise stated, concentrations are given in molar units.
3. Vapor pressure mixes are blended at a sufficiently low pressure so as to eliminate phase separation under most low temperature conditions encountered during transport or storage. However, it is generally recommended that cylinders containing vapor pressure restricted mixes be placed on the floor in a horizontal position and rolled back and forth to improve homogeneity of the gas phase mixture before being put into service.

Analytical Gas Standards are prepared and analyzed using combinations of NIST traceable weights, SRM's provided by NIST, or internal gas standards that have been verified for accuracy using procedures published by the US-EPA. Pure gases are analyzed and certified for purity using minor component Analytical Gas Standards prepared according to the methods specified above. Balances are calibrated to NIST test weights covered by NIST test number 822/256175/96. Reference Certification #'s: 163/W, 830/N and 3280. Calibration methods are in conformance with MIL-STD 45662A.

MESA Specialty Gases & Equipment

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CERTIFICATE OF ANALYSIS

<u>PRODUCT</u>	<u>CONCENTRATION</u>
HP Grade NITROGEN	99.995%
O ₂	< 10 ppm
H ₂ O	< 10 ppm

Authorized Signature



Annex F

Event Action Plans for Air Quality Monitoring

Table F1 Event Action Plans for Air Quality

Event	Action	
Action Level being exceeded in the monitoring station	ET	TDC
	<ul style="list-style-type: none"> • Notify TDC; • Provide details of AQO exceedance and monitoring condition to EPD; 	<ul style="list-style-type: none"> • Liaise with EPD to investigate mitigation proposals; • Implement mitigation proposals, if required.

Annex G

NO₂ Monitoring Results

Annex G - Summary of Hourly Average of NO₂ at AM3

Hourly Average NO ₂ (µg/m ³) in Reporting Month															
Time / Date	1-Sep-10	2-Sep-10	3-Sep-10	4-Sep-10	5-Sep-10	6-Sep-10	7-Sep-10	8-Sep-10	9-Sep-10	10-Sep-10	11-Sep-10	12-Sep-10	13-Sep-10	14-Sep-10	15-Sep-10
0:00	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s
1:00	83.8	56.9	60.4	46.9	34.9	56.8	20.6	24.3	65.1	60.0	92.9	40.4	37.4	21.6	38.8
2:00	67.4	66.1	40.8	34.4	30.7	36.8	13.5	36.9	61.8	42.8	78.3	30.0	40.0	23.2	31.8
3:00	61.5	36.6	37.2	33.6	22.3	38.7	14.5	41.3	38.4	31.6	78.6	59.4	32.2	19.4	24.8
4:00	61.4	59.8	55.2	30.1	15.3	47.8	13.9	41.4	46.6	47.8	66.0	60.6	28.8	16.5	25.5
5:00	60.2	52.3	74.8	38.4	22.9	51.5	21.8	41.5	75.8	58.5	66.2	57.1	24.7	18.0	22.6
6:00	66.4	32.9	77.3	45.9	29.0	54.6	31.4	40.7	82.7	66.7	72.1	52.4	26.7	29.1	35.5
7:00	84.0	66.1	97.4	61.6	53.0	83.9	44.0	47.0	90.6	84.6	74.2	62.2	36.0	42.7	47.3
8:00	140.0	122.4	142.6	79.7	73.6	97.1	64.9	75.8	103.0	117.4	109.8	54.2	55.5	66.9	66.4
9:00	163.7	159.6	134.8	113.0	64.7	102.8	115.5	80.1	128.3	122.2	111.1	64.7	47.9	80.5	80.0
10:00	131.0	114.3	150.3	106.4	78.8	111.4	73.8	88.6	114.0	96.7	106.8	45.7	67.4	81.2	75.7
11:00	136.1	92.7	119.5	107.3	67.6	109.9	65.4	98.4	118.9	104.8	75.5	66.3	63.5	63.0	63.4
12:00	116.5	80.6	87.4	126.9	66.5	96.1	60.8	120.8	138.6	109.0	82.5	73.5	66.1	53.2	66.3
13:00	115.9	106.7	107.4	88.0	64.0	89.0	54.5	185.5	144.6	120.6	87.6	56.2	58.6	54.3	71.0
14:00	108.7	144.8	89.1	103.1	74.1	101.3	70.7	203.0	128.0	180.8	100.3	76.8	53.0	80.7	52.5
15:00	96.3	164.2	124.1	101.0	55.1	130.4	71.9	258.1	160.4	216.1	108.7	70.0	58.2	68.1	66.4
16:00	123.3	154.9	154.2	72.5	50.8	116.2	88.6	278.6	209.5	229.3	144.1	65.8	63.4	61.9	73.5
17:00	148.8	142.8	-	75.7	65.3	86.4	78.1	256.2	156.4	242.2	134.9	86.1	67.4	81.3	78.5
18:00	209.4	157.3	122.6	59.6	61.6	120.3	80.4	222.7	184.1	186.9	96.2	67.8	55.9	96.3	121.8
19:00	251.5	184.7	148.2	52.9	68.5	139.0	112.6	295.1	215.5	163.2	80.9	63.8	66.6	71.5	86.0
20:00	186.6	98.1	104.6	46.7	72.5	58.2	59.6	92.4	185.5	118.1	61.9	50.5	54.1	76.4	85.8
21:00	108.7	74.1	89.2	42.7	63.2	47.7	51.7	76.6	149.5	76.8	66.1	54.3	38.8	59.1	41.1
22:00	57.7	64.4	88.6	39.9	54.0	35.6	47.6	58.5	128.8	91.4	55.0	48.3	42.3	63.5	50.3
23:00	80.0	60.0	66.7	44.6	51.8	32.2	41.8	96.3	116.1	85.0	50.2	51.4	37.9	64.1	44.9

