

Hip Hing Joint Venture

Hong Kong Convention and
Exhibition Centre Expansion
Project: *1st Operational Phase*
Monthly Environmental Monitoring
and Audit Report

August 2010

Environmental Resources Management

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ENVIRONMENTAL MONITORING &
AUDIT REPORT

Hip Hing Joint Venture

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Exhibition Centre Expansion
Project: *1st Operational Phase*
Monthly Environmental Monitoring
and Audit Report

August 2010

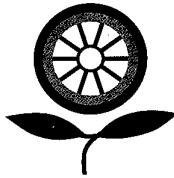
Reference 0050690

For and on behalf of ERM-Hong Kong, Limited	
Approved by:	Dr Robin Kennish
Signed:	
Position:	Director
Certified by:	 (Environmental Team Leader - Marcus Ip)
Date:	23 August 2010

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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Our Ref: 3.16/014/2006/gl

23 August 2010

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

Attn: Ms Vera Chan

Dear Sir/Madam,

**Hong Kong Convention and Exhibition Centre Expansion Project:
1st 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 23 August 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: Mr. Marcus Ip)

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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 first Environmental Monitoring and Audit (EM&A) report presenting the EM&A work carried out during the period from 6 to 31 July 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 August 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 first 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 6 to 31 July 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.

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 6 July 2010 ⁽¹⁾. 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 2 August 2010.

3.1.7 *Event Action Plan*

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

⁽¹⁾ The accuracy of the calibration curve was verified using a one-point check approach on 2 August 2010. The check was conducted upon completion of calibration with a span gas of a concentration of approximately 200ppb NO. The measured NO concentration (ie 187ppb NO) was reasonably close to the expected value, suggesting that the adopted calibration curve was valid. Arrangements for multi-point calibration are also being made. Multi-point calibration is anticipated to be implemented by early 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 results and adjusted if proved to be necessary in the future.

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 there was no zero/span drift beyond the acceptable bounds presented in *Section 3.1.5*. Likewise, the weekly flow checks confirmed that the sampling flow rate was maintained within the acceptable range. Monitoring data for the period between 1900 hours on 6 July and 1600 hours on 9 July 2010 and the period between 1600 hours on 26 July and 1400 hours on 27 July 2010 were not available owing to power outage. Appropriate arrangements have been made with HKTDC, the owner of the premises where the monitoring equipment is located, to prevent unexpected power cut-off in future. 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.

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 August 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) / 1800 ^(b)	51.5	7.7 – 248.2

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 well 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 6 to 31 July 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

