

Hip Hing Joint Venture

Hong Kong Convention and
Exhibition Centre Expansion
Project: *4th Operational Phase*
Monthly Environmental Monitoring
and Audit Report

November 2010

Environmental Resources Management

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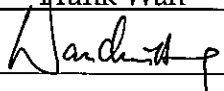
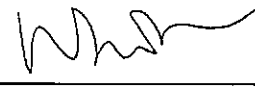
ENVIRONMENTAL MONITORING &
AUDIT REPORT

Hip Hing Joint Venture

Hong Kong Convention and
Exhibition Centre Expansion
Project: *4th Operational Phase*
*Monthly Environmental Monitoring
and Audit Report*

November 2010

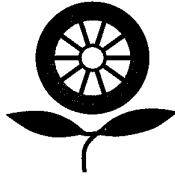
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For and on behalf of ERM-Hong Kong, Limited	
Approved by:	<u>Frank Wan</u>
Signed:	<u></u>
Position:	<u>Partner</u>
Certified by:	<u></u>
(Environmental Team Leader - Winnie Ko)	
Date:	<u>24 November 2010</u>

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.

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23 November 2010

Maunsell Consultants Asia Ltd
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Attn: Ms Marian Kwok
Senior Project Manager

Dear Ms Kwok,

**Hong Kong Convention and Exhibition Centre Expansion Project:
4th Operational Phase Monthly Environmental Monitoring and Audit Report
Monthly EM&A Report for August 2006
(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 November 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
Managing Director

- 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)

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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 fourth Environmental Monitoring and Audit (EM&A) report presenting the EM&A work carried out during the period from 1 to 31 October 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 exceedance of the Action and Limit Levels of 1-hour NO₂ was recorded at the designated monitoring station under the ALE in this reporting period. One exceedance of the Action and Limit Levels of 1-hour NO₂ was recorded at Hour 1900 on 8 September 2010 at the designated monitoring station under the ALE.

Multi-point calibration check with mass flow controllers was completed on 29 October 2010. As stated in the September report, NO₂ monitoring data collected from July to October 2010 would be reviewed against the multi-point calibration check data to ensure data validity. As such, summary of the adjusted air quality monitoring results and cases of exceedances from July to September 2010 were also presented in the current report.

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 November 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 fourth 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 31 October 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.

Multi-point calibration check with mass flow controllers was completed on 29 October 2010. As stated in the September report, NO₂ monitoring data

collected from July to October 2010 would be reviewed against the multi-point calibration check data to ensure data validity. As such, in addition to data in the reporting month, summary of the adjusted air quality monitoring results and cases of exceedances from July to September 2010 were also presented in the current report.

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.
Notification of Exceedance of Hourly NO ₂ AQO Criteria	HKCEC_4 Nov 10_Hourly NO ₂ _Station AM3	-	Submitted to EPD on 9 November 2010

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
	Mass-flow Controllers	Cole Parmer Instrument Model 56089 and 56090

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 $\pm 15\%$, the data obtained before and after the particular zero/span check would be flagged and excluded from the calculation of the reported 1-hour NO_2 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 NO_2 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. A downward drift in span check reading was observed starting from early August 2010 and it was found that the anomaly would most likely be related to faults in the permeation tube used for generating automatic span gas. On 22 October 2010, the permeation tube was replaced and auto-span check were started. Between 1 and 22 October 2010, a manual span check with standard 400ppb NO gas was conducted weekly (ie, 8, 15 and 22 October 2010) to ensure span drift was within the acceptable limits stated in the QA Handbook. The span gas readings were 368, 370 and 404 ppb NO, which fell within the acceptable range of $\pm 15\%$ from 400ppb NO and suggested the monitoring data was valid. From 22 October 2010, auto-span check results demonstrated that drifting fell within the acceptable range of $\pm 15\%$ from the new permeation tube (311 ppb NO).

As indicated above, the air flow rate of the analyzer was checked on a weekly basis and maintained at $500 \pm 50 \text{ cm}^3/\text{s}$ 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 15 October 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 for the NO_2 analyzer is scheduled on 12 November 2010.

The mass-flow controllers required for multi-point calibration check were delivered in the reporting month, and the multi-point calibration check was completed on 29 October 2010 to ensure compliance with requirements in *USEPA ST 40 CFR 53*. The calibration certificates of the mass flow controllers are provided in *Annex E*. The flow rate of gas through the mass-flow

controllers were also confirmed using the portable flow meter. NO gas concentrations of 0ppb, 90ppb, 150ppb, 200ppb, 300ppb and 400ppb were generated from the standard 0ppb and 400ppb standard NO gas with mass-flow controllers. The gases were then injected to the analyzer for checking of the accuracy of the calibration curve generated by the 0ppb and 400ppb standard gas.

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.

Multi-point check with mass flow controllers was completed on 29 October 2010, and the adjusted results from July to October 2010 were demonstrated in *Annex G*. Review of monitoring data collected from July to October 2010 revealed that hourly NO₂ concentration at hour 1900 on 8 September 2010 exceeded the limit level by approximately 4 µgm⁻³ in the worst case scenario after adjustments with multi-point calibration results. Review of environmental setting on the day of monitoring suggested that exceedance might be a result of the following:

- 8 September 2010 was the first day of Horse Race Meeting for Year 2010-2011. Road closure and traffic diversion near the concourse was anticipated to cause exceptional congestion in the Wan Chai area, especially at the harbour front area on Convention Avenue during the evening peak hour. Heavy traffic might stop under the ALE for extended periods of time with running engines and therefore emitting NO₂ exhaust in close proximity to the monitoring station for an extended period of time, leading to the high NO₂ concentration detected.

Exceedance of hourly NO₂ AQO criterion only occurred once on 8 September 2010 from July to October 2010. As monitoring of hourly NO₂ concentration will be continued for another 2 months from the end of the reporting month, the ET will continue to keep track of hourly NO₂ levels during rush hours to determine if NO₂ exceedance is a persistent issue at the monitoring station. Until then, it is recommended that no specific mitigation measures will be necessary.

The ET will also 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 in this reporting period.

One exceedance of the Action and Limit Levels of 1-hour NO₂ was recorded at hour 1900 on 8 September 2010 at the designated monitoring station under the ALE after adjustments with multi-point calibration results. Details of the exceedance are presented in *Section 5*. Exceedance of hourly NO₂ AQO criterion only occurred once on 8 September 2010 from July to October 2010. As monitoring of hourly NO₂ concentration will be continued for another 2 months from the end of the reporting month, the ET will continue to keep track of hourly NO₂ levels during rush hours to determine if NO₂ exceedance is a persistent issue at the monitoring station. Until then, it is recommended that no specific mitigation measures will be necessary.

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 November 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 (AQO) and the Tunnel Air Quality Guidelines (TAQG) (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 in Oct 2010, µgm ⁻³	
		Normal Hours	Peak Hours		Standard	Average
AM3	Convention Avenue	146	183	300 (a) / 1,800 (b)	72.5	13.3 – 216

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 in the reporting month, the criterion in the AQO and the criterion in the TAQG. 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 in the reporting month.

Review of monitoring data over the 6-month monitoring period after the implementation of multi-point calibration check indicated the hourly AQO criteria for NO₂ was exceeded once on 8 September 2010 at hour 1900. In this period of time, the peak NO₂ concentration recorded by the analyzer in a 5-minute period was as high as 979µgm⁻³. The difference from the peak 5-minute NO₂ concentration from the tunnel and the current reading could be contributed by the difference traffic flow breakdown between the EIA prediction and the actual traffic flow. In the approved EIA Report, light goods vehicles (LGV) and heavy good vehicles (HGV) accounted for only 10% of the total traffic flow. On site, the percentage of LGV and HGV should be

higher where construction vehicles and trucks were observed to be frequent users of Convention Avenue, probably due to a number of construction projects in the Central/Western and Wanchai districts. This might have led to an underestimation of the NO₂ emission factor used and therefore the NO₂ concentration predicted.