Remarks

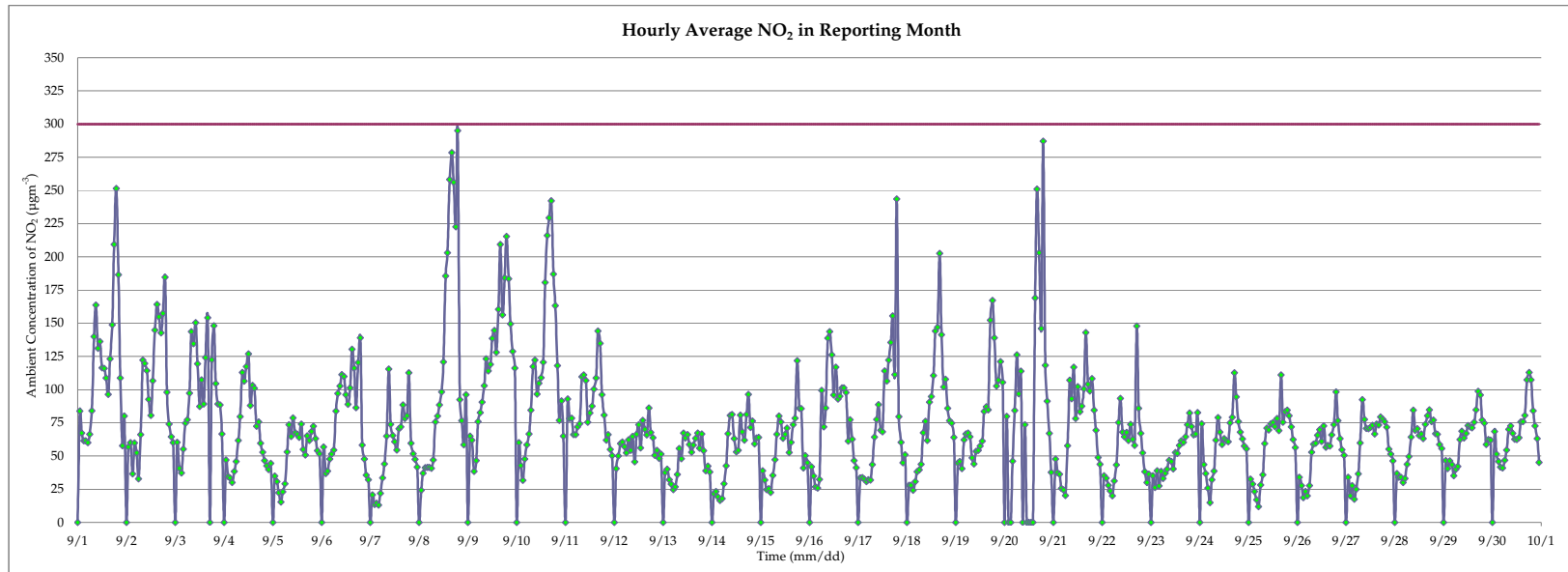
- Analyzer Calibration in Progress
- z/s Zero-span check in progress. Less than 40 minutes of data is collected in the reporting period and is therefore not presented.
- * Less than 40 minutes of valid data is collected in the period and is therefore flagged and not presented