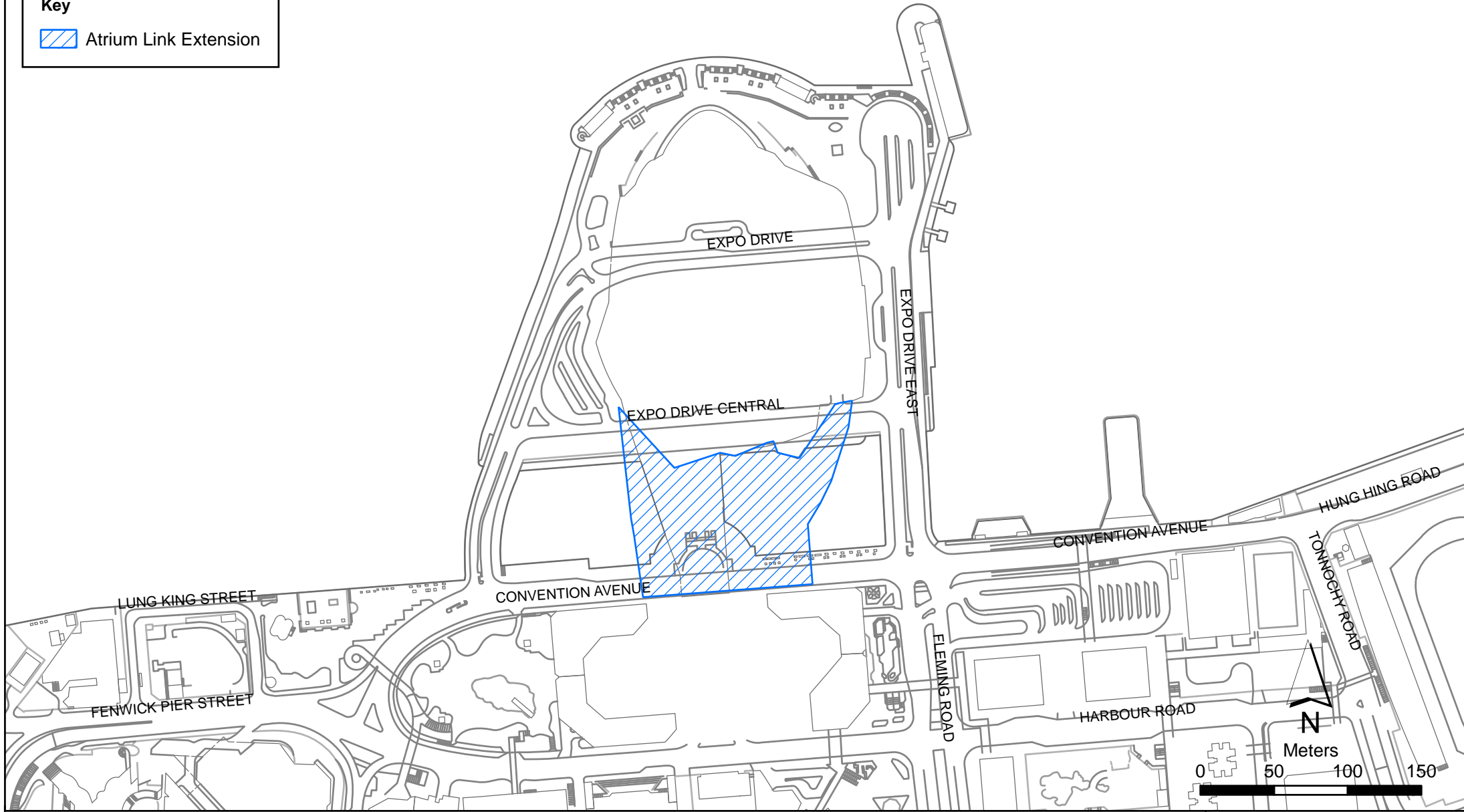


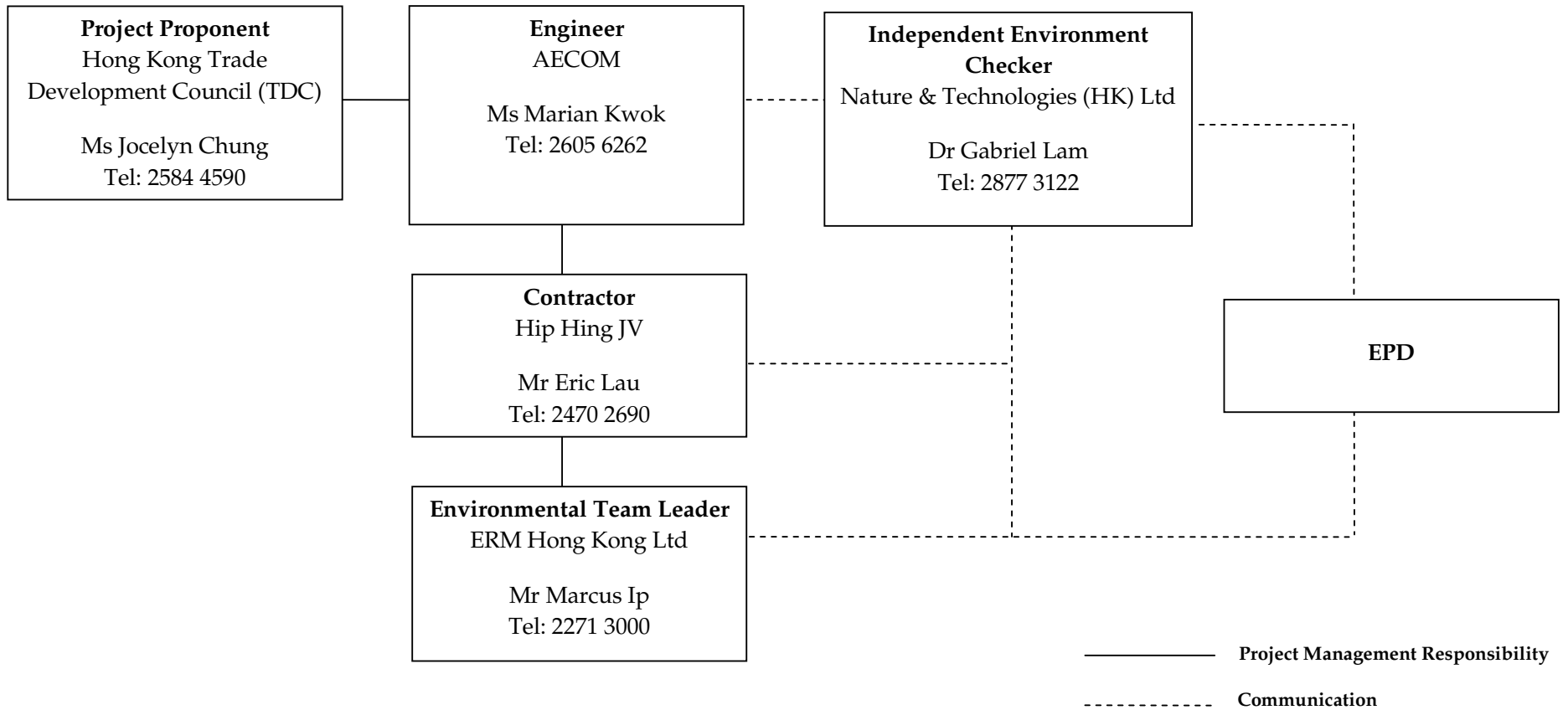
Figure A1

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

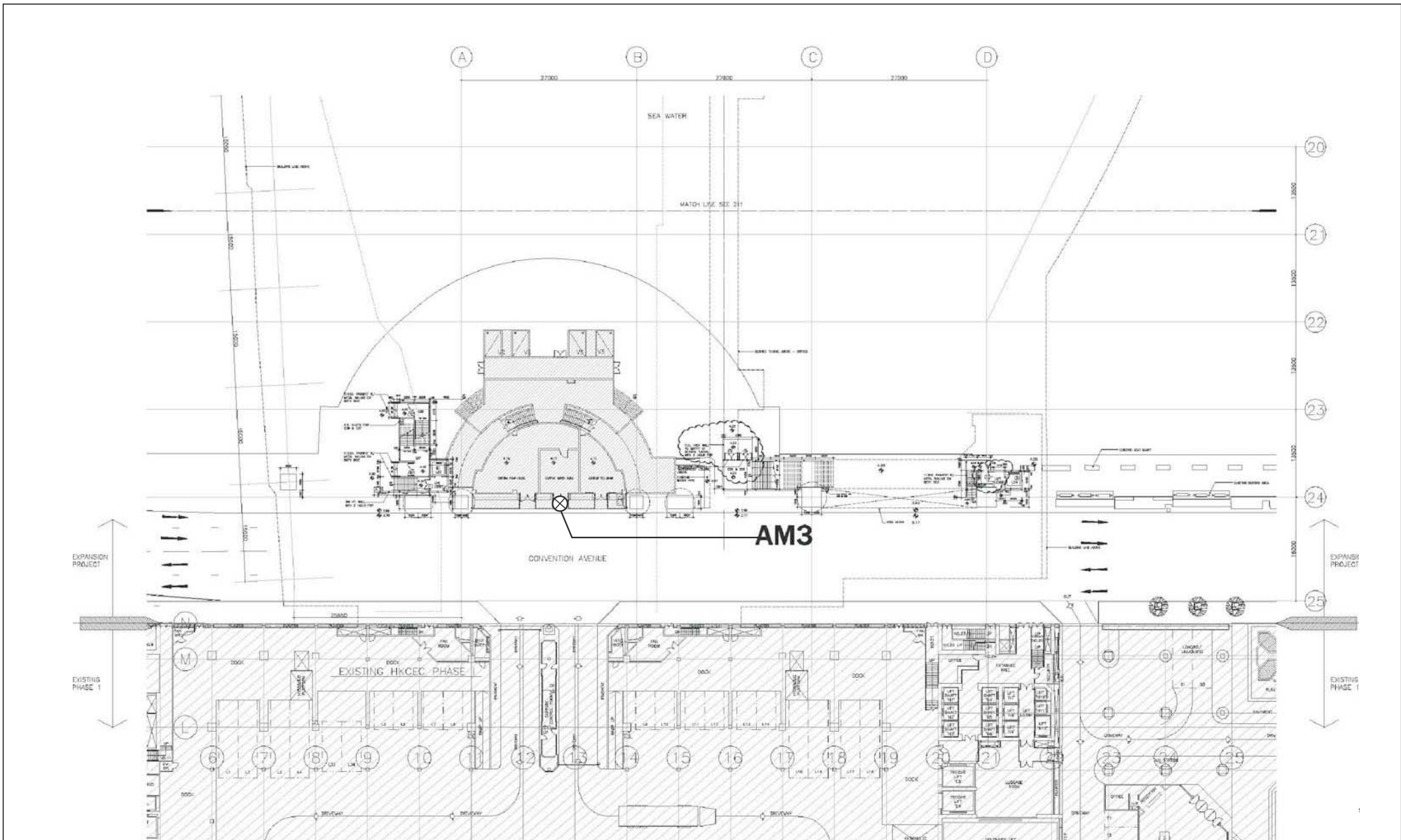


Figure C1

Location of NO₂ Monitoring Station

FILE: 0050690a
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 - July 2010**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1-Jul	2-Jul	3-Jul
4-Jul	5-Jul	6-Jul	7-Jul	8-Jul	9-Jul	10-Jul
		2-point calibration 24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring flow check	24-hour monitoring
11-Jul	12-Jul	13-Jul	14-Jul	15-Jul	16-Jul	17-Jul
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring replace filter flow check	24-hour monitoring
18-Jul	19-Jul	20-Jul	21-Jul	22-Jul	23-Jul	24-Jul
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring flow check	24-hour monitoring
25-Jul	26-Jul	27-Jul	28-Jul	29-Jul	30-Jul	31-Jul
