AIR QUALITY
IN HONG KONG 2008

Air Science Group

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Environmental Protection Department

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The Government of the Hong Kong
Special Administrative Region

A report on the results from the Air Quality Monitoring Network (AQMN) (2008)

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Summary

This report summarises the 2008 air quality monitoring data collected by the Environmental Protection Department's monitoring network.

As a result of the enhanced vehicle emission control programme implemented by the Government since 2000, concentrations of respirable suspended particulates, nitrogen oxides and sulphur dioxide at roadside have reduced over the past decade.

Concentrations of ozone have been on a slow rising trend since 1990, reflecting a deterioration in regional air quality. On this front, the Hong Kong Special Administrative Region Government and the Guangdong Provisional Government are implementing a Regional Air Quality Management Plan to improve air quality in the Pearl River Delta Region.

As in previous years, concentrations of sulphur dioxide, carbon monoxide and lead remained at levels well below their respective Air Quality Objectives limits in 2008.

C O N T E N T S

Appendices

List of Tables

List of Figures

1. Introduction

The Environmental Protection Department (EPD) operates a network of 14 air quality monitoring stations for measuring concentrations of major air pollutants. It consists of 11 general stations for monitoring ambient air quality and three roadside stations for measuring street level air quality. Details of these monitoring stations are shown in Table B1 of Appendix B.

Additional monitoring facilities specifically designed for collecting Toxic Air Pollutants (TAPs) samples have been installed at the Tsuen Wan and Central/Western monitoring stations since 1997.

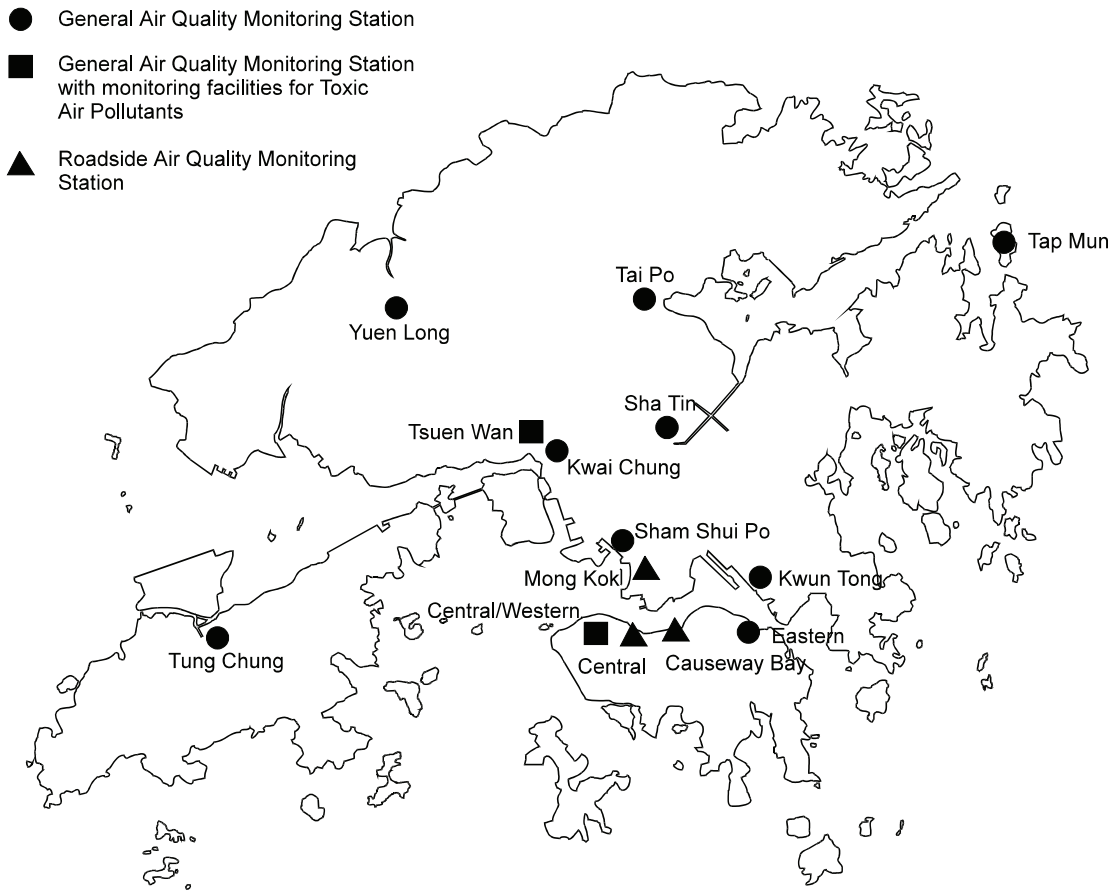


Figure 1: Location of EPD's Air Quality Monitoring Stations (2008)

Apart from EPD's network, the Hongkong Electric Co. Ltd. (HEC) and the CLP Power Hong Kong Limited (CLP) also operate a number of monitoring stations to assess the ambient levels of sulphur dioxide and nitrogen dioxide in the vicinity of their power generating stations. The locations of these monitoring stations and the relevant monitoring results in 2008 are at Appendix D.

2. Gaseous Pollutants

2.1 Sulphur Dioxide (SO_2)

Sulphur dioxide (SO_2) is formed primarily from the combustion of sulphur-containing fossil fuels. In Hong Kong, power stations are the major sources of SO_2, followed by marine vessels, fuel combustion and motor vehicles.

Exposure to high levels of SO_2 may cause impairment of respiratory function and aggravate existing respiratory and cardiac illnesses. Prolonged exposure at lower levels may also increase the risk of developing chronic respiratory diseases.

Figure 2a: Sulphur Dioxide Monitoring 2008
(1-Hour Average Statistics)

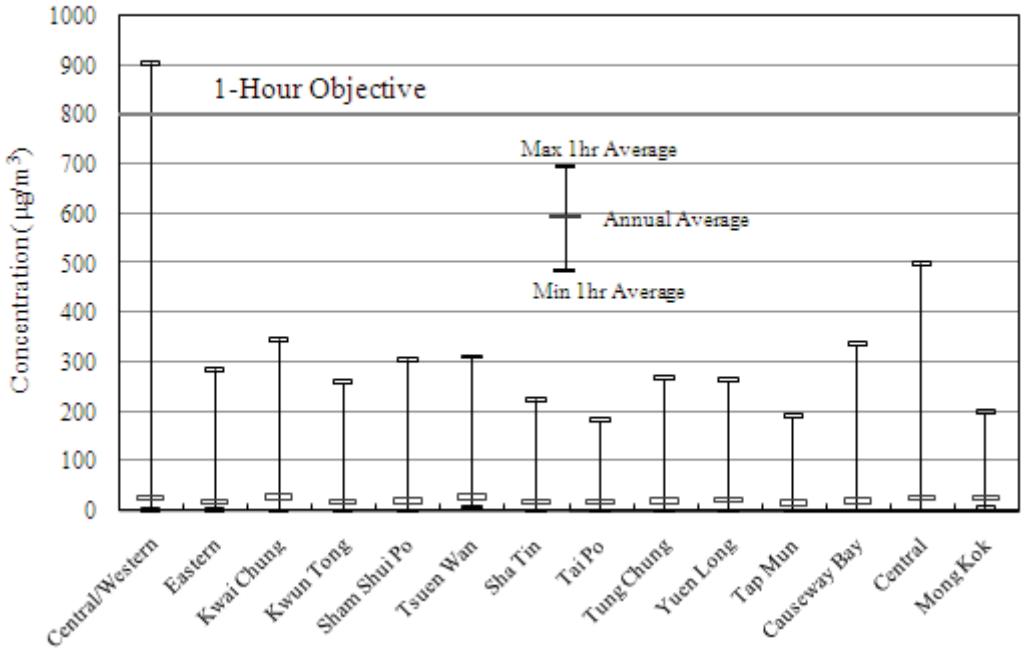


Figure 2b: Sulphur Dioxide Monitoring 2008
(24-Hour Average Statistics)