The current monitoring location is setup adjacent to the mid-section of Convention Avenue under the ALE. Given the environmental setting, the monitoring location was more similar to a tunnel-setting as stated in the approved EIA Report than an open space setting. Although the monitoring result at hour 1900 on September 2010 has exceeded the AQO, the Tunnel Air Quality Guidelines is complied. The fresh air intakes of the nearby hotels and convention centre were relocated and the pedestrian uses under the ALE was observed to be negligible and of transient nature. No adverse air quality impacts are therefore expected for nearby air sensitive receivers.

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 4-months monitoring results indicated that the operation of the Project has only caused impacts to the environment on a transient basis. Nonetheless, more monitoring data in the remaining period will be required to determine whether recommendations given in the EIA are adequate and sufficient 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 31 October 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 under the ALE in this reporting period.

One exceedance of the Action and Limit Levels of 1-hour NO₂ was recorded at Hour 1900 on 8 September 2010 at the designated monitoring station under the ALE.

Annex A

Location of Project

Key

 Atrium Link Extension

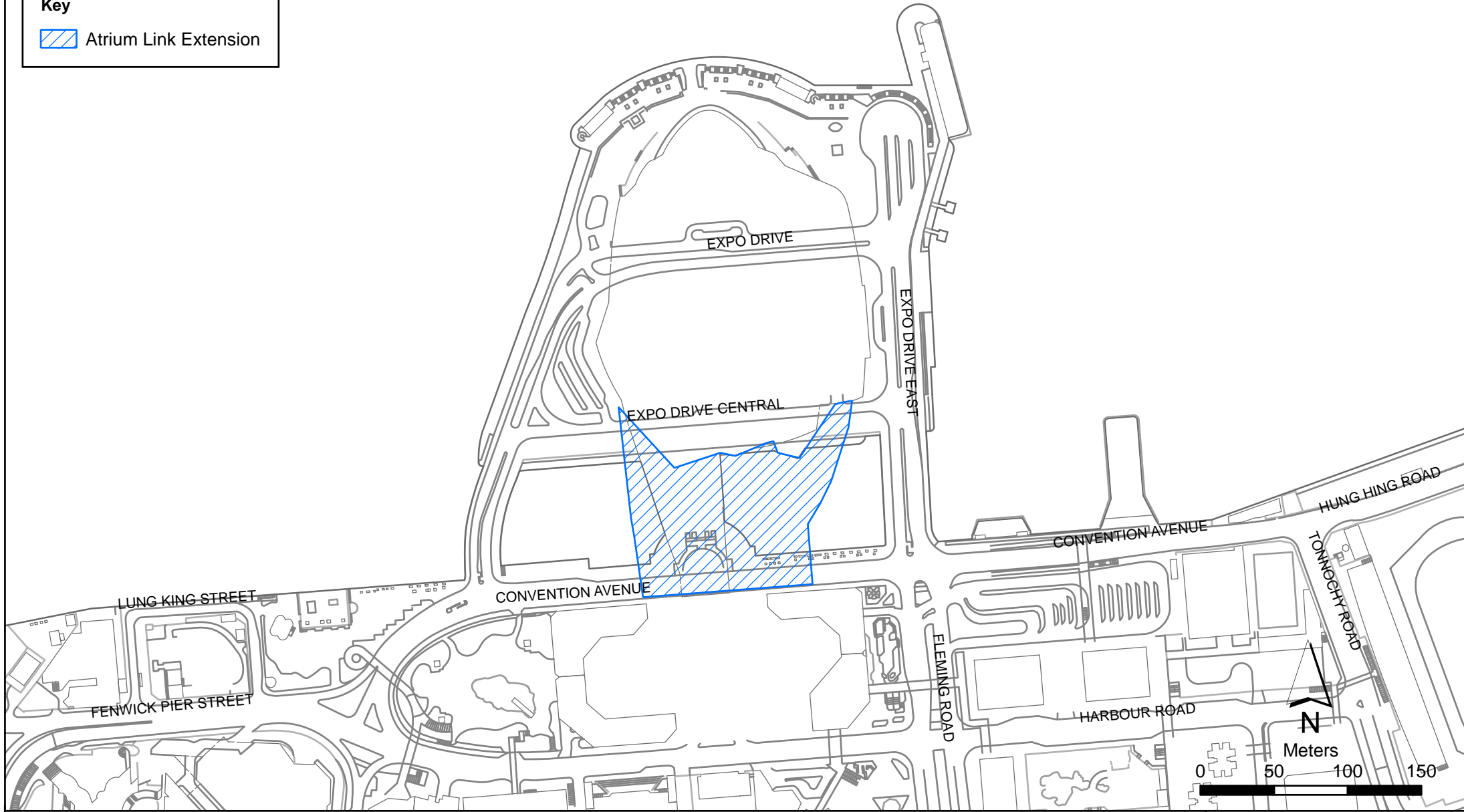


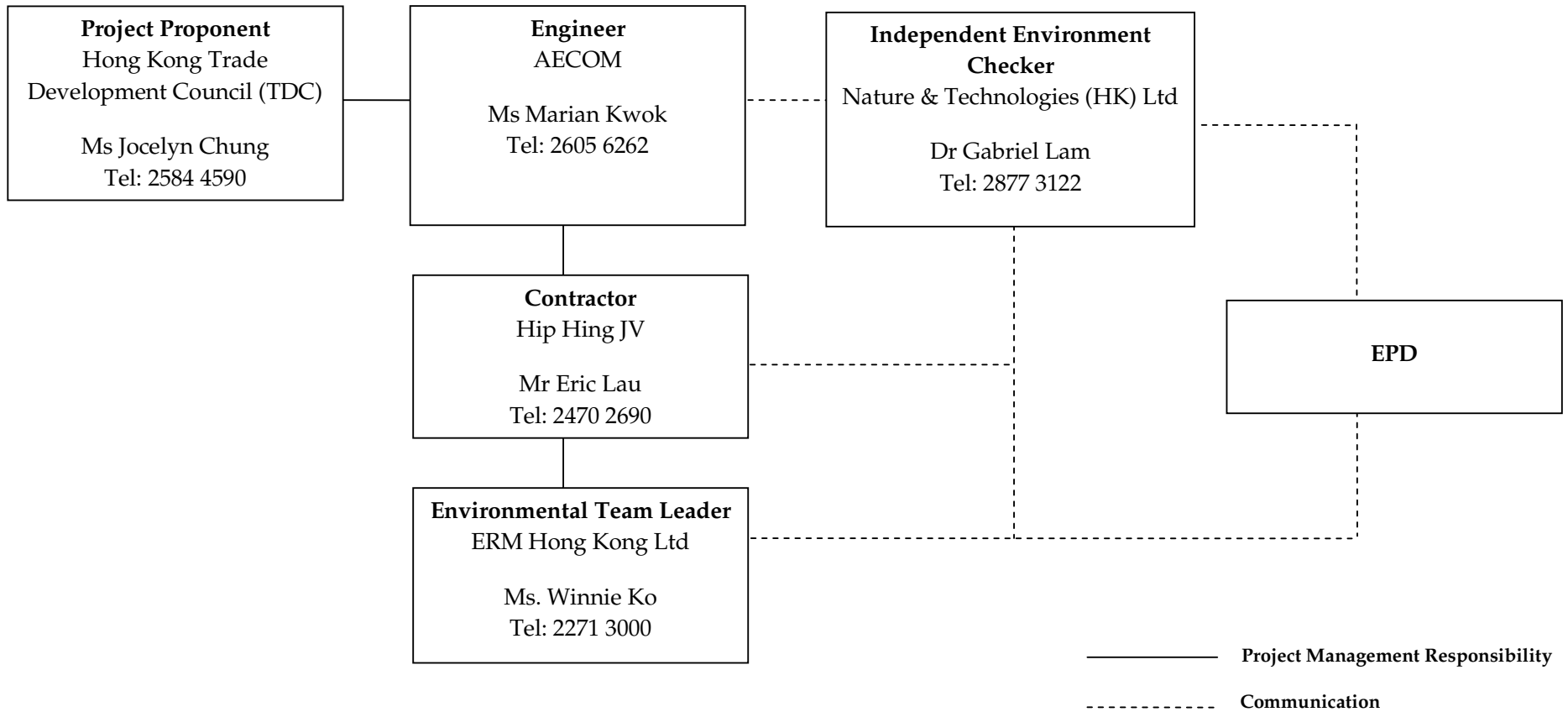
Figure A1

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

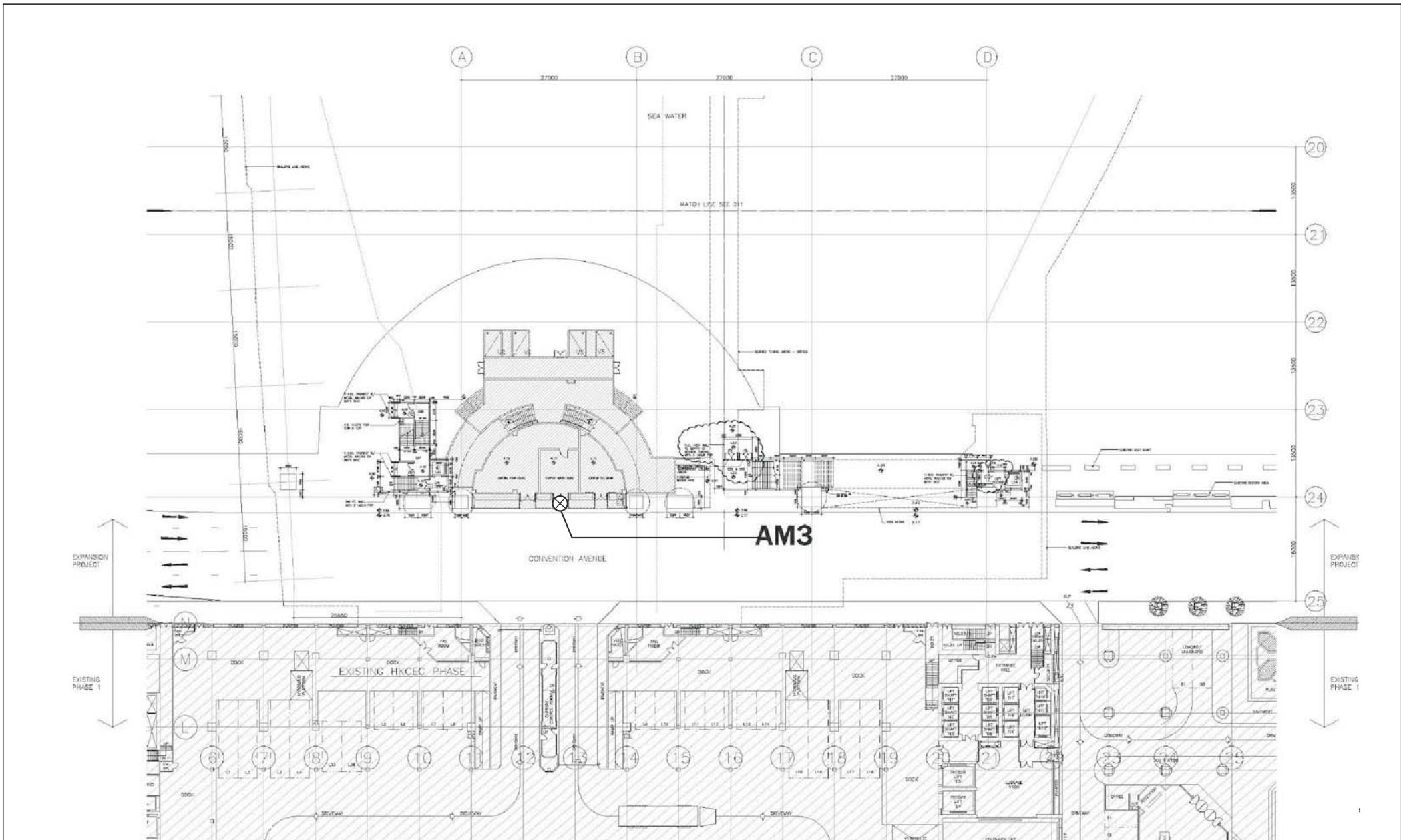


Figure C1

Location of NO₂ Monitoring Station

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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 - 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	Manual Span Check 24-hour monitoring Replace filter and permeation tube 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 Multi-point check	24-hour monitoring