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring replace filter flow check	24-hour monitoring

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-Aug	2-Aug	3-Aug	4-Aug	5-Aug	6-Aug	7-Aug
24-hour monitoring	2-point calibration with 1-point check 24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring flow check	24-hour monitoring
8-Aug	9-Aug	10-Aug	11-Aug	12-Aug	13-Aug	14-Aug
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring replace filter flow check	24-hour monitoring
15-Aug	16-Aug	17-Aug	18-Aug	19-Aug	20-Aug	21-Aug
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring flow check	24-hour monitoring
22-Aug	23-Aug	24-Aug	25-Aug	26-Aug	27-Aug	28-Aug
24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring	24-hour monitoring replace filter flow check	24-hour monitoring
29-Aug	30-Aug	31-Aug				
24-hour monitoring	24-hour monitoring	24-hour monitoring				

Annex E

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

Calibration Date: 6th July 2010

*Calibration Period: 15:04 - 18:55

* Including administration time

Conducted by: William Lai

Test Result

Tested Gas: Nitrogen Oxide, NO

No.	Time Stamp	Type & Standard	Quantity	Result
1)	6/7/2010 17:05	Pure (0 ppb) \pm 15 ppb[1] =	0.0067 (ppb)	(PASS)
2)	6/7/2010 18:49	NO (400 ppb) \pm 15 % [1] =	428.6056 (ppb)	(PASS)

*NO Slope [2]: 1.1246

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

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

Coordinated By:

Patrick Tse
Senior Staff

Coordinated and Conducted By:

William Lai (William Lai)
Staff in charge

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 Temperature	: 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



HONG KONG SPECIALTY GASES CO., LTD.