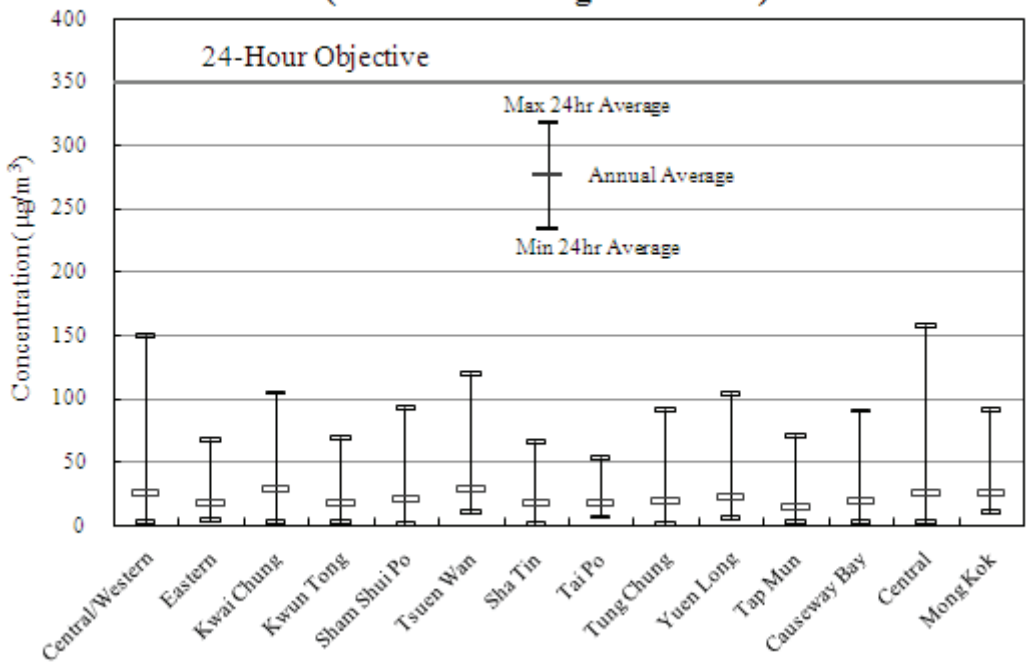
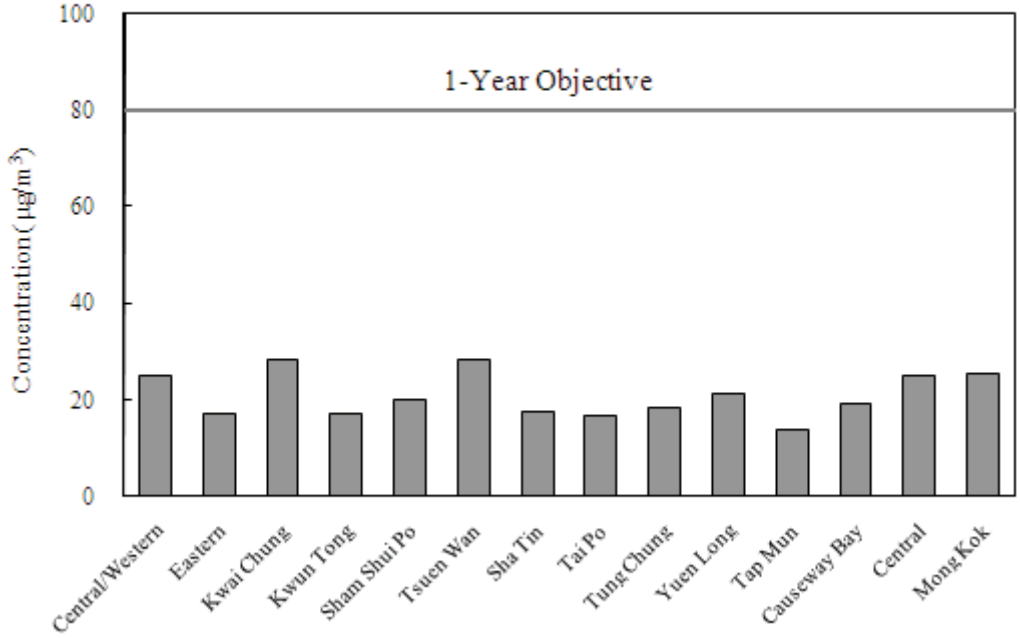


Figure 2c: Sulphur Dioxide Monitoring 2008 (Annual Average)



Sulphur dioxide was continuously measured at all the 14 monitoring stations during 2008. As in previous years, SO_2 concentrations remained low throughout the territory in 2008. All of the 14 monitoring stations complied with the relevant short and long term Hong Kong Air Quality Objectives[1] (AQOs) for SO_2. The highest 1-hour average (904 µg/m^3) was recorded at the Central/Western station. The Central roadside station had the highest 24-hour average (157 µg/m^3) in the year. As for the annual average, the Kwai Chung station and Tsuan Wan station both recorded the highest value (28 µg/m^3) in the year. The highest 24-hour average and the highest annual averages were well below their respective AQO limits.

2.2 Nitrogen Oxides (NO_x) and Nitrogen Dioxide (NO_2)

The various chemical species of the oxides of nitrogen are collectively termed as nitrogen oxides. From an air pollution standpoint, the most important nitrogen oxides in the atmosphere are nitric oxide (NO) and nitrogen dioxide (NO_2). These two gases, which are often mentioned jointly in the air pollution literature as NO_x, usually enter the atmosphere as a result of combustion processes. Emissions from power stations and motor vehicles are the two major sources of NO_x in Hong Kong. NO_x emissions from motor vehicles have great impact on roadside air quality.

Nitrogen dioxide (NO_2) is mainly formed from oxidation of nitric oxide (NO) emitted from fuel combustion. Long-term exposure to NO_2 can lower a person's resistance to respiratory infections and aggravate existing chronic respiratory diseases.

Nitrogen dioxide was continuously measured at all the 14 monitoring stations during 2008. In 2008, the highest 1-hour average (346 µg/m^3) and the highest 24-hour average (209 µg/m^3) were both recorded at the Central roadside station. Among all 14 stations, only the Central roadside station breached the 1-hour AQO (i.e., with the 1-hour AQO limit exceeded more than three times in the year). Regarding the 24-hour AQO, the Kwai Chung station and the three roadside stations at Causeway Bay, Central and Mong Kok violated the AQO for NO_2 (i.e., with the 24-hour AQO limit exceeded more than once in the year).

[1] The Hong Kong Air Quality Objectives can be found in Appendix A.

As in previous years, all general stations complied with the annual AQO for NO_2 in 2008 while non-compliance was observed at the three roadside stations. The highest annual average (102 $\mu g/m^3$) was recorded at the Central roadside station in the year.

Figure 3a: Nitrogen Dioxide Monitoring 2008
(1-Hour Average Statistics)

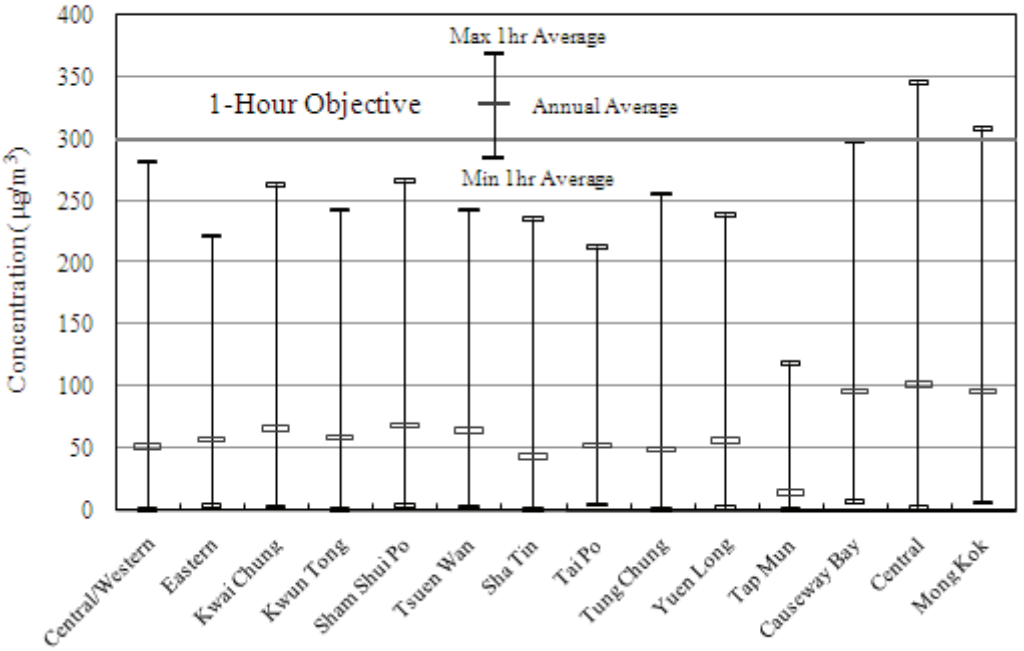


Figure 3b: Nitrogen Dioxide Monitoring 2008
(24-Hour Average Statistics)

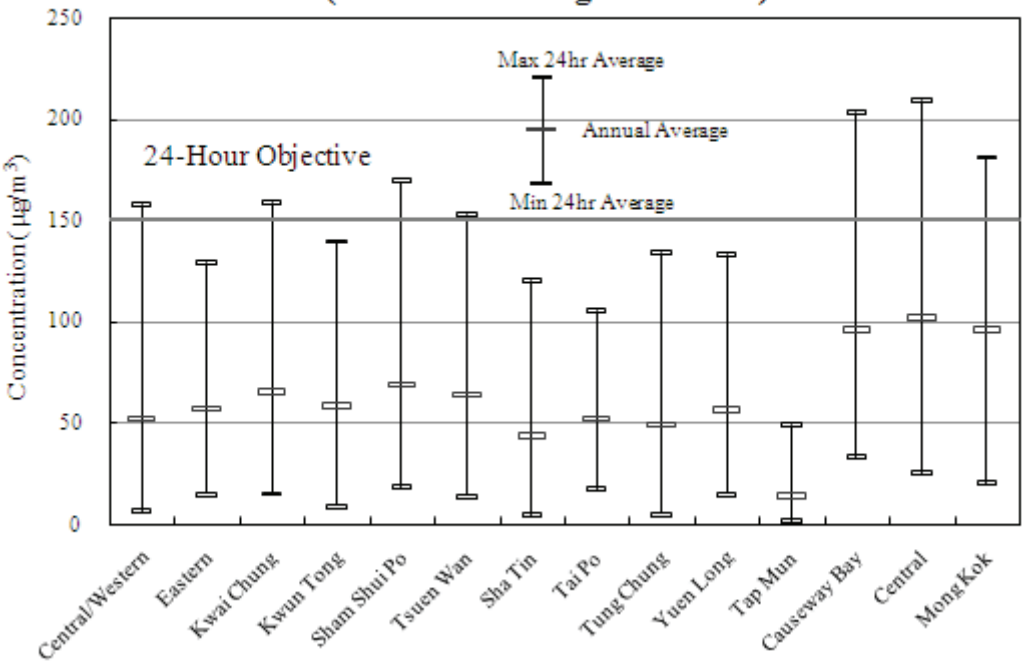
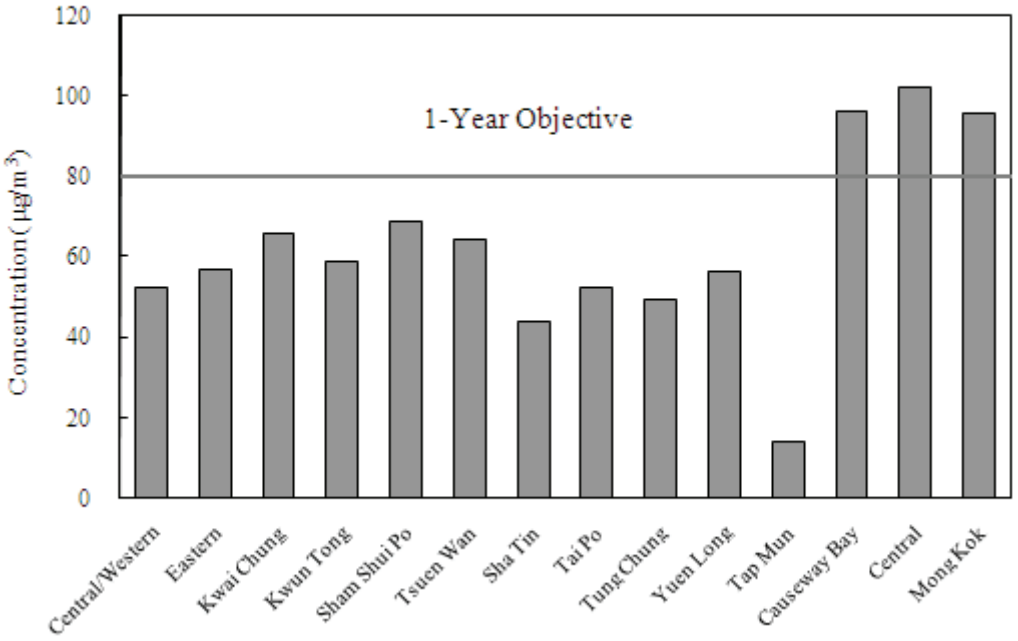