31-Oct						
24-hour monitoring						

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

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

Annex E

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

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

Calibration Certificate

General

Location:	Atrium Link
Calibration Date:	15-Oct-10
*Calibration Period:	17:50 - 18:10
Conducted by:	William Lai

*Including administration time

Equipment

Testing gas used:	Nitrogen Oxide, NO
Temperature:	26.5 (°C)

Calibration Result

No.	Time Stamp	Type & Standard	Quantity (ppb)	Stability (ppm)	Result
1	15 October 2010 17:55	Pure (0 ppb) ± 15 ppb[1] =	-0.396	0.2113	(PASS)
2	15 October 2010 18:05	NO (400 ppb) ± 15 % [1] =	400.4489	0.5443	(PASS)

*NO Slope [2]: 1.045

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

Coordinated By:

Patrick Tse
Senior Staff

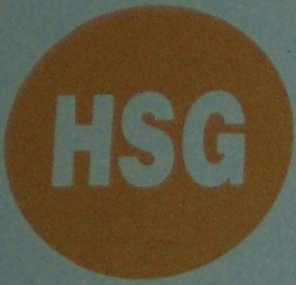
Coordinated and Conducted By:

William Lai (William Lai)
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



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

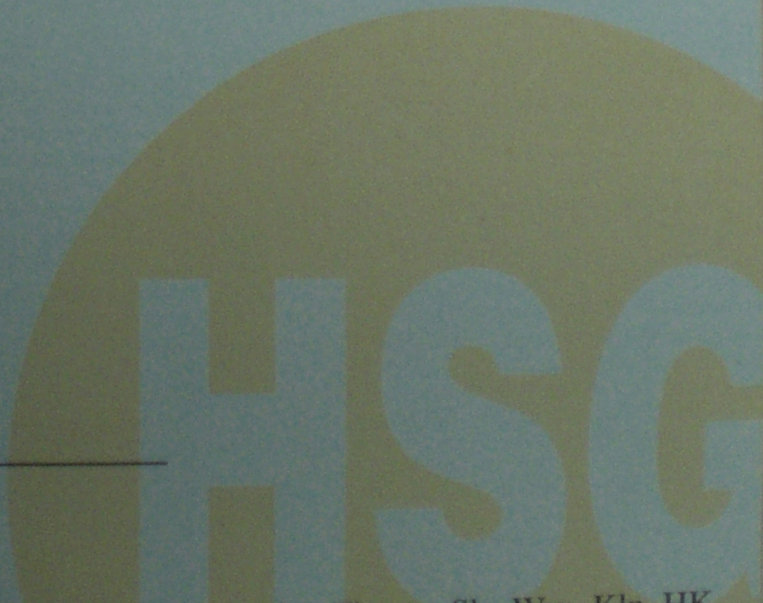
Authorized Signature

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>





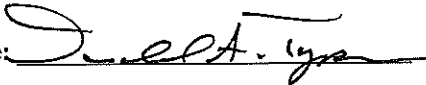
CERTIFICATE OF ANALYSIS

Customer Name: Cinotech Consultants Ltd
Stock or Analyzer Tag Number: N/A
Customer Reference: PO-10008
MESA Reference: 107693
Date of Certification: 6/22/2010
Recommended Shelf Life: 1 Year

Cylinder Number: CC87834
Product Class: Primary NIST Standard
Cylinder - Contents¹: 140 CF @ 2000 PSI
Cylinder-CGA: A030-HP-SS/660
Analysis Method: Process Analyzers
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

division of MESA International Technologies, Inc.

2427 South Anne St ♦ Santa Ana, California 92704 ♦ USA

TEL: 714-434-7102 ♦ FAX: 714-434-8006 ♦ E-mail: mail@mesagas.com

On-line Catalog at www.mesagas.com

Cole Parmer Instrument Co.