HSG – A companion for excellence

CERTIFICATE OF ANALYSIS

PRODUCT

CONCENTRATION

HP Grade
NITROGEN

99.995%

O₂

< 10 ppm

H₂O

< 10 ppm

Authorized Signature

2/F, Blk B, Wing Cheong Fty Bldg., No. 121 King Lam St., Cheung Sha Wan, Kln, HK

TEL: (852) 2668 5738

FAX: (852) 2652 0401

Website: <http://www.hsg.com.hk>



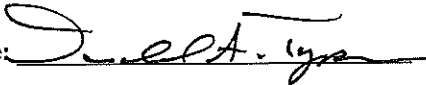


CERTIFICATE OF ANALYSIS

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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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

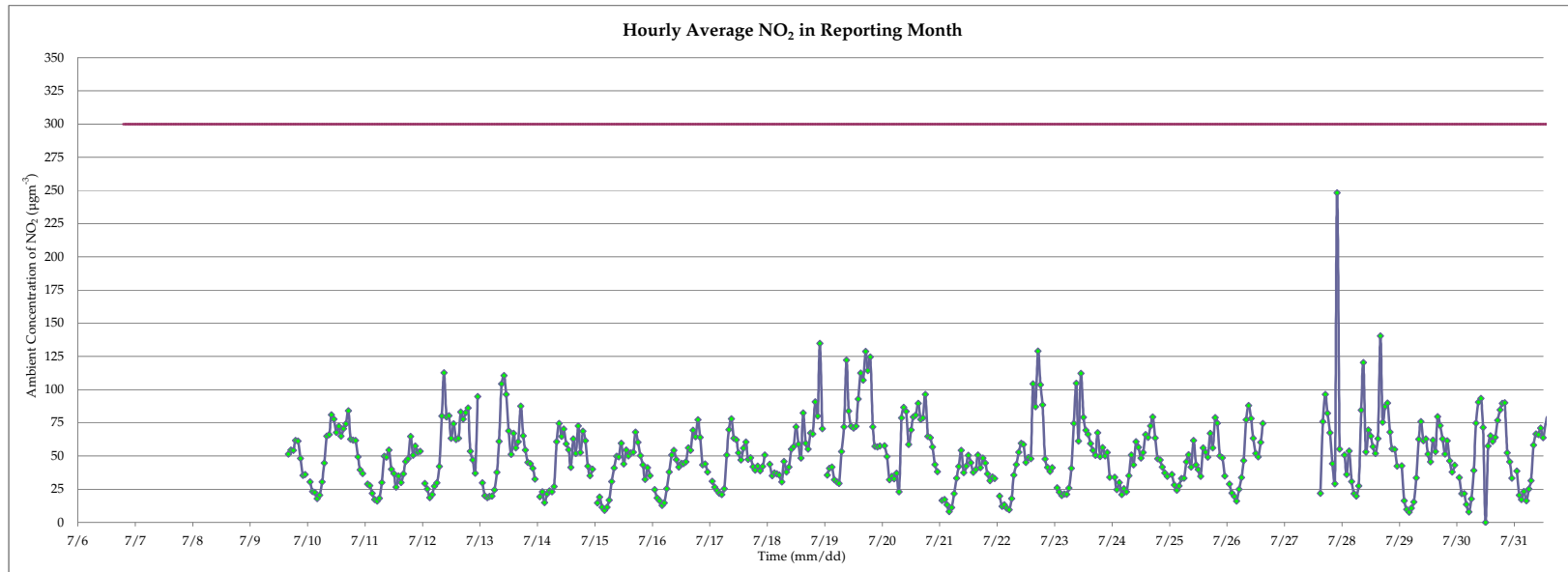
Annex G - Summary of Hourly Average of NO₂ at AM3