Figure 3c: Nitrogen Dioxide Monitoring 2008 (Annual Average)



2.3 Ozone (O_3)

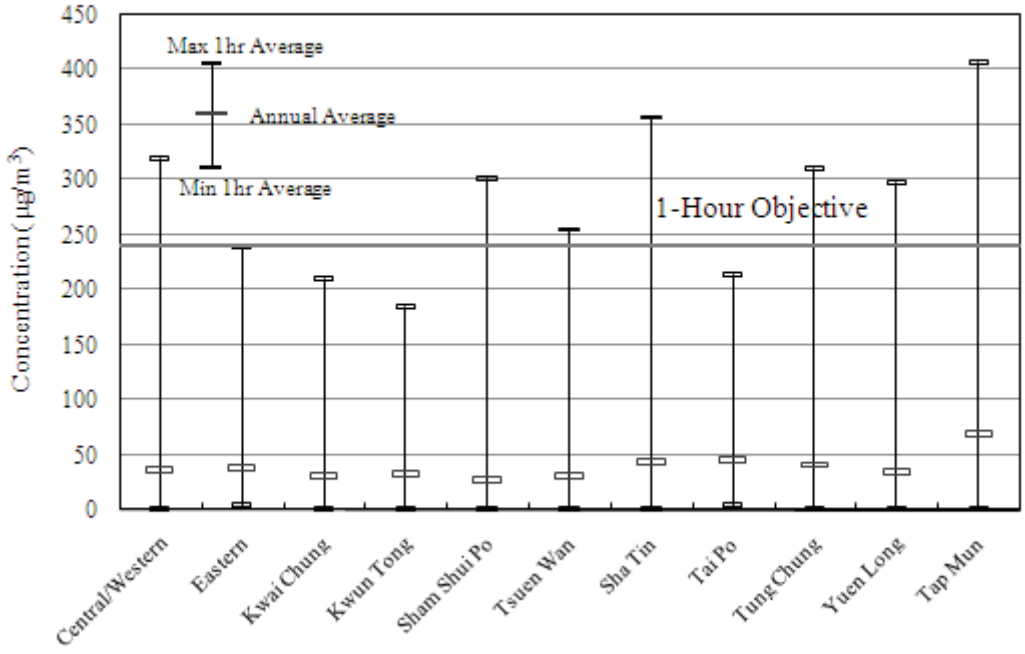
Ozone (O_3) is a major constituent of photochemical smog. It is not a pollutant directly emitted from man-made sources but formed by photochemical reactions of other primary pollutants such as nitrogen oxides (NOx) and volatile organic compounds (VOCs) under sunlight. As it takes several hours for these photochemical reactions to take place, O3 recorded in one place could be attributed to VOC and NOx emissions from places afar. Hence, ozone is a regional air pollution problem.

Being a strong oxidant, ozone can cause irritation to the eyes, nose and throat even at low concentrations. At elevated levels, it can increase a person's susceptibility to respiratory infections and aggravate pre-existing respiratory illnesses such as asthma.

Among the 11 general stations with ozone measurement, five of them violated the 1-hour AQO in 2008 (i.e., with the 1-hour AQO limit exceeded more than three times in the year). The highest 1-hour average (407 μg/m^3) was recorded at the Tap Mun station, followed by the Sha Tin station (357 μg/m^3) and the Central/Western station (320 μg/m^3).

In Hong Kong, elevated ozone incidents are mostly associated with very hot, fine and calm weather conditions in the region which favour the photochemical formation and accumulation of ozone. Such weather conditions mostly occur in summer and autumn, especially when Hong Kong and the Pearl River Delta Region is under the influence of subsiding air induced by a tropical cyclone located in the Western Pacific Ocean near Taiwan.

Figure 4a: Ozone Monitoring 2008
(1-Hour Average Statistics)



2.4 Carbon Monoxide (CO)

Carbon monoxide (CO) comes mainly from vehicular emissions although a small amount of which may also come from incomplete combustion of fuels from factories and power stations. When it enters the bloodstream, CO can reduce oxygen delivery to the body's organs and tissues. Typical symptoms of CO poisoning include shortness of breath, chest pain, headaches, and loss of co-ordination. The health threat from CO is more severe for those who suffer from heart diseases.

Carbon monoxide was continuously monitored at seven stations including four general stations and three roadside stations during 2008. Similar to previous years, both the ambient and roadside CO concentrations remained very low throughout the year. All the seven monitoring stations complied with the 1-hour and 8-hour AQOs for CO. In 2008, the highest 1-hour average (5290 µg/m^3) and the highest 8-hour average (3780 µg/m^3) were both recorded at the Causeway Bay station; these values were around one fifth and two fifths of the respective AQO limits.

Figure 5a: Carbon Monoxide Monitoring 2008
(1-Hour Average Statistics)

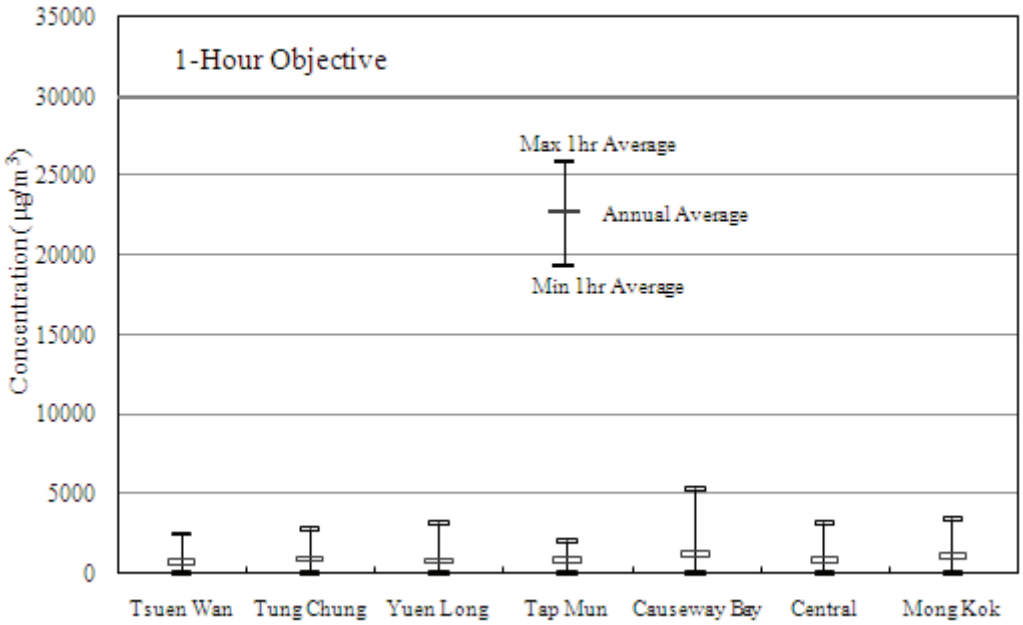
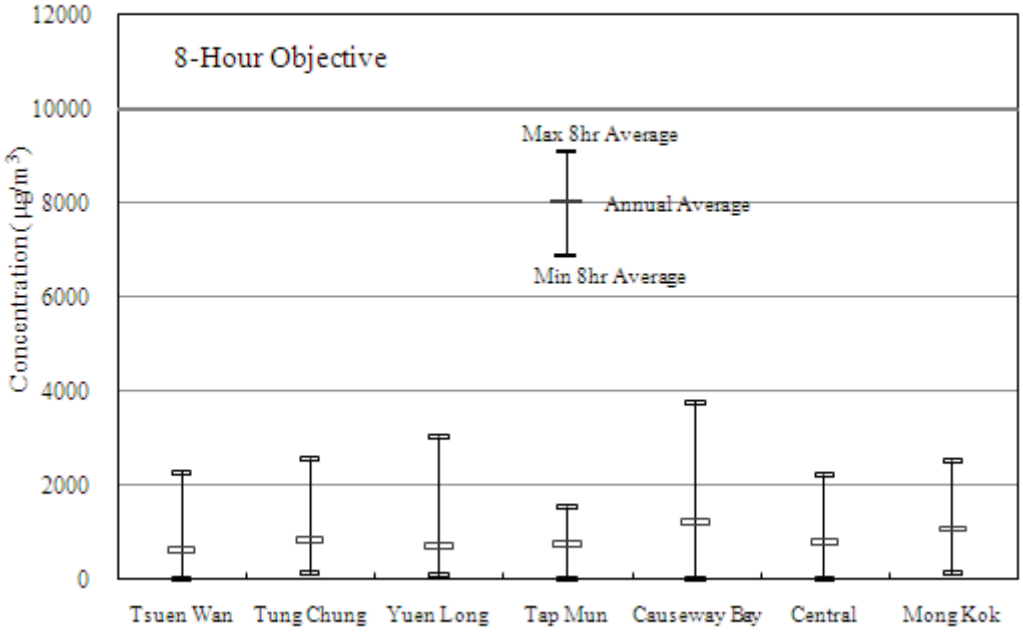


Figure 5b: Carbon Monoxide Monitoring 2008
(8-Hour Average Statistics)



3. Suspended Particulates

3.1 Total Suspended Particulates (TSP)

Total suspended particulates (TSP) are small airborne particulates such as dust, fume and smoke with diameters less than 100 micrometres. Major sources of TSP include power stations, construction activities and vehicle exhausts. TSP can be broadly divided into two major types. Suspended particulates with a nominal aerodynamic diameter of 10 micrometres or less are called respirable suspended particulates (RSP), or PM10 for short, and are usually of much greater health concern (see Section 3.2 below). On the other hand, suspended particulates that are larger than 10 micrometres in diameter mainly cause soiling and dust nuisance.