Calibration Data Sheet

Certification Number: 0000049715

Sales Order Number: SO304015
Serial Number: 56090
Part Number: 32907-67
Software Version: GP07R93
P/D/I Values: 100 / 12000 / 0
Process Gas: Selectable
Calibration Gas: Air
Range: 1 SLPM
Gas Temperature: 24.9 °C
Ambient Humidity: 42%
Calibration Procedure/Rev. #: DOC-AUTOCAL-GASFLOW/Rev. 60
Calibrated By: Jamie Wilde
Calibration Date: 09/01/2010
Full Scale Pressure: 160 PSIA
Full Scale Pressure Accuracy: +/- 0.5% of Full Scale
Temperature Accuracy: +/- 1.5 °C
Standard Temp. & Pressure: 25°C, 14.6959 PSIA
Calibration due 1 yr. after receipt:

Equipment Used

Temperature: TOOL-TEMP6	Voltage: TOOL-CMTR12
Tool Due Date: 07/08/2011	Tool Due Date: 07/08/2011
Manufacturer/Model: ERTCO	Manufacturer/Model: Fluke 85
NIST #: 33173	NIST #: 664133-7971257:1272460434
Device Uncertainty: +/- 0.2 deg C	Device Uncertainty: +/- (0.1% + 1 digit)
Flow: TOOL-FLOW4	Pressure: TOOL-PRESSURE8
Tool Due Date: 05/10/2011	Tool Due Date: 04/23/2011
Manufacturer/Model: Alicat / MCAL-1E0L	Manufacturer/Model: Alicat / P-100PSIG-D
NIST #: 62225-68342	NIST #: 936034-76650613:1143713248
Device Uncertainty: +/- (0.3% Reading + 0.2% F.S.)	Device Uncertainty: +/- 0.2%

All test equipment used for calibration is NIST traceable.

Calibration

Uncertainty: +/- (0.8% of Reading + 0.2% of Full Scale)
Units of measure: SLPM

Calibration Pressure: Inlet: 10 PSIG
Outlet: 0 PSIG

Output 1 Configuration Output 2 Configuration
Mini-Din Pin #6 Mini-Din Pin #2

D.U.T.	Actual	In Tolerance	Output 1	Output 2
0.000	0.000	Yes	0.000 Vdc	5.12 Vdc
0.250	0.250	Yes	1.250 Vdc	5.12 Vdc
0.499	0.500	Yes	2.495 Vdc	5.12 Vdc
0.747	0.750	Yes	3.735 Vdc	5.12 Vdc
0.999	0.999	Yes	5.00 Vdc	5.12 Vdc

Notes: 0-5V set-point.

Tech Signature: 

QC Signature: 

Calibration performed by Alicat Scientific, Inc.

CS1 Rev 14 Last Modified 04/17/2007

Cole Parmer Instrument Co.

Calibration Data Sheet

Certification Number: 0000049714

Sales Order Number: SQ304015
Serial Number: 56089
Part Number: 32907-67
Software Version: GP07R93
P/D/I Values: 100 / 12000 / 0
Process Gas: Selectable
Calibration Gas: Air
Range: 1 SLPM
Gas Temperature: 24.9 °C
Ambient Humidity: 42%
Calibration Procedure/Rev. #: DOC-AUTOCAL-GASFLOW/Rev. 60
Calibrated By: Jamie Wilde
Calibration Date: 09/01/2010
Full Scale Pressure: 160 PSIA
Full Scale Pressure Accuracy: +/- 0.5% of Full Scale
Temperature Accuracy: +/- 1.5 °C
Standard Temp. & Pressure: 25°C, 14.6959 PSIA
Calibration due 1 yr. after receipt:

Equipment Used

Temperature: TOOL-TEMP6
Tool Due Date: 07/08/2011
Manufacturer/Model: ERTCO
NIST #: 33173
Device Uncertainty: +/- 0.2 deg C

Flow: TOOL-FLOW4
Tool Due Date: 05/10/2011
Manufacturer/Model: Alicat / MCAL-1E0L
NIST #: 62225-68342
Device Uncertainty: +/- (0.3% Reading + 0.2% F.S.)

Voltage: TOOL-CMTR12
Tool Due Date: 07/08/2011
Manufacturer/Model: Fluke 85
NIST #: 664133-7971257.1272460434
Device Uncertainty: +/- (0.1% + 1 digit)

Pressure: TOOL-PRESSURE8
Tool Due Date: 04/23/2011
Manufacturer/Model: Alicat / P-100PSIG-D
NIST #: 936034-76650613:1143713248
Device Uncertainty: +/- 0.2%

All test equipment used for calibration is NIST traceable.

Calibration

Uncertainty: +/- (0.8% of Reading + 0.2% of Full Scale)
Units of measure: SLPM

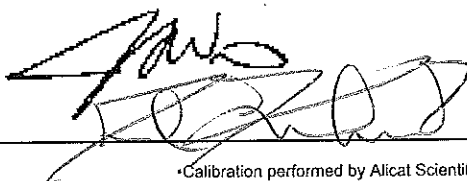
Calibration Pressure: Inlet: 10 PSIG
Outlet: 0 PSIG

Output 1 Configuration Output 2 Configuration
Mini-Din Pin #6 Mini-Din Pin #2

D.U.T.	Actual	In Tolerance	Output 1	Output 2
0.000	0.000	Yes	0.000 Vdc	5.12 Vdc
0.249	0.250	Yes	1.245 Vdc	5.12 Vdc
0.499	0.500	Yes	2.495 Vdc	5.12 Vdc
0.748	0.750	Yes	3.740 Vdc	5.12 Vdc
0.999	1.000	Yes	5.000 Vdc	5.12 Vdc

Notes: 0-5V set-point.

Tech Signature: _____



QC Signature: _____

• Calibration performed by Alicat Scientific, Inc. •

CS1 Rev 14 Last Modified 04/17/2007

CERTIFICATE

The permeation rate of the DYNACAL® PERMEATION DEVICE listed below is certified traceable to N.I.S.T. standards.

Serial Number: F-37106

Certification Date: Sep 29, 2010	Certificate Expires: Sep 29, 2011
Chemical: Nitrogen Dioxide	Part Number: 147-663-0081-C50
Device Type: Dynacal Wafer	Geometry: 60F3
Permeation Rate: 327.09 ng/min	Temperature: 50 C
True Accuracy: +/- 0.68 %	Max Allowed Accuracy: +/- 5.00 %
Certification Method: Gravimetric	Order No: 104248
Customer: VICI AG - VALCO EUROPE	

Approved By: _____



VICI Metronics, Inc.
26295 Twelve Trees Lane NW
Poulsbo, WA 98370
(360) 697-9199 Fax: (360) 697-6682



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 July 2010																														
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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
1:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
2:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
3:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
4:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
5:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
6:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
7:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
8:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
9:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
10:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
11:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
12:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
13:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
14:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
15:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
16:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
17:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
18:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
19:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
20:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
21:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
22:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
23:00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

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 - Summary of Hourly Average of NO₂ at AM3