Hourly Average NO ₂ (µgm ³) in Reporting Month																														
Time / Date	6-Jul-10	7-Jul-10	8-Jul-10	9-Jul-10	10-Jul-10	11-Jul-10	12-Jul-10	13-Jul-10	14-Jul-10	15-Jul-10	16-Jul-10	17-Jul-10	18-Jul-10	19-Jul-10	20-Jul-10	21-Jul-10	22-Jul-10	23-Jul-10	24-Jul-10	25-Jul-10	26-Jul-10	27-Jul-10	28-Jul-10	29-Jul-10	30-Jul-10	31-Jul-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	z/s	z/s	z/s	z/s	z/s	z/s	z/s	z/s			
1:00	-	-	-	-	30.6	28.9	29.4	29.9	19.3	14.6	24.7	31.0	43.8	35.5	87.7	16.5	19.8	26.0	34.1	36.2	28.9	-	50.7	42.7	33.8	38.6				
2:00	-	-	-	-	23.3	27.7	25.1	20.1	23.0	19.0	18.3	26.6	35.2	40.7	49.6	17.3	12.1	22.8	24.7	28.2	22.2	-	36.2	16.2	21.6	20.5				
3:00	-	-	-	-	22.6	21.8	18.6	18.7	14.8	11.3	16.2	24.1	37.2	41.7	32.2	13.3	13.3	20.3	30.1	24.2	19.6	-	53.8	9.8	21.7	17.2				
4:00	-	-	-	-	18.0	17.3	21.1	19.6	21.4	9.1	12.7	21.8	36.5	32.2	34.8	8.2	10.7	21.5	20.9	27.5	16.0	-	30.7	7.7	13.5	23.4				
5:00	-	-	-	-	20.5	16.1	27.3	19.7	23.9	11.5	14.6	21.0	35.6	30.5	32.8	11.3	9.6	21.1	25.3	33.1	24.8	-	21.8	10.7	8.0	16.2				
6:00	-	-	-	-	38.4	18.1	28.9	24.4	23.0	16.8	25.4	25.3	30.5	29.2	37.0	21.6	17.9	25.7	22.9	33.4	33.8	-	19.8	15.3	17.8	25.2				
7:00	-	-	-	-	44.7	30.0	42.2	37.7	27.1	30.9	37.9	50.8	45.9	53.5	22.9	33.4	35.7	40.8	35.1	45.7	46.6	-	27.4	33.4	39.1	31.4				
8:00	-	-	-	-	64.9	49.8	80.1	61.0	60.8	40.9	50.8	69.9	38.0	72.0	78.7	42.1	43.6	74.5	50.8	51.1	77.3	-	84.5	62.6	74.6	58.2				
9:00	-	-	-	-	66.1	49.1	112.7	104.3	74.5	49.9	54.3	78.0	41.8	122.2	86.5	54.2	52.8	104.8	43.3	41.6	87.9	-	120.3	76.0	90.6	66.5				
10:00	-	-	-	-	81.0	54.4	79.5	110.6	64.7	49.4	47.2	63.3	55.2	83.9	83.6	37.5	59.5	61.4	60.8	61.8	78.3	-	53.0	61.6	93.4	66.1				