TSP measurement was conducted by sampling using high-volume samplers at nine general stations and one roadside station during 2008.

All stations complied with the 24-hour AQO (260 μg/m^3) for TSP in 2008. The highest 24-hour average (227 μg/m^3) was recorded at the Kwai Chung station in the year. Exceedance of the annual AQO for TSP (80 μg/m^3) was observed at the Mong Kok roadside station, the Yuen Long and Sham Shui Po general stations respectively. As in the previous years, the highest annual average (108 μg/m^3) was recorded at the Mong Kok roadside station.

Figure 6a: TSP Monitoring 2008
(24-Hour Average Statistics)

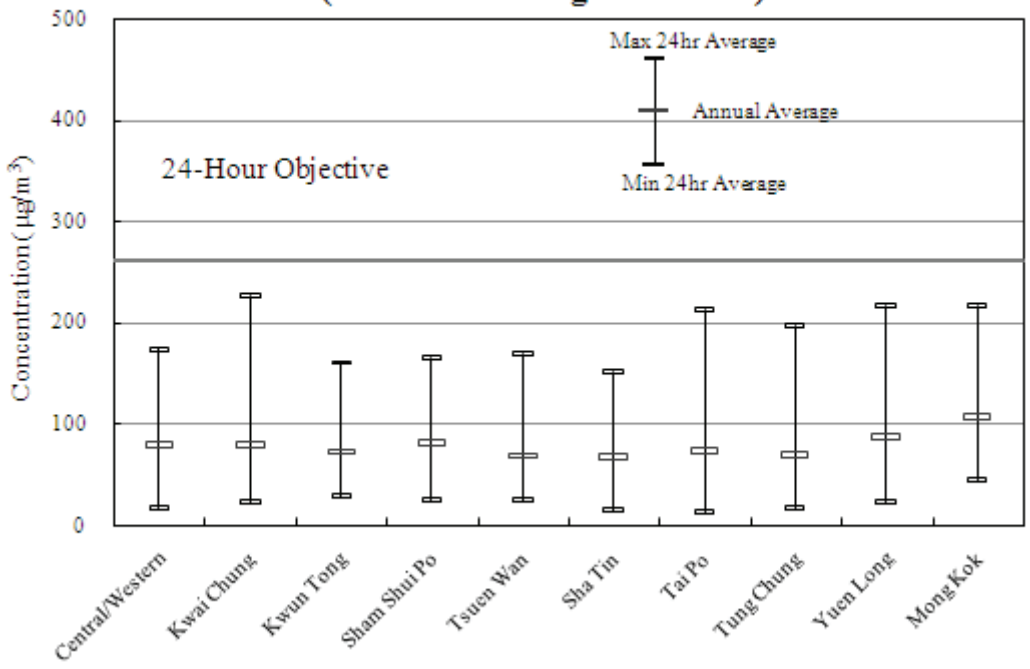
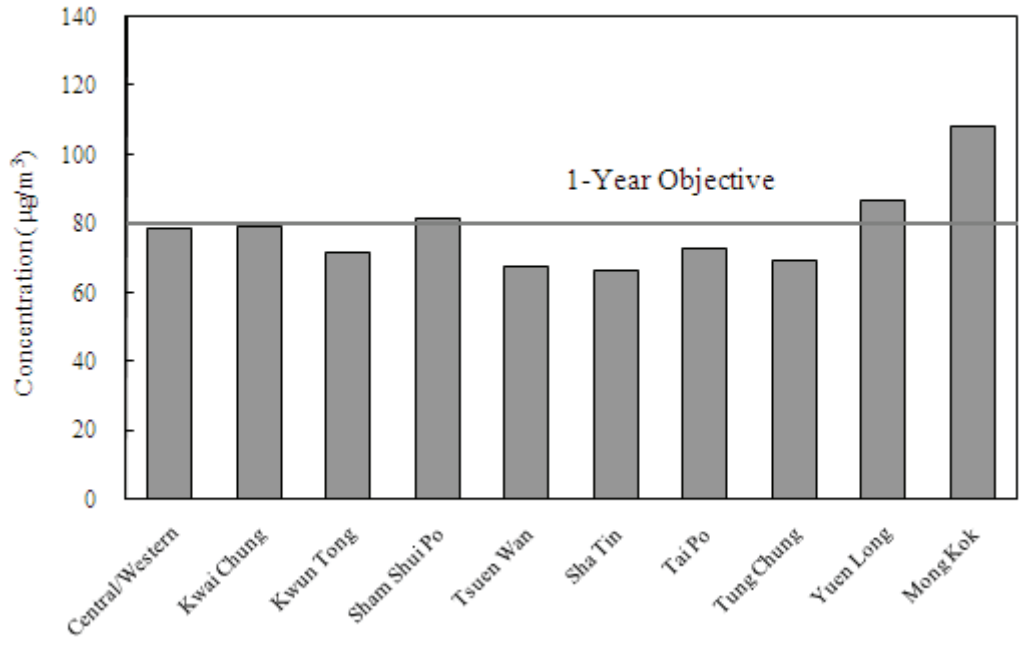


Figure 6b: TSP Monitoring 2008
(Annual Average)



3.2 Respirable Suspended Particulates (RSP)

Respirable suspended particulates (RSP) refer to those suspended particulates with nominal aerodynamic diameters of 10 micrometres or less. Combustion sources, in particular diesel vehicle exhaust and emissions from power plants, are the major sources of RSP in Hong Kong. Besides, RSP can be formed by atmospheric oxidation of sulphur dioxide and nitrogen oxides. Although to a lesser extent, crustal derived dust and marine aerosols are also sources of RSP.

RSP at high levels may cause chronic and acute effects on human health, particularly the pulmonary function, as they can penetrate deep into the lungs and cause respiratory problems. These effects are enhanced if high RSP levels are associated with higher levels of other pollutants, such as SO_2. The smaller particulates in RSP have a major impact on visibility.

RSP was continuously measured at all 14 monitoring stations during 2008. Most of these stations were also equipped with high-volume sampler to collect particulate samples for chemical analysis.

In 2008, all stations complied with the 24-hour AQO of RSP. The annual AQO limit of RSP (55 $\mu g/m^3$) was exceeded at three roadside stations and one general station (Yuen Long) in the year. The highest annual average (79 $\mu g/m^3$) was measured at the Causeway Bay roadside station while the Yuen Long station recorded the highest 24-hour average (164 $\mu g/m^3$).

Figure 7a: RSP Monitoring 2008
(24-Hour Average Statistics)

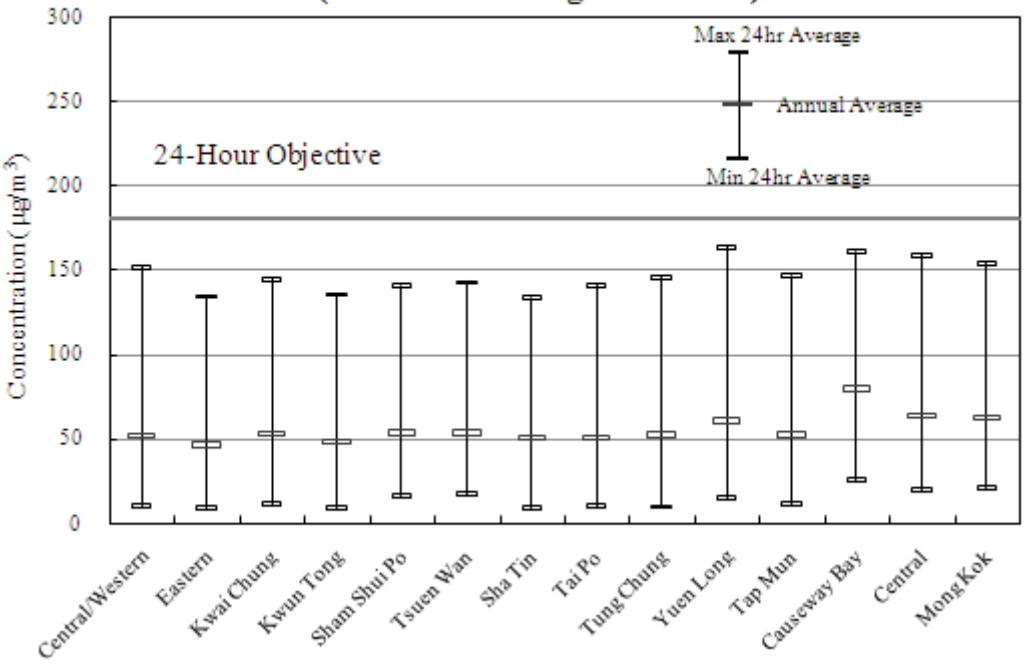
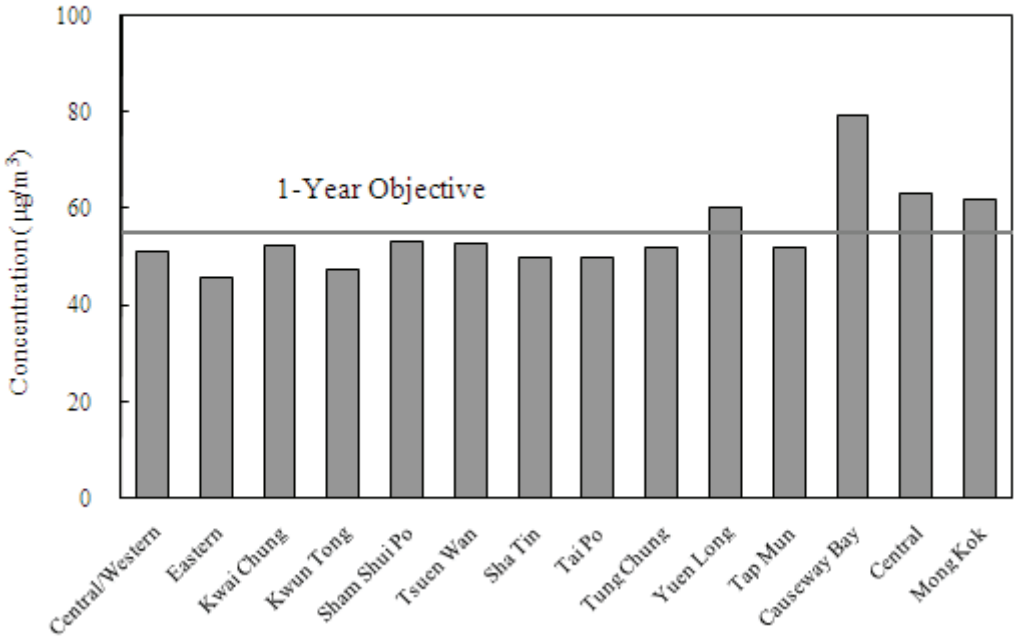