Hourly Average NO ₂ (µg/m ³) in Reporting Month															
Time / Date	16-Sep-10	17-Sep-10	18-Sep-10	19-Sep-10	20-Sep-10	21-Sep-10	22-Sep-10	23-Sep-10	24-Sep-10	25-Sep-10	26-Sep-10	27-Sep-10	28-Sep-10	29-Sep-10	30-Sep-10
0:00	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s
1:00	42.0	33.6	27.8	44.7	79.8	47.8	35.3	35.1	74.4	32.6	34.0	34.0	36.9	46.5	68.5
2:00	34.9	33.8	28.0	46.0	*	37.4	33.3	26.4	43.4	28.8	27.7	20.1	34.1	40.6	51.5
3:00	26.7	32.7	24.3	40.5	*	36.4	27.9	38.9	36.7	23.3	18.6	27.7	34.0	46.3	45.8
4:00	25.7	30.9	36.7	62.1	46.2	25.7	23.8	27.4	25.9	17.1	23.4	17.6	30.1	43.7	41.6
5:00	32.4	32.0	38.2	66.5	84.4	24.3	20.0	38.5	14.8	11.9	19.9	24.9	33.1	35.1	40.9
6:00	99.4	31.8	39.6	67.3	126.3	20.4	31.3	33.0	32.0	28.2	27.7	36.5	43.8	40.1	46.7
7:00	72.0	43.4	43.8	64.5	96.8	57.7	43.4	37.1	38.8	35.9	52.8	59.9	49.6	42.2	54.6
8:00	86.2	64.2	67.4	48.7	113.8	107.0	75.3	40.1	62.0	59.3	58.8	92.4	64.3	62.5	70.0
9:00	138.8	77.5	76.2	44.1	*	93.1	93.3	46.8	78.9	71.1	59.5	77.6	84.5	68.7	72.7
10:00	143.7	88.8	61.7	53.5	73.6	116.8	67.9	45.8	68.1	69.6	65.7	70.9	69.4	63.6	62.1
11:00	126.3	69.3	90.5	54.2	*	78.2	64.5	40.2	58.7	74.4	69.8	70.6	70.5	67.1	62.7
12:00	95.8	68.3	94.7	57.5	*	102.3	67.7	52.7	63.1	75.3	61.1	71.4	65.5	73.0	62.3
13:00	117.0	114.0	110.7	61.2	*	83.3	61.7	51.8	61.7	72.1	72.8	73.2	66.7	72.0	63.8
14:00	93.0	106.5	144.2	83.6	*	87.6	73.8	58.0	60.8	78.2	56.5	66.7	63.0	71.1	75.8
15:00	95.0	122.3	147.0	87.0	169.1	100.6	62.6	61.6	75.1	69.2	58.1	74.1	73.7	75.5	75.8
16:00	101.4	135.4	202.5	84.7	251.1	143.0	57.9	60.4	79.2	111.0	57.6	73.4	80.3	84.8	80.5
17:00	101.4	155.6	141.4	152.3	203.1	104.1	148.0	64.5	112.7	75.4	65.8	79.4	84.8	98.8	107.2
18:00	97.9	111.2	102.0	167.1	145.9	99.0	86.0	73.5	94.4	83.5	73.6	77.8	75.9	96.0	112.8
19:00	61.1	243.6	107.9	139.1	287.2	108.2	67.1	82.5	75.8	84.5	98.3	76.0	77.1	77.2	107.4
20:00	77.2	79.7	85.8	102.6	118.2	84.6	52.4	72.2	68.1	80.4	76.7	71.8	66.8	74.7	84.1
21:00	62.6	60.3	76.7	107.2	91.3	69.4	38.1	66.0	62.9	72.0	63.2	55.3	66.3	58.8	72.7
22:00	46.5	45.0	74.7	121.1	67.1	48.8	30.1	66.5	57.4	62.4	54.8	51.4	58.8	62.4	63.2
23:00	41.2	50.9	64.0	105.4	37.6	43.7	36.3	82.8	55.3	56.2	50.6	46.4	55.7	62.0	45.2