Hourly Average NO ₂ (ppm ³) in August 2010															
Time / Date	1-Aug-10	2-Aug-10	3-Aug-10	4-Aug-10	5-Aug-10	6-Aug-10	7-Aug-10	8-Aug-10	9-Aug-10	10-Aug-10	11-Aug-10	12-Aug-10	13-Aug-10	14-Aug-10	15-Aug-10
000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	35.4	39.7	36.6	29.9	112.1	79.7	43.4	39.1	47.0	36.0	46.6	31.6	34.0	36.4	27.8
200	29.4	30.2	29.6	21.2	101.2	60.5	59.8	24.4	20.1	30.8	46.5	29.7	35.2	30.6	22.1
300	28.4	21.9	27.4	26.3	83.0	55.3	49.7	19.4	27.0	38.2	46.6	31.2	28.4	31.7	30.1
400	25.2	21.2	33.2	28.5	81.8	52.0	39.9	12.2	21.1	43.4	33.2	27.0	34.4	29.4	34.3
500	23.0	33.6	33.1	16.5	74.6	66.5	28.7	13.9	26.5	44.4	36.2	31.3	37.3	36.4	30.7
600	25.5	46.2	35.4	28.1	73.9	55.0	37.0	31.0	22.0	49.6	47.3	41.5	43.6	45.6	32.7
700	41.4	48.9	48.7	38.9	104.2	49.0	34.4	46.5	41.0	62.7	50.0	72.3	52.8	36.1	36.4
800	49.0	47.3	53.3	53.1	132.7	61.8	35.8	36.3	24.7	85.9	75.3	24.3	73.3	45.3	47.0
900	53.1	106.2	59.6	76.0	175.8	68.8	46.8	41.1	88.1	121.9	121.2	98.9	92.0	105.0	53.7
1000	31.5	37.6	77.9	60.1	119.0	78.7	46.5	51.6	69.0	120.3	144.3	102.1	137.1	75.6	54.6
1100	36.1	101.5	59.7	78.7	144.0	95.2	51.4	41.4	38.4	124.6	118.5	107.7	149.7	70.6	49.0
1200	40.9	45.6	46.6	47.8	110.3	86.4	45.1	44.5	67.7	85.6	98.6	75.2	44.3	107.3	47.5
1300	35.7	-	91.3	116.9	88.3	81.8	44.2	44.8	65.2	58.7	86.2	77.8	88.3	99.3	47.4
1400	35.7	79.1	80.8	135.3	97.2	61.7	47.1	56.2	67.0	81.7	98.1	66.8	75.3	89.9	41.5
1500	31.6	86.4	79.6	136.3	131.4	105.4	76.3	58.4	62.8	78.6	120.4	80.8	88.5	72.5	48.5
1600	33.0	73.0	79.0	217.3	132.7	113.7	124.6	66.2	66.4	91.3	109.4	84.6	286.7	126.3	51.1
1700	33.2	69.6	72.9	286.8	134.7	103.8	100.5	62.6	64.4	100.0	127.2	66.6	162.8	80.1	57.4
1800	34.1	99.1	88.4	207.0	151.6	99.0	100.7	107.2	74.2	98.7	130.9	80.2	90.2	79.7	59.5
1900	42.8	81.6	114.0	172.4	91.0	130.1	106.1	101.8	90.8	107.7	82.5	142.7	75.2	70.2	80.8
2000	44.4	60.6	75.8	174.0	133.3	87.6	102.8	102.7	83.8	78.2	70.3	87.7	137.8	56.3	41.7
2100	30.5	52.6	57.4	141.4	215.2	82.4	78.1	71.1	65.1	62.3	56.4	56.7	51.7	43.6	45.5
2200	27.2	48.0	61.4	133.7	79.3	63.6	61.3	61.2	58.8	48.1	52.7	57.4	49.5	49.1	
2300	29.0	37.0	49.0	103.1	91.6	62.8	52.1	52.1	50.3	54.2	39.0	49.8	59.8	47.0	40.7

Remarks
-
z/z

Hourly Average NO ₂ (ppm ³) in August 2010																
Time / Date	16-Aug-10	17-Aug-10	18-Aug-10	19-Aug-10	20-Aug-10	21-Aug-10	22-Aug-10	23-Aug-10	24-Aug-10	25-Aug-10	26-Aug-10	27-Aug-10	28-Aug-10	29-Aug-10	30-Aug-10	31-Aug-10
000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
100	24.1	27.8	31.2	21.1	31.5	92.0	36.5	17.4	27.0	26.6	46.3	47.3	55.5	123.7	75.0	80.5
200	28.6	361.2	28.9	19.4	31.6	76.9	22.7	16.0	25.1	25.4	38.6	48.6	50.9	98.1	70.8	82.1
300	20.1	103.2	28.4	14.9	29.8	26.3	13.1	9.9	22.3	26.0	26.9	42.0	53.1	40.8	78.5	69.2
400	21.3	122.2	28.6	14.7	25.7	23.9	17.4	11.2	12.1	35.1	45.6	45.9	56.4	68.3	82.4	61.6
500	29.1	21.2	33.2	17.3	21.7	27.9	17.6	11.6	14.9	30.5	42.8	50.8	59.8	49.5	72.8	72.4
600	24.8	33.9	42.1	28.6	32.6	23.7	20.0	21.4	21.2	34.2	42.2	53.9	67.5	67.3	64.6	80.6
700	42.0	52.9	42.4	38.9	24.2	30.6	21.6	38.6	27.2	36.3	59.9	81.6	77.3	75.8	79.0	101.6
800	44.8	44.8	81.7	58.9	88.1	99.1	32.4	45.2	34.6	82.5	69.5	99.6	120.6	75.0	102.3	122.3
900	89.0	117.6	63.6	74.9	100.0	99.0	49.3	73.7	68.9	62.6	101.7	93.3	158.7	74.3	155.3	161.2
1000	93.3	124.8	53.3	71.8	75.4	72.1	49.7	48.0	41.0	119.2	107.6	79.4	185.6	91.0	132.5	124.8
1100	76.7	100.2	60.4	55.7	80.1	47.0	54.9	43.2	34.6	68.1	111.8	102.0	232.2	109.8	149.3	122.9
1200	70.4	46.5	75.9	53.1	64.1	65.7	59.0	48.4	32.7	73.9	101.3	97.1	277.2	102.4	132.0	193.6
1300	61.0	103.7	57.0	54.6	67.6	69.6	43.8	54.5	38.9	70.3	80.2	65.5	151.6	98.4	132.4	129.2
1400	62.9	66.6	56.2	57.6	68.0	61.6	52.0	61.1	44.3	80.6	89.9	104.9	142.4	109.1	115.9	131.9
1500	86.1	73.1	60.9	52.3	101.2	79.0	58.4	50.4	67.2	80.8	102.9	119.2	175.3	149.5	140.4	216.1
1600	138.7	61.8	88.7	65.8	98.1	134.1	57.8	74.5	84.8	123.2	89.7	127.5	187.6	143.0	136.3	281.1
1700	62.4	70.7	45.0	74.7	104.9	95.4	62.8	68.5	125.4	105.8	90.7	101.1	200.5	120.7	198.2	170.6
1800	93.4	103.5	58.5	78.7	128.0	92.5	67.8	63.7	75.8	121.1	84.1	93.5	193.1	89.1	197.0	164.6
1900	138.5	73.5	101.8	75.8	151.6	80.9	71.8	78.4	83.8	138.2	80.3	81.9	152.3	88.7	196.5	208.7
2000	76.4	58.2	47.7	66.4	119.8	87.8	56.8	55.9	92.7	73.3	68.3	54.8	157.9	87.3	114.4	183.0
2100	62.2	37.1	37.7	99.1	117.9	79.1	42.5	45.8	44.7	46.1	53.7	54.5	146.5	73.8	91.3	203.5
2200	69.5	45.1	45.5	49.2	105.2	63.6	38.2	38.1	37.0	51.0	57.7	48.4	138.6	69.0	92.2	186.6
2300	55.5	45.3	39.2	98.1	94.4	52.1	38.1	33.5	45.7	52.7	55.8	50.0	114.4	74.6	109.3	119.6