Figure 7b: RSP Monitoring 2008
(Annual Average)



3.3 Lead (Pb)

Lead is the only one criteria pollutant included in the AQO that is also a toxic air pollutant. In Hong Kong, the sale and supply of leaded petrol, which is a known major source of lead, was banned from 1 April 1999. As in previous years, the ambient lead concentrations continued to linger at very low levels during 2008. The overall 3-month averages, ranging from five ng/m^3 (Tung Chung) to 109 ng/m^3 (Yuen Long), were well below the AQO limit of 1,500 ng/m^3.

4. Toxic Air Pollutants (TAPs)

Two groups of toxic air pollutants (TAPs), viz. heavy metals and organic substances, were regularly monitored at the Central/Western and Tsuen Wan stations since mid 1997. Among the various TAPs monitored in 2008, eight of them are considered more important in terms of their health impacts and their annual averages are summarised in Table C8. Detailed description of the TAPs monitoring operation is given in Appendix B4. The monitoring data collected so far indicate that the levels of toxic air pollutants in Hong Kong are comparable to those observed in other major cities.

5. Variation of Air Pollution Levels over Time

The concentrations of air pollutants in the atmosphere can change over a day, over the months of a year and in the period of several years.

5.1 Over a Day

The concentrations of most air pollutants generally follow the diurnal pattern of human activities and traffic. For instance, higher levels of NO_2 and RSP are usually observed in the morning and the evening rush hours when there are more traffic and human activities. Likewise, the lowest concentrations often occur from midnight to dawn when the traffic is at its minimum. To no surprise, this type of traffic induced diurnal pattern is much more distinct for pollutant levels at roadside.

Figure 8: 2008 Diurnal variations of NO_2

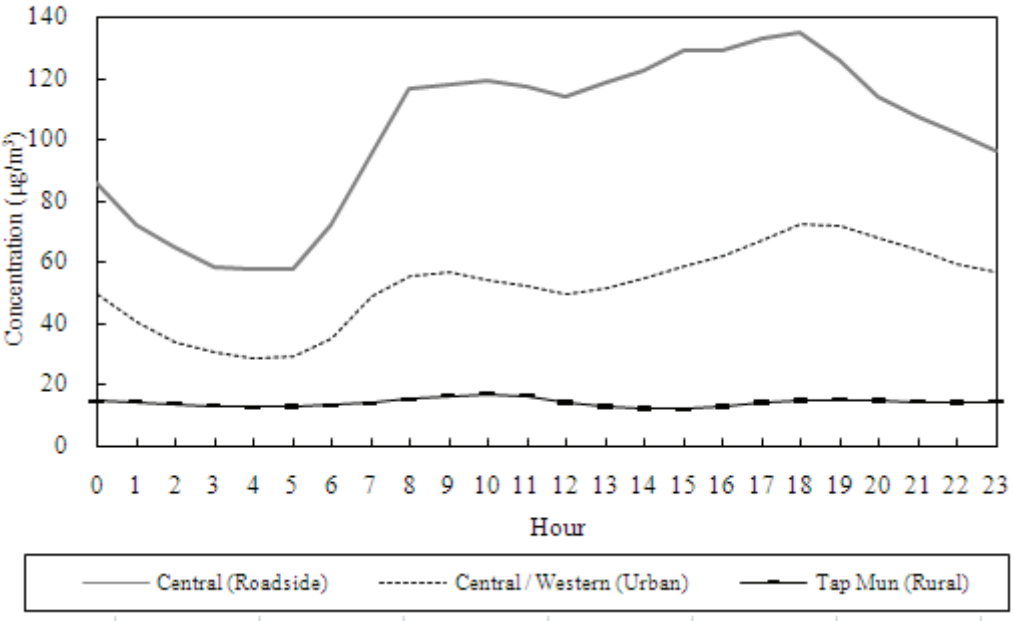
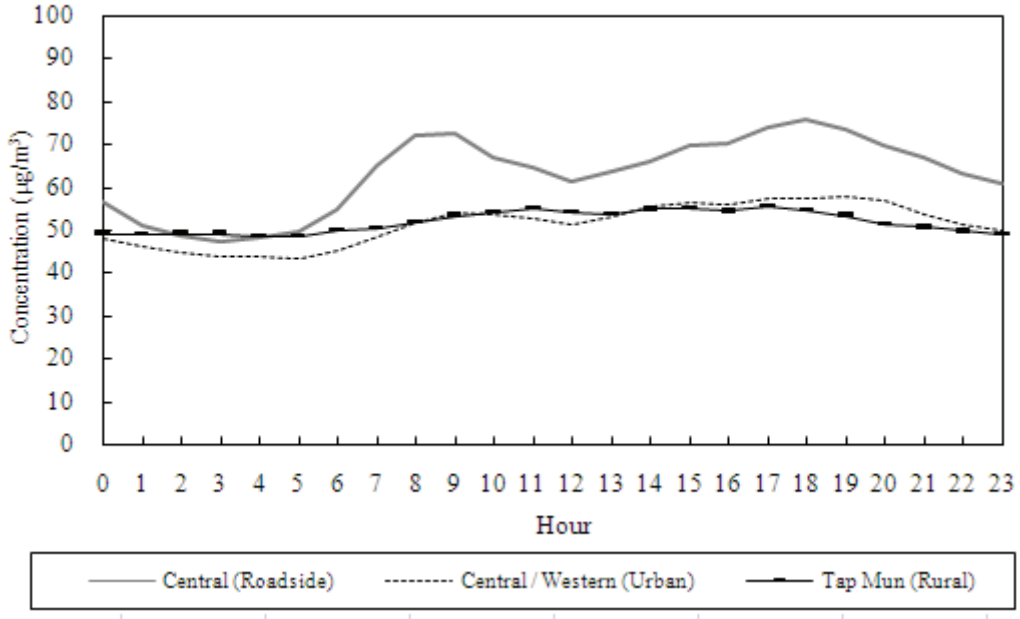
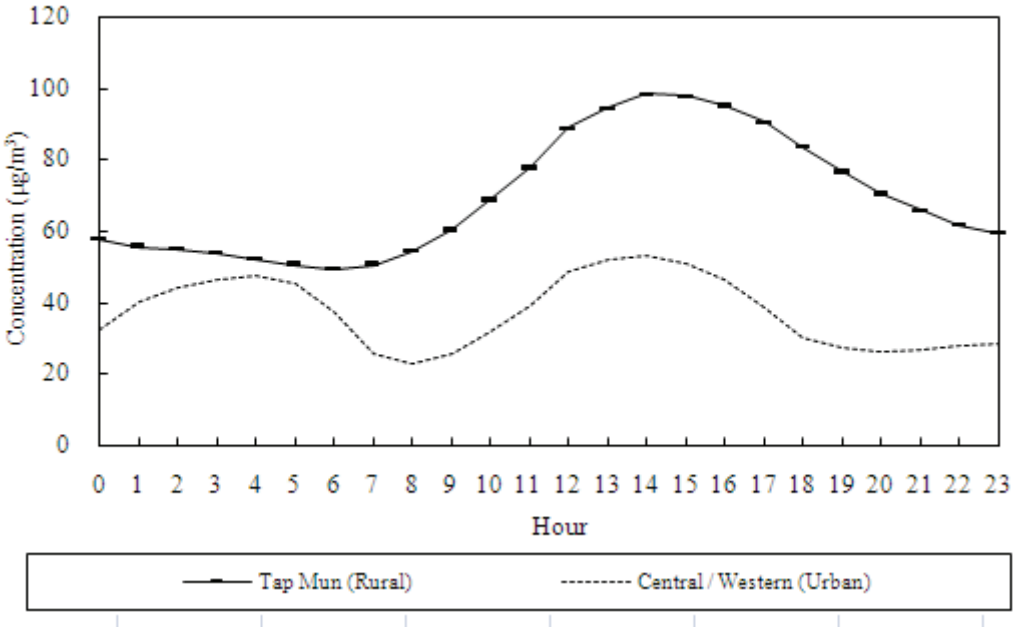


Figure 9: 2008 Diurnal variations of RSP



The diurnal pattern of ozone is different from that of NO_2 and RSP. Ozone is formed by photochemical reactions of its precursor pollutants such as NOx and volatile organic compounds (VOCs) under sunlight. Outside urban centres the ambient ozone levels start to build up before noon and peak in the afternoon, when precursor pollutants are accumulated and sunlight is strong. In urban areas, the lowest ozone concentrations are often observed during the rush hours. This is because a large amount of nitric oxide from the rush-hour traffic acts as an efficient scavenger of ozone, and sunlight is not strong enough for photochemical reactions to take place.