Remarks

- Analyzer Calibration in Progress
- z/s Zero-span check in progress. Less than 40 minutes of data is collected in the reporting period and is therefore not presented.
- * Less than 40 minutes of valid data is collected in the period and is therefore flagged and not presented

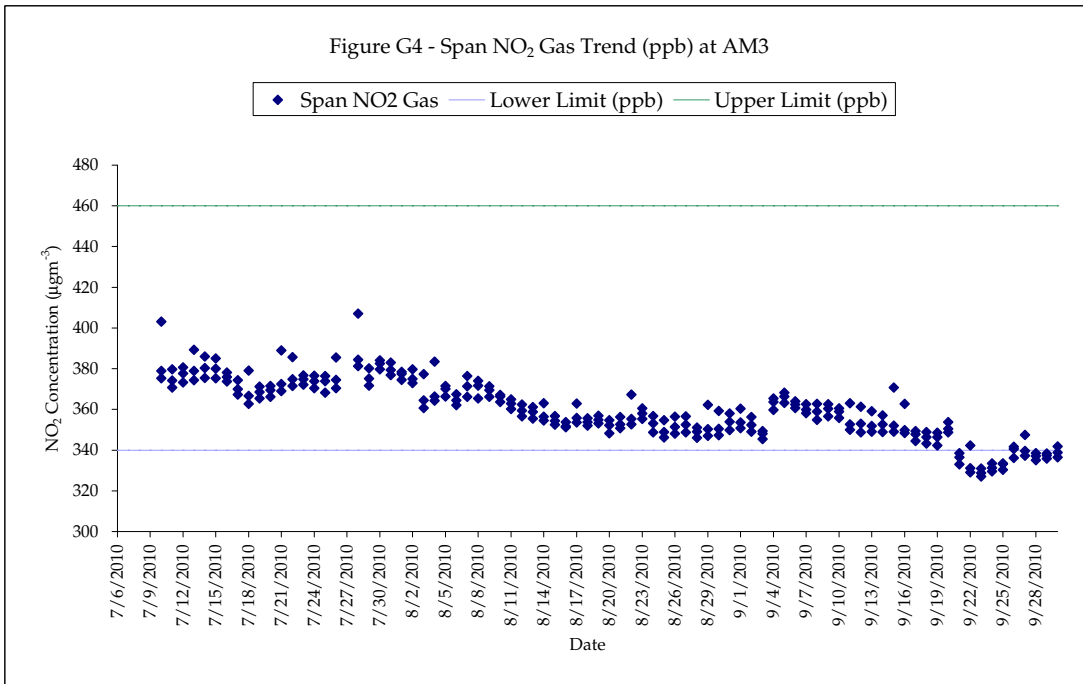
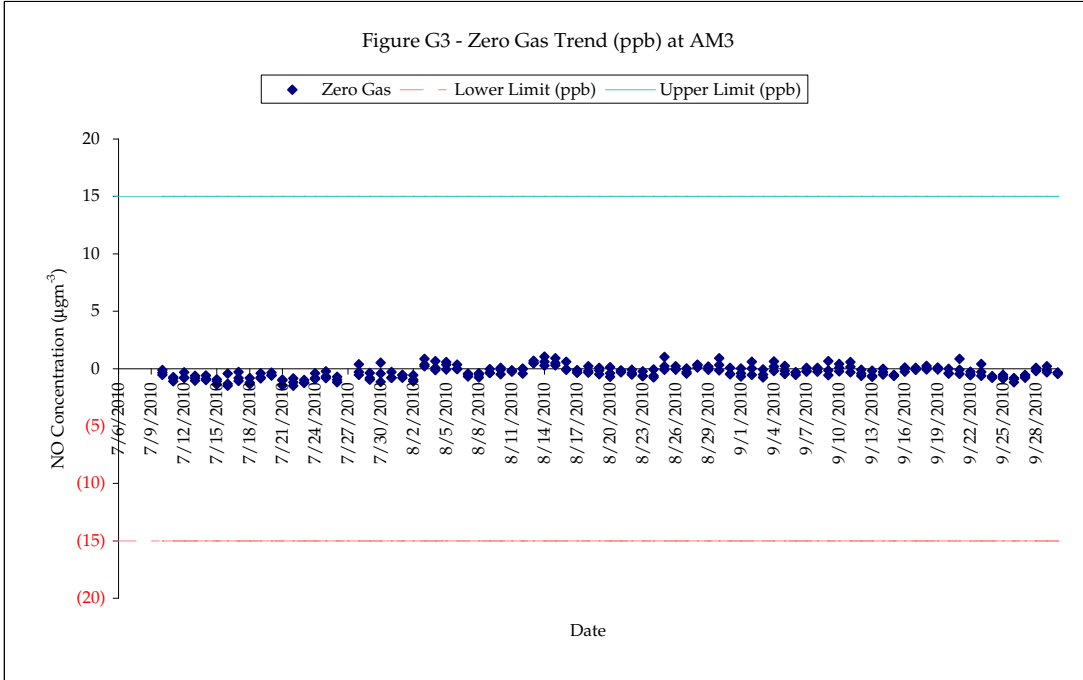
Annex G - Graphical Presentation of Hourly Average of NO₂ at AM3



Remarks:

Zero-Span checks are conducted for approximately 30min from 0005 - 0035 hours daily. Less than 40 minutes of monitoring data is collected and thus a zero reading is presented at 12am daily.

Annex G - Graphical Presentation of Daily Zero-Span Check Results



NO₂ Analyzer Weekly Flowcheck

Sampling Flowcheck Results at AM3 (Under Atrium Link Extension)

Date	Avg. flow (cm ³ /min)	Avg. flow (cm ³ /s)	Required Flowrate by Specification of Equipment (cm ³ /s)	Compliance of Upper Flowrate Requirement (9.1 cm ³ /s)	Compliance of Upper Flowrate Requirement (7.5 cm ³ /s)
3-Sep-10	467.7	7.8	8.3±0.8	Y	Y
10-Sep-10	476.7	7.9	8.3±0.8	Y	Y
17-Sep-10	472.7	7.9	8.3±0.8	Y	Y
24-Sep-10	474.0	7.9	8.3±0.8	Y	Y
30-Sep-10	471.3	7.9	8.3±0.8	Y	Y