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

Annex G - Summary of Hourly Average of NO₂ at AM3

Hourly Average NO ₂ (µg/m ³) in September 2010															
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	88.3	60.0	63.6	49.5	36.8	59.8	21.8	25.6	68.6	63.2	98.0	42.6	39.5	22.8	40.9
2:00	71.0	63.3	43.0	36.2	32.4	38.8	14.3	38.9	65.2	45.1	82.5	52.7	42.2	24.5	33.6
3:00	64.9	36.6	39.2	35.4	23.5	40.7	15.3	43.5	40.4	33.3	82.8	62.6	33.9	20.4	26.1
4:00	64.7	63.1	58.2	31.7	16.1	50.4	13.6	43.7	49.1	50.4	69.6	63.8	30.3	17.4	26.8
5:00	63.4	55.2	78.9	40.5	34.2	54.2	23.0	43.7	79.9	61.6	69.7	60.2	26.1	18.9	23.8
6:00	70.0	34.6	81.5	48.4	30.6	57.5	35.3	42.9	87.2	70.3	76.0	55.2	28.2	30.7	37.4
7:00	88.6	69.7	102.6	65.0	35.9	88.4	46.3	49.5	95.5	89.2	78.3	65.5	38.0	45.0	49.9
8:00	147.5	129.0	151.4	84.0	77.6	102.3	68.4	79.9	108.5	123.7	115.7	57.1	58.5	70.5	70.0
9:00	172.6	126.1	141.8	119.1	68.2	108.4	121.8	84.4	129.9	128.8	117.1	68.2	50.5	84.8	84.3
10:00	128.1	120.4	158.4	112.2	83.0	117.4	77.8	93.4	120.2	101.9	112.6	48.1	71.0	85.6	79.8
11:00	143.5	97.7	125.9	123.7	71.2	115.9	68.9	103.7	125.3	110.4	79.6	69.8	66.9	66.4	66.8
12:00	122.8	85.0	92.1	133.7	70.1	101.2	64.1	127.3	146.1	114.9	86.9	77.5	69.7	56.0	69.8
13:00	122.1	112.5	113.2	92.8	67.4	93.8	57.5	195.6	152.4	127.1	92.4	59.2	61.8	57.3	74.9
14:00	114.6	152.7	93.9	108.7	78.1	106.8	74.5	213.9	134.9	190.5	105.8	80.9	55.8	85.1	55.4
15:00	101.5	173.0	138.8	106.3	80.0	137.4	75.7	272.1	169.1	227.7	114.6	73.8	61.4	71.8	63.7
16:00	129.9	163.3	162.5	76.4	53.6	122.5	93.4	293.6	220.8	241.7	151.8	69.4	66.9	65.2	77.5
17:00	156.9	150.5	-	79.8	68.8	91.0	82.4	270.1	164.8	255.3	142.2	90.7	71.0	85.6	82.8
18:00	220.7	165.8	129.2	62.8	64.9	126.8	84.7	222.7	194.1	197.0	101.4	71.5	58.9	101.5	128.4
19:00	265.1	194.7	156.2	55.7	72.2	146.5	118.7	304.2	227.1	172.1	85.3	67.3	70.2	75.4	90.7
20:00	196.7	103.4	110.2	49.2	76.4	61.4	62.9	97.4	195.4	124.5	65.2	53.2	57.0	80.5	90.4
21:00	114.6	78.1	94.1	45.0	66.6	50.3	54.5	80.8	157.6	80.9	69.7	57.2	40.9	62.3	43.3
22:00	60.8	67.9	93.4	42.1	57.0	37.5	61.7	135.7	86.3	57.9	50.9	44.6	67.0	53.0	53.0
23:00	84.3	63.3	70.3	47.0	54.6	33.9	44.0	101.5	122.4	68.5	52.9	54.1	39.9	67.6	47.4

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
 Exceedance recorded

Hourly Average NO ₂ (µg/m ³) in September 2010															
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	44.3	35.5	29.3	47.1	84.2	50.4	37.2	37.0	78.4	34.3	35.8	35.8	38.9	49.1	72.2
2:00	36.8	35.6	29.5	48.4	*	39.4	35.1	27.8	45.8	30.3	29.2	21.1	35.9	42.7	54.3
3:00	28.1	34.4	25.6	42.7	*	38.4	29.4	41.0	38.7	24.6	19.6	29.2	35.8	48.8	48.3
4:00	27.1	32.5	32.4	65.4	48.7	27.1	25.0	28.9	27.3	18.0	24.6	18.5	31.7	46.0	43.9
5:00	34.1	33.7	40.3	70.1	88.9	25.6	21.1	40.6	15.6	12.5	21.0	26.3	34.9	37.0	43.1
6:00	104.7	33.5	41.7	70.9	133.1	21.5	33.0	34.8	33.8	29.7	29.2	38.4	46.1	42.3	49.3
7:00	75.9	45.8	46.2	68.0	102.0	60.8	45.7	39.1	40.9	37.8	55.7	63.2	52.3	44.4	57.5
8:00	90.9	67.7	71.3	51.3	119.9	112.8	79.3	42.3	65.3	62.5	62.0	97.4	67.8	65.9	73.8
9:00	146.3	81.6	80.3	46.4	*	98.1	98.4	49.3	83.2	74.9	62.8	81.8	89.0	72.4	76.7
10:00	151.5	93.6	65.1	56.4	77.6	123.1	71.6	48.3	71.7	73.4	69.3	74.7	73.2	67.0	70.7
11:00	133.1	73.1	95.4	57.1	*	82.4	68.0	42.3	61.9	78.4	73.6	74.4	74.3	70.7	66.1
12:00	101.0	72.0	99.9	60.6	*	107.8	71.4	35.5	66.5	78.3	64.4	75.2	69.1	76.9	65.7
13:00	123.3	120.2	116.7	64.5	*	87.8	65.0	54.6	65.0	76.0	76.7	77.2	70.3	75.9	67.3
14:00	98.0	112.2	152.0	88.1	*	92.4	77.8	61.1	64.0	82.4	59.6	70.3	66.4	75.0	79.8
15:00	100.1	128.9	154.9	91.7	178.2	106.0	66.0	64.9	79.1	72.9	61.2	78.1	77.7	79.6	79.9
16:00	106.9	142.7	213.4	89.3	264.7	150.8	61.0	63.7	83.5	117.0	60.7	77.4	84.6	89.4	84.8
17:00	106.8	164.0	149.0	160.5	214.1	109.8	135.9	68.0	118.8	79.4	69.3	83.6	89.4	104.1	113.0
18:00	103.2	117.2	107.5	176.1	153.8	104.3	90.6	77.4	99.5	88.0	77.6	82.0	79.9	101.2	118.9
19:00	64.4	256.8	113.7	146.6	296.1	114.3	70.7	87.0	79.9	89.1	103.6	80.1	81.3	81.3	113.2
20:00	81.4	84.0	90.5	108.2	124.6	89.1	55.2	76.1	71.8	84.7	80.8	75.7	70.4	78.7	88.6
21:00	66.0	63.5	80.8	113.0	96.2	73.2	40.1	69.6	66.3	75.9	66.6	58.3	69.9	61.9	76.6
22:00	49.1	47.4	78.7	127.6	70.7	51.5	31.7	70.1	60.5	65.8	57.7	54.2	62.0	65.7	66.6
23:00	43.4	53.7	67.4	111.1	39.7	46.1	38.3	87.2	58.3	59.3	53.3	48.9	58.7	65.3	47.7

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 - Summary of Hourly Average of NO₂ at AM3

Hourly Average NO ₂ (µg/m ³) in Reporting Month															
Time / Date	1-Oct-10	2-Oct-10	3-Oct-10	4-Oct-10	5-Oct-10	6-Oct-10	7-Oct-10	8-Oct-10	9-Oct-10	10-Oct-10	11-Oct-10	12-Oct-10	13-Oct-10	14-Oct-10	15-Oct-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	18.3	22.6	37.5	40.8	26.4	34.0	30.1	38.9	34.4	32.4	23.2	31.1	35.8	45.2	35.2
2:00	19.0	21.2	44.1	30.8	28.9	27.7	28.0	32.4	29.9	29.7	19.8	22.8	27.4	45.1	31.9
3:00	18.7	20.6	30.8	24.1	28.6	27.8	20.2	26.3	29.9	22.8	21.1	18.3	19.2	25.4	27.2
4:00	16.6	19.4	35.2	19.1	27.3	35.4	18.8	28.0	22.0	27.9	21.4	22.7	19.9	22.0	23.2
5:00	16.5	13.3	21.8	20.1	24.3	21.6	26.0	27.6	20.1	24.6	22.8	18.0	22.3	19.7	22.5
6:00	24.2	21.0	22.2	25.5	30.0	22.9	29.3	25.9	34.3	22.5	16.7	22.9	35.3	31.6	26.3
7:00	32.5	37.2	27.3	35.1	42.9	41.5	47.1	39.7	51.9	47.9	32.0	61.8	50.7	50.6	41.4
8:00	35.0	56.9	37.9	59.3	81.1	65.1	90.0	91.7	82.5	44.3	50.9	87.6	67.5	91.5	62.9
9:00	36.0	63.1	44.0	81.9	115.5	91.6	95.8	115.6	144.0	57.6	95.8	126.1	116.0	97.9	106.4
10:00	40.1	56.2	33.0	66.9	140.8	101.0	80.3	93.1	73.1	82.7	63.5	90.1	97.4	117.5	78.4
11:00	36.4	67.0	59.8	78.9	84.9	94.8	87.5	97.3	77.2	52.7	69.6	90.4	108.5	88.3	72.7
12:00	47.4	52.0	42.0	56.7	55.1	74.0	77.2	85.7	74.5	48.4	74.1	93.4	78.3	79.5	73.8
13:00	46.8	98.0	59.1	60.4	67.2	100.6	116.9	98.2	71.1	40.3	61.1	82.2	88.9	80.3	76.5
14:00	57.4	93.0	63.8	78.4	105.1	88.7	99.8	94.4	67.8	45.9	71.8	76.8	68.6	87.4	88.2
15:00	50.8	74.3	70.9	90.1	119.2	95.9	96.0	129.4	74.2	44.4	77.9	75.2	94.8	110.7	72.7
16:00	50.7	75.0	69.5	99.8	178.6	110.6	114.1	111.9	99.8	55.0	93.5	87.9	70.7	98.7	71.4
17:00	65.3	77.1	61.1	111.5	114.1	105.7	134.0	111.9	82.7	49.1	87.8	105.6	78.8	98.2	67.2
18:00	67.4	87.6	70.7	119.5	135.5	125.5	113.5	128.4	80.4	56.5	105.9	84.9	105.5	121.2	107.1
19:00	51.4	89.6	74.0	139.9	127.7	92.0	108.9	90.6	72.0	53.2	80.1	112.9	103.5	110.1	98.8
20:00	30.8	91.6	49.8	76.1	97.9	80.4	99.4	72.2	66.4	40.6	53.1	100.4	137.8	69.2	75.5
21:00	27.9	93.2	61.2	56.7	67.4	57.3	72.3	55.0	68.5	38.0	58.3	52.6	53.3	51.8	60.1
22:00	56.0	67.1	57.6	54.1	88.8	53.9	64.8	50.7	57.5	45.8	60.0	99.8	38.5	56.9	68.5
23:00	45.8	57.9	50.6	60.4	83.5	59.8	74.9	52.7	57.1	41.9	56.0	49.9	60.3	52.5	68.4