Figure 10: 2008 Diurnal variations of O_3



5.2 Over a Year

Concentrations of NO_2, RSP and O_3 are substantially lower in summer months (June to August) due to a number of reasons. The higher temperatures in summer months induce larger mixing heights, which favours the dispersion of pollutants. The rains in summer help to wash out pollutants more frequently. The south-westerly monsoon in summer also helps to replenish the region with cleaner oceanic air.

Figure 11: Monthly variations of NO_2 and RSP at Central / Western in 2008

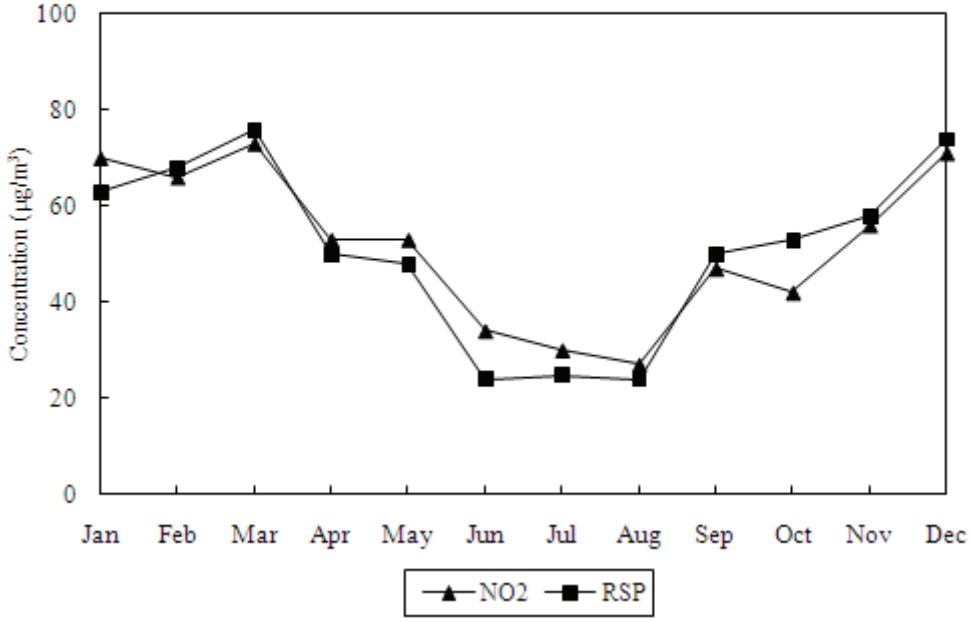
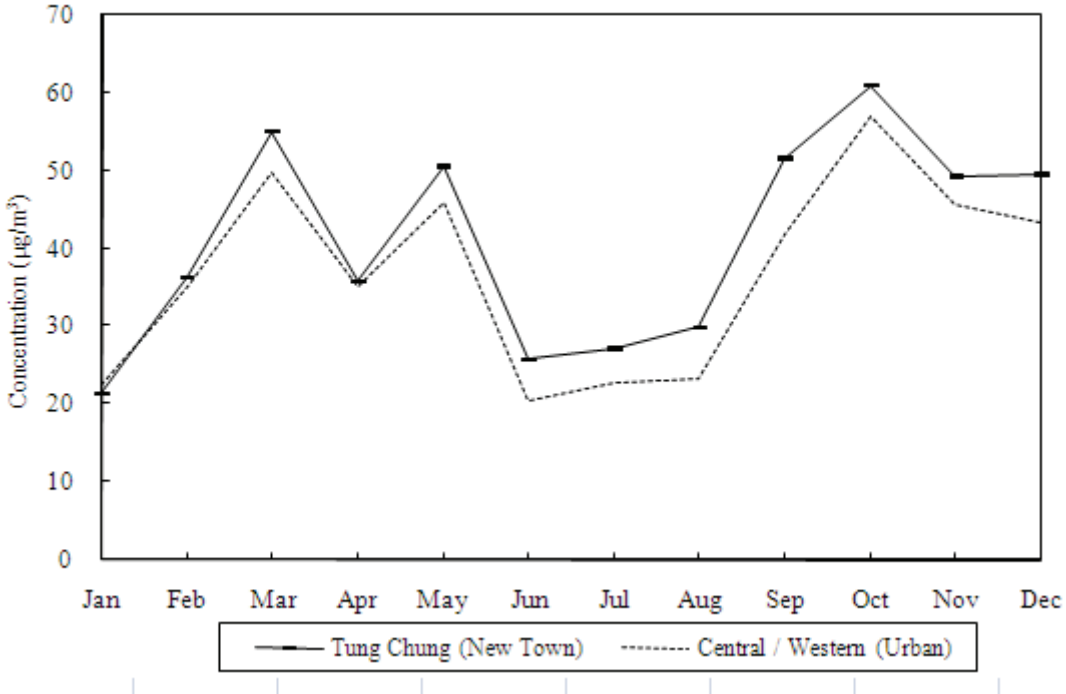


Figure 12: Monthly variations of O_3 in 2008



5.3 Long Term Trends

The long-term trends for the air pollutants presented in this section are based on their annual average concentrations recorded from the relevant air quality monitoring stations categorised into four groups of land use types, namely Urban, New Town, Rural and Roadside as defined in Table 1 below.

Table 1: Classification of Air Monitoring Stations by Land Use Types

Land Use Type	Land Use Characteristics	Air Monitoring Stations
Urban	Densely populated residential areas mixed with some commercial and/or industrial areas	Central/Western, Eastern, Kwai Chung, Kwun Tong, Sham Shui Po and Tsuen Wan
New Town	Mainly residential areas	Sha Tin, Tai Po, Tung Chung and Yuen Long
Rural	Rural areas	Tap Mun (background station)
Roadside[2]	Urban roadside in mixed residential/ commercial area with heavy traffic and surrounded by many tall buildings	Causeway Bay and Central

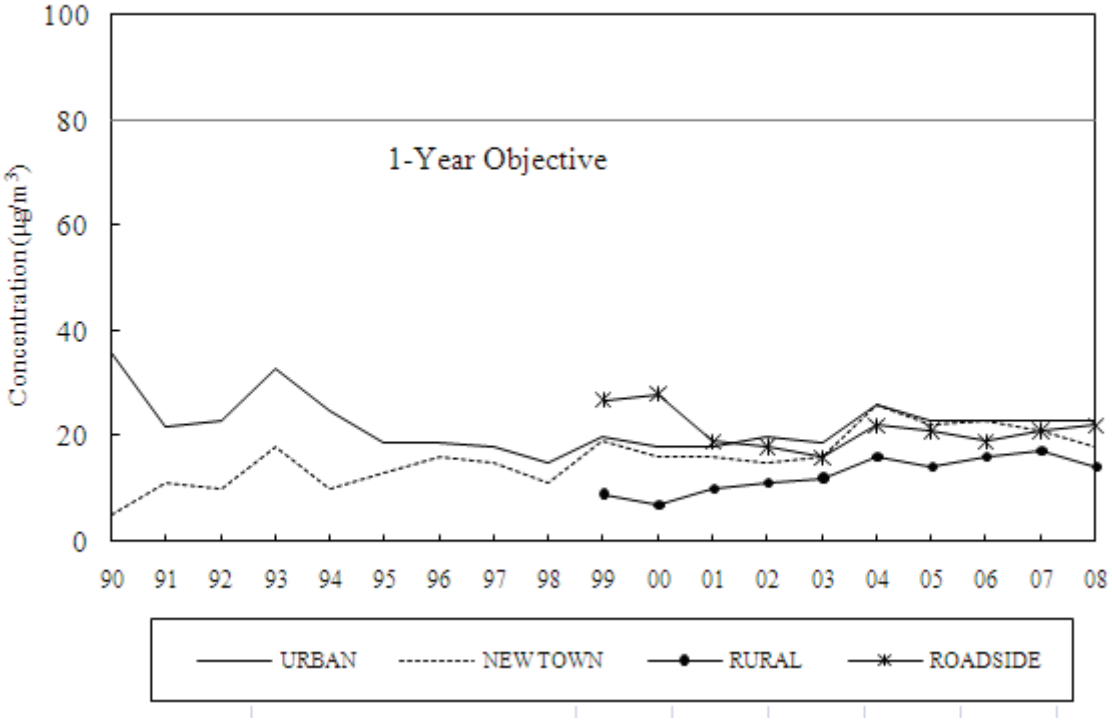
5.3.1 Sulphur Dioxide (SO_2)

Since the implementation of the Air Pollution Control (Fuel Restriction) Regulations in 1990 for restricting sulphur content of industrial fuels and the Air Pollution Control (Motor Vehicle Fuel) Regulations in 1995 for controlling motor vehicle fuel quality, SO_2 concentrations in Hong Kong have remained at levels well below the annual AQO limit of 80 $\mu g/m^3$.

As a result of the introduction of ultra low sulphur diesel for vehicle fleet in late 2000, the average SO_2 concentration at roadside in 2008 (22 $\mu g/m^3$) dropped by 19% as compared with the 1999 value (27 $\mu g/m^3$).

[2] The current Mong Kok roadside station, commissioned in 2001, is not included in the trend analysis due to its relatively short history of measurement as compared with other two roadside stations, viz. Causeway Bay and Central stations.