11:00	-	-	-	-	77.8	40.1	80.3	96.3	70.2	59.7	41.7	62.1	57.1	72.3	58.7	42.4	58.7	112.3	56.5	43.3	63.3	-	69.6	62.8	71.4	71.1				
12:00	-	-	-	-	67.9	36.8	63.4	69.0	59.2	44.0	44.4	52.5	72.1	71.0	69.6	50.6	45.1	79.2	48.5	39.7	51.8	-	64.9	51.4	71.9	63.8				
13:00	-	-	-	-	72.5	26.5	74.3	81.2	54.6	54.4	44.1	47.1	58.8	72.4	79.3	44.9	48.8	69.3	52.5	34.7	49.3	-	57.0	45.6	57.5	74.2				
14:00	-	-	-	-	65.1	35.0	62.4	67.0	41.4	50.1	45.5	55.9	48.5	92.8	80.7	37.7	48.0	64.5	66.2	56.0	60.4	-	51.8	62.0	65.3	79.6				
15:00	-	-	-	-	70.5	30.0	63.4	56.0	62.9	52.4	56.1	60.5	82.4	112.5	89.7	39.8	104.2	99.3	64.1	52.9	74.4	21.9	63.2	53.2	60.9	69.6				
16:00	-	-	-	-	51.4	74.4	36.5	83.1	60.7	52.0	52.9	54.2	47.4	59.5	107.2	77.6	50.8	87.0	54.2	72.6	49.0	-	75.8	140.4	79.6	64.0				
17:00	-	-	-	-	54.4	84.1	45.9	77.8	87.6	72.5	68.1	69.4	48.8	55.2	128.7	78.8	41.3	129.1	50.6	79.4	67.1	-	96.5	75.5	72.8	76.9				
18:00	-	-	-	-	54.2	62.7	47.9	82.7	65.3	52.7	60.3	64.5	41.9	67.3	114.4	96.3	48.5	103.6	67.6	63.6	56.1	-	82.1	87.3	63.0	84.7				
19:00	-	-	-	-	61.8	62.0	64.6	86.2	54.5	68.6	50.3	77.2	39.4	66.7	124.7	64.7	44.7	88.4	49.7	48.0	78.9	-	67.6	89.8	51.5	89.7				
20:00	-	-	-	-	61.3	61.7	50.4	53.5	45.2	61.4	43.4	64.0	42.5	90.9	71.9	63.8	36.5	47.7	56.3	47.0	74.7	-	44.2	68.0	61.5	90.1				
21:00	-	-	-	-	48.2	49.3	57.6	47.1	44.1	42.4	32.4	43.2	38.9	80.1	57.3	56.7	31.4	41.3	50.0	41.7	50.1	-	29.0	55.5	46.3	52.4				
22:00	-	-	-	-	35.3	39.6	52.8	37.0	40.9	35.2	41.1	44.1	42.1	134.8	96.7	42.5	34.1	38.5	52.8	37.2	48.7	-	248.2	54.0	38.1	45.6				
23:00	-	-	-	-	36.0	36.9	53.4	44.8	32.7	40.0	35.1	38.0	50.8	70.7	57.6	38.3	33.0	41.2	34.0	34.7	34.8	-	55.2	42.4	43.2	33.2				