Remarks

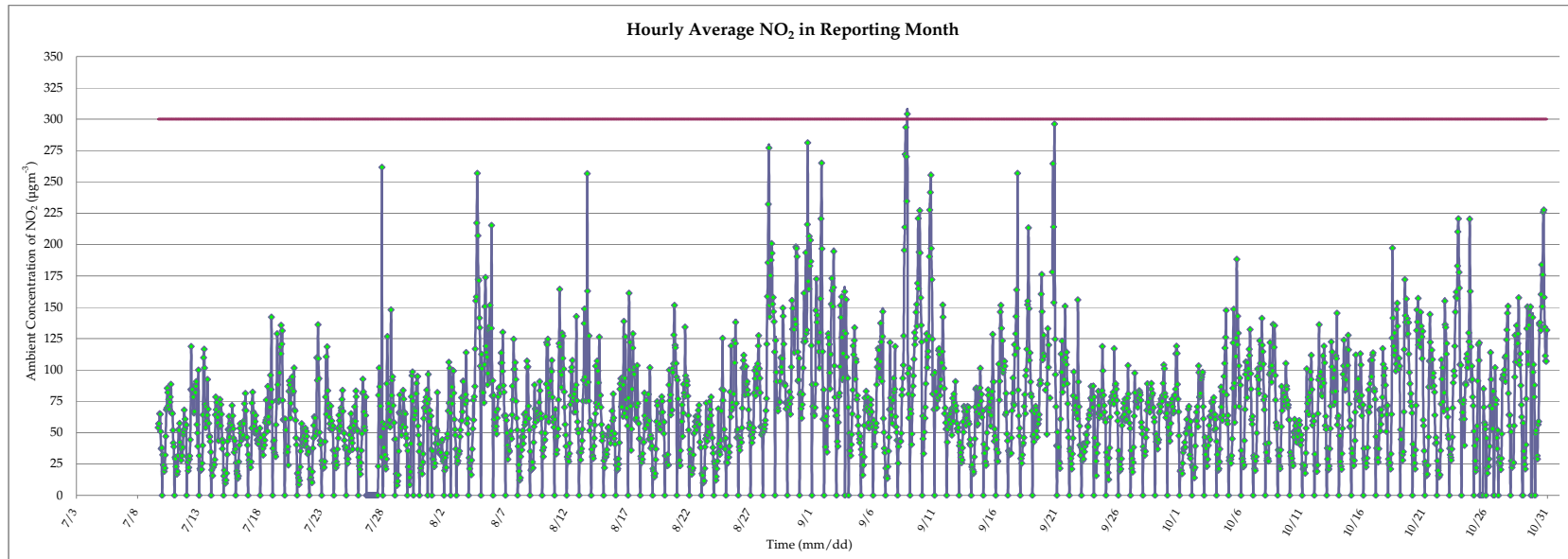
- Analyzer Calibration in Progress
- z/s Zeno-span check in progress. Less than 40 minutes of data is collected in the reporting period and is therefore not presented.
- * Less than 40 minutes of valid data is collected in the period and is therefore flagged and not presented
- Multi-point calibration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

Hourly Average NO ₂ (µg/m ³) in Reporting Month																
Time / Date	16-Oct-10	17-Oct-10	18-Oct-10	19-Oct-10	20-Oct-10	21-Oct-10	22-Oct-10	23-Oct-10	24-Oct-10	25-Oct-10	26-Oct-10	27-Oct-10	28-Oct-10	29-Oct-10	30-Oct-10	31-Oct-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
1:00	35.4	44.5	27.4	49.8	38.6	25.4	26.0	35.5	57.5	48.5	43.2	25.1	48.0	54.8	46.7	75.5
2:00	27.8	35.8	24.3	42.3	30.3	23.0	18.8	30.8	62.8	37.5	20.9	28.6	26.1	33.3	48.9	82.5
3:00	26.7	27.3	22.9	32.1	22.3	16.6	14.9	28.6	69.4	26.1	16.8	22.7	21.0	29.5	28.2	67.4
4:00	24.4	28.4	24.8	30.7	24.5	14.8	14.1	26.6	72.2	18.4	22.4	24.3	23.6	23.5	30.1	65.9
5:00	21.5	25.2	19.9	26.6	19.9	16.1	15.3	35.0	57.8	20.8	21.8	19.6	25.0	20.0	27.5	58.1
6:00	24.2	35.3	31.3	33.1	34.2	22.7	15.5	44.2	37.9	42.4	27.6	28.0	24.7	38.3	53.5	65.0
7:00	28.2	64.9	61.4	63.2	68.0	44.2	34.0	66.1	84.2	52.5	37.2	46.6	52.7	73.2	55.9	86.6
8:00	36.3	64.8	119.1	110.4	124.8	82.0	69.2	85.2	84.9	86.5	67.6	87.9	89.5	126.3	130.4	89.5
9:00	64.2	48.8	187.1	163.3	140.4	101.8	102.6	94.1	83.6	114.0	108.1	89.2	121.2	142.6	128.9	67.5
10:00	80.0	53.9	134.3	136.0	131.2	136.9	87.9	90.4	103.4	102.0	87.7	91.2	101.1	108.5	130.9	78.9
11:00	62.8	64.9	112.8	131.0	149.2	115.8	96.5	112.9	106.8	115.4	50.4	91.0	101.1	99.2	124.7	60.1
12:00	67.0	60.5	106.0	148.7	113.8	102.0	70.8	138.7	96.6	65.8	95.0	128.6	152.1	127.2	72.7	
13:00	84.6	74.3	122.9	121.7	117.5	82.2	63.6	150.3	101.0	50.3	104.5	114.0	141.4	174.5	107.7	
14:00	101.8	111.1	109.7	133.8	127.9	109.8	77.6	153.9	123.1	78.7	86.0	114.9	136.1	143.0	111.9	
15:00	102.5	99.2	94.2	122.2	112.3	102.9	146.9	149.0	116.4	105.6	122.3	142.7	167.0	132.7	127.7	
16:00	89.8	90.7	99.3	130.8	138.6	89.4	128.1	173.8	209.2	117.7	149.5	149.5	214.3	127.7	127.7	
17:00	102.4	83.4	140.7	106.8	127.9	92.5	127.1	199.4	154.4	73.4	125.2	102.2	216.0	155.1	155.1	
18:00	106.2	96.3	145.3	92.9	120.1	83.0	106.8	209.4	112.5	96.6	137.9	98.7	149.9	162.7	140.0	
19:00	108.0	83.3	128.0	84.5	103.5	78.1	115.0	168.9	87.2	80.7	69.0	143.1	107.3	127.4	140.0	
20:00	79.2	67.4	97.0	70.8	124.2	60.8	65.2	156.8	97.8	66.7	72.1	77.3	83.1	93.1	105.6	134.8
21:00	80.7	48.4	95.5	76.9	57.0	39.1	59.2	98.9	87.7	54.9	43.5	60.9	68.4	98.9	101.6	123.8
22:00	78.9	61.1	103.8	67.5	52.6	43.8	45.6	71.5	74.5	53.4	35.2	52.7	59.4	74.5	101.5	135.7
23:00	72.7	68.1	97.7	62.4	33.8	38.8	43.0	98.5	67.8	50.1	49.2	60.7	61.5	83.3	125.0	108.3