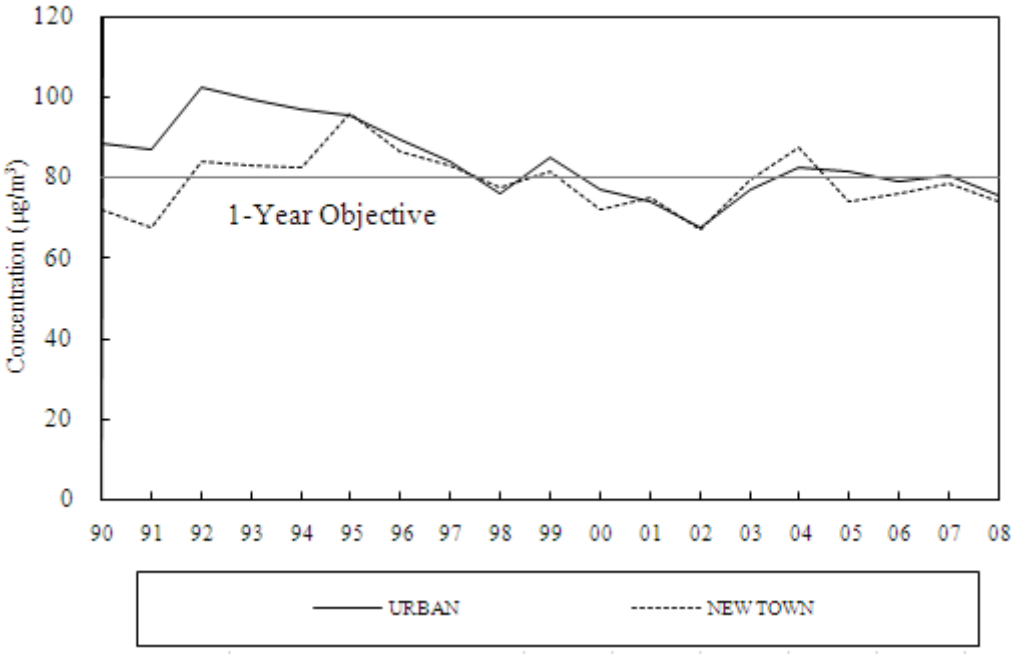
Figure 13: SO_2 long term trend



5.3.2 Total Suspended Particulates (TSP)

The TSP concentrations in the territory exhibited a general declining trend from mid-1990s.

Figure 14: TSP long term trend

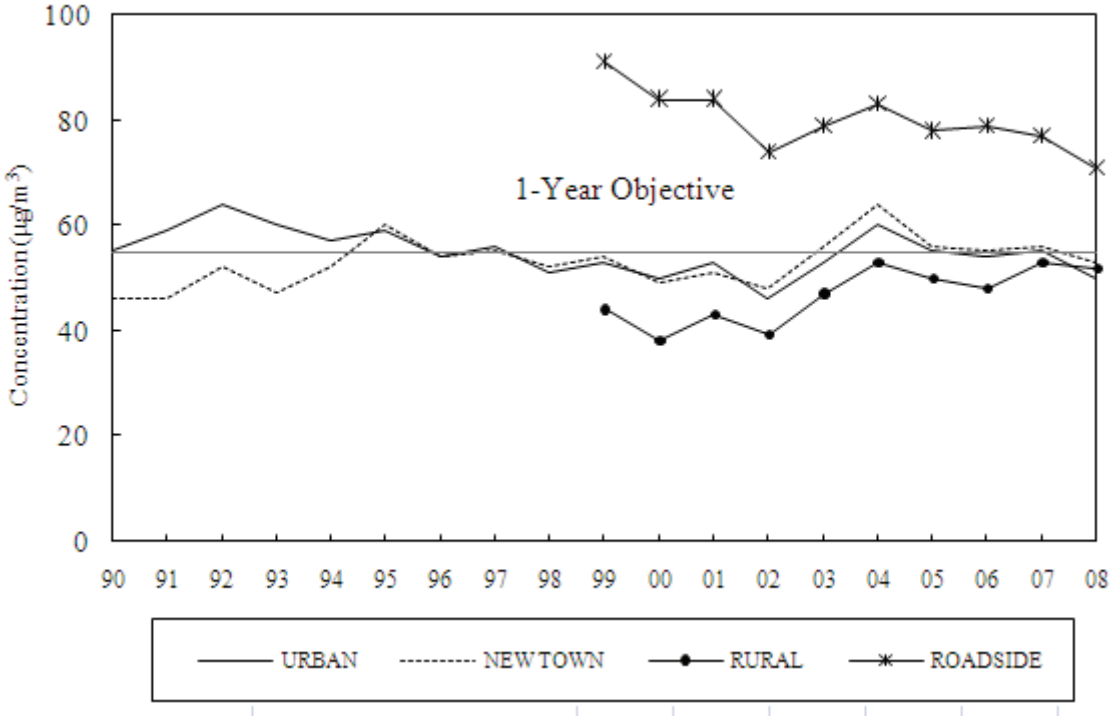


5.3.3 Respirable Suspended Particulates (RSP)

The concentrations of RSP in the territory showed a primarily downward trend between 1995 and 2002, followed by a rebound that peaked in 2004 which was caused by the increase in regional background RSP levels. The RSP concentrations then dropped to a level close to the annual AQO limit, reflecting a reduction in regional background RSP levels in the past few years.

In Hong Kong, high level of roadside RSP, caused mainly by the exhaust emissions of diesel vehicles, has long been a major air pollution concern. As a result of the implementation of various vehicle emission control measures in recent years, the annual average of RSP concentration at roadside in 2008 had reduced by 22% when compared with the 1999 value.

Figure 15: RSP long term trend



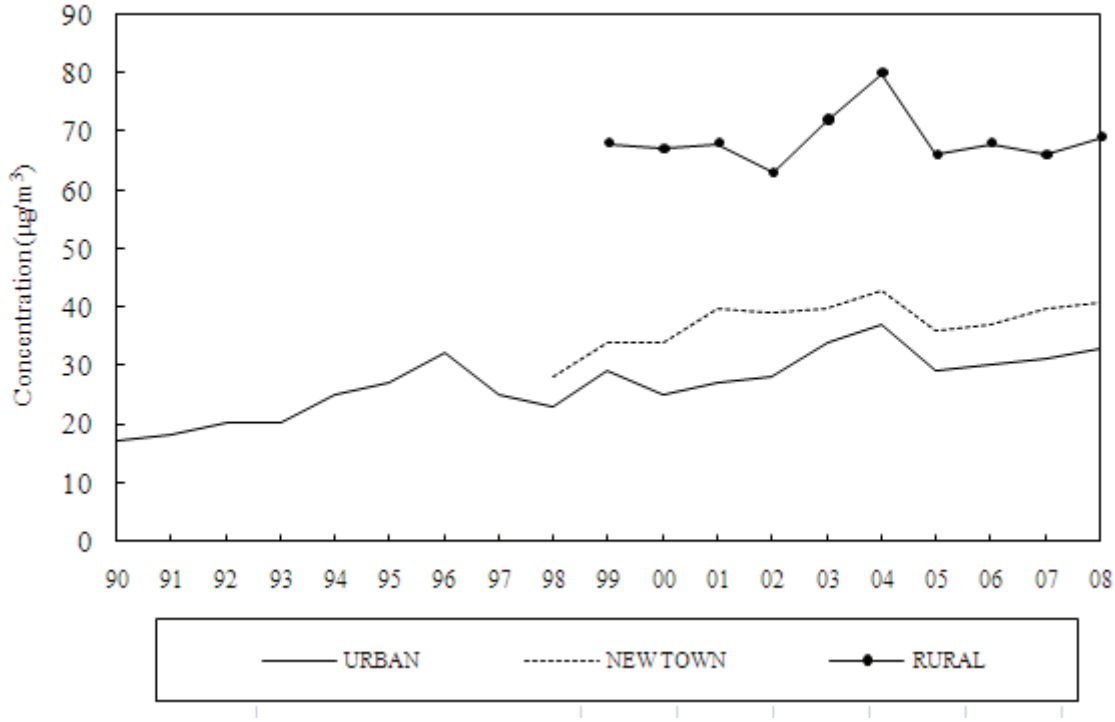
5.3.4 Ozone (O_3)

The ozone concentrations in the territory have shown a moderate upward trend since 1990.

As nitric oxide emissions from motor vehicles can react with and remove ozone in the air, regions with heavy traffic normally have lower ozone levels than areas with light traffic. Hence, Tap Mun rural station has steadily recorded more than twice the ozone levels measured in urban areas since 1999.

Ozone is a regional air pollution issue. The rising trend of ozone generally reflects deterioration in air quality on a regional scale over the past years. The Hong Kong Special Administrative Region Government and Guangdong Provincial Government are implementing a regional air quality management plan to improve air quality in the Pearl River Delta region.