Remarks

- Period when monitoring has not yet been commenced
- Failure in data collection due to power outage
- z/s Zero-span check in progress. Less than 40 minutes of data is collected in the reporting period and is therefore not presented.

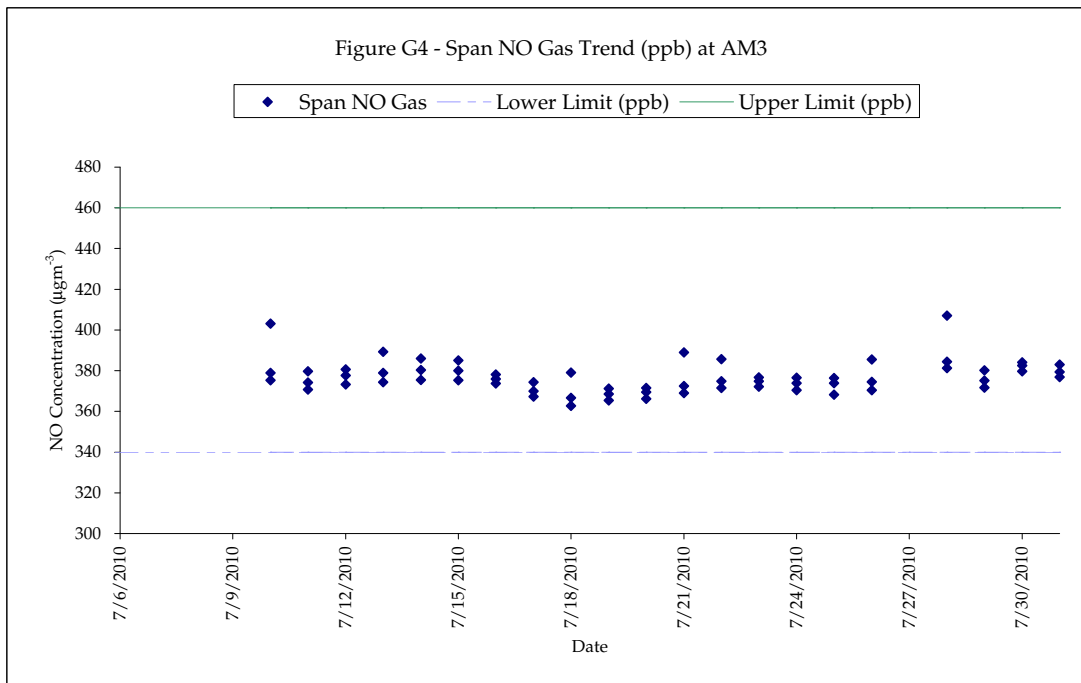
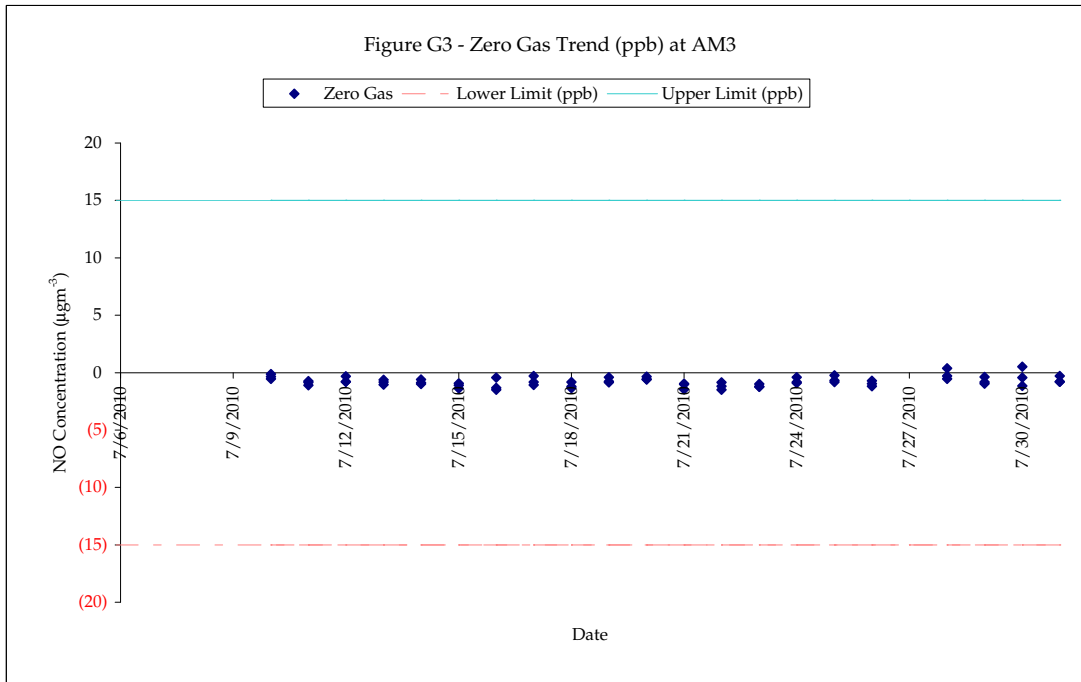
Annex G - Graphical Presentation of Hourly Average of NO₂ at AM3



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 not presented on graph. Data collection from 1900 hours on 6 July to 1600 hours on 9 July 2010 and 1600 hours on 26 July 2010 to 1400 hours on 27 July 2010 failed due to power outage.

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



Annex G - Weekly Flowcheck Summary

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)
9-Jul-10	476.0	7.9	8.3±0.8	Y	Y
16-Jul-10	462.5	7.7	8.3±0.8	Y	Y
23-Jul-10	466.5	7.8	8.3±0.8	Y	Y
30-Jul-10	457.6	7.6	8.3±0.8	Y	Y