Remarks

- Analyzer Calibration in Progress
- z/s Zeno-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
- Multi-point calibration check in progress

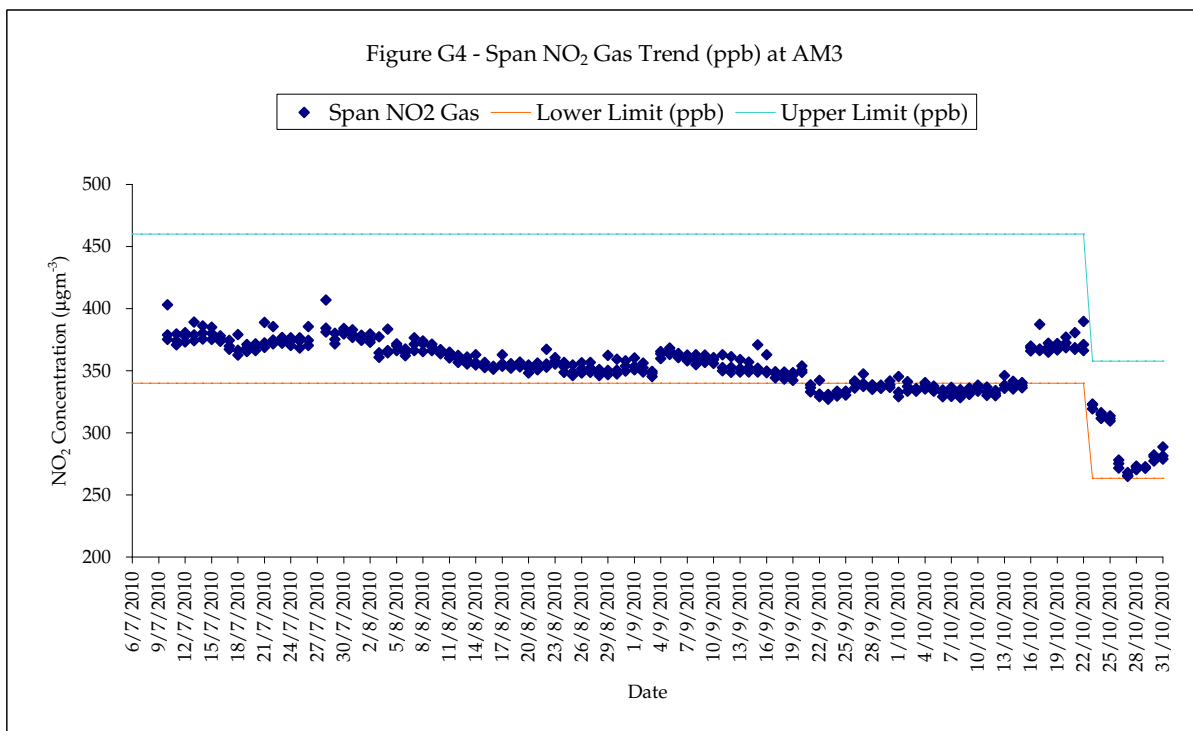
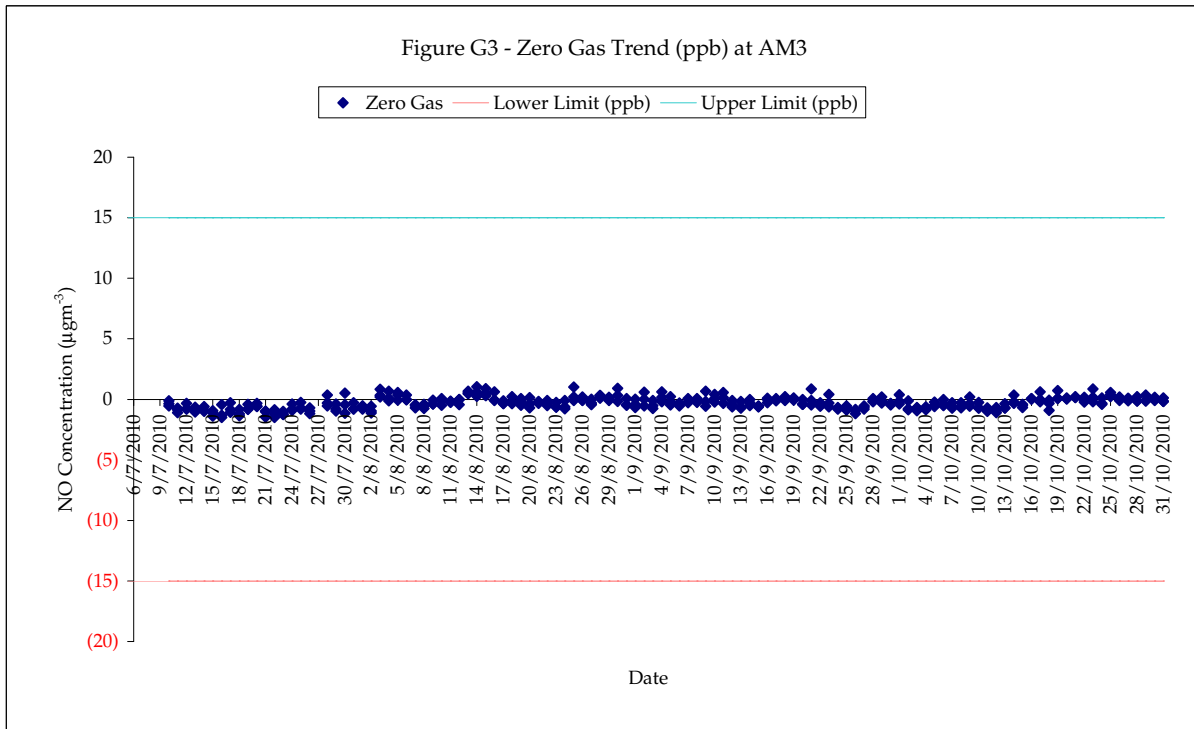
Annex G - Graphical Presentation of Hourly Average of NO₂ at AM3



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



Note:
 Manul span gas checks were implemented from late-August on a weekly basis and confirmed the readings by the analyzer were valid. The Pmeration Tube has been replaced on 22 October 2010. Concentration of NO gas has been changed to 311 ppb NO.

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)
8-Oct-10	467.6	7.8	8.3±0.8	Y	Y
15-Oct-10	473.5	7.9	8.3±0.8	Y	Y
22-Oct-10	475.9	7.9	8.3±0.8	Y	Y
29-Oct-10	477.7	8.0	8.3±0.8	Y	Y

NO₂ Analyzer Multi-point Calibration Check Results

Multi-point Check Results at AM3 (Under Atrium Link Extension)

Standard NO Gas Concentration by Mass Flow Controller (ppb)	Flow of Mass Flow Controller from 0ppb NO Gas (cm ³ /min)	Flow of Mass Flow Controller from 400ppb NO Gas (cm ³ /min)	NO Gas Concentration by Analyzer (ppb)	Amount of Drifting
0	0.51	0.00	0.26	0.26*
90	0.408	0.102	85.2	-5.4%
150	0.319	0.191	145.3	-3.1%
200	0.255	0.255	193.9	-3.1%
320	0.102	0.408	316.3	-1.2%
400	0.000	0.510	399.9	0.0%

Notes:

* - Drifting is absolute value