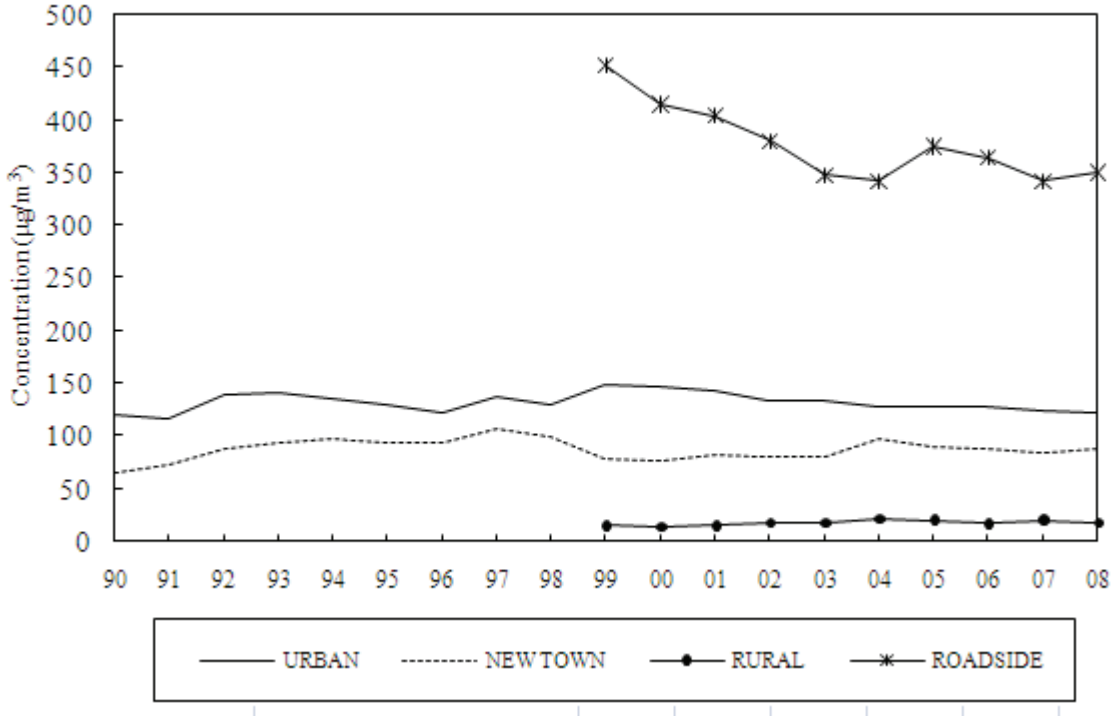
Figure 16: O_3 long term trend



5.3.5 Nitrogen Oxides (NO_x) and Nitrogen Dioxide (NO_2)

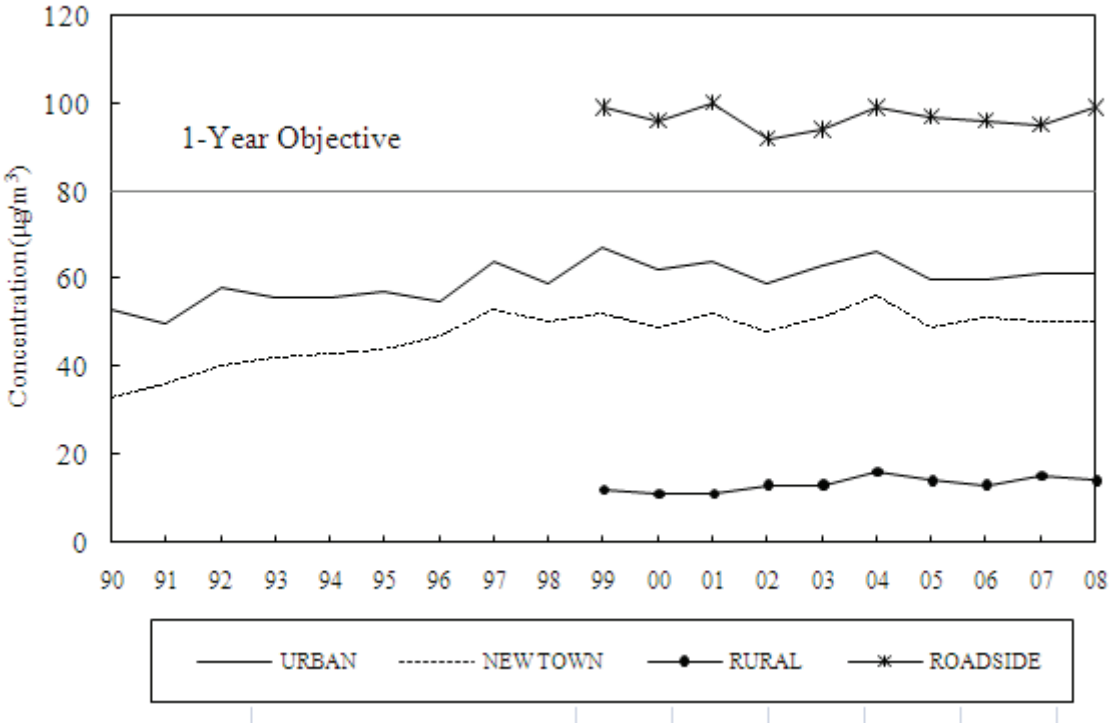
The annual average of NO_x in urban areas has remained quite constant over the past decade. During the same period, the roadside NO_x concentration has generally shown a decreasing trend, reflecting a reduction in vehicular NOx emission as a result of vehicle emission control measures implemented in the past decade. The roadside NOx concentration in 2008 was 23% lower than its 1999 value.

Figure 17: NO_x long term trend



NO_2 is mainly formed from the oxidation of nitric oxide, a major component of NO_x. The oxidation can be promoted by the presence of more ozone and VOCs in the ambient air. Since 1990, the NO_2 levels in the territory have exhibited slow rising trends similar to those of ozone.

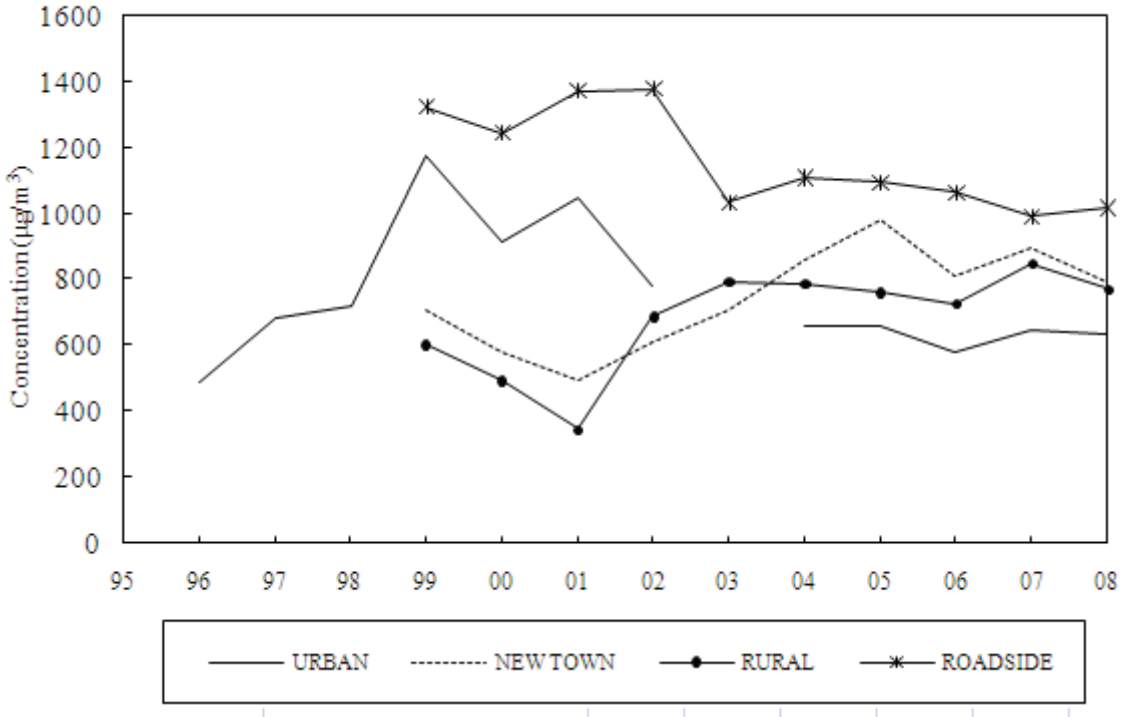
Figure 18: NO_2 long term trend



5.3.6 Carbon Monoxide (CO)

The concentrations of CO in Hong Kong remained at very low levels in the past several years. Even at the roadside close to the vehicular emission sources, the CO levels were well within the 1-hour AQO (30,000 µg/m^3) and 8-hour AQO (10,000 µg/m^3) levels.

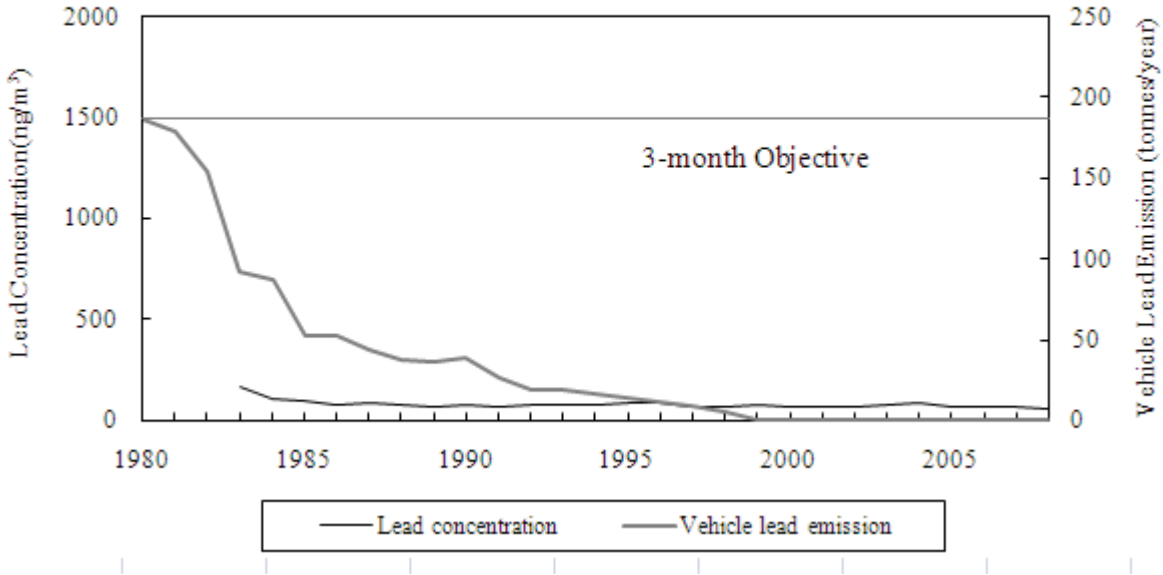
Figure 19: CO long term trend



5.3.7 Lead (Pb)

The ambient lead concentrations have been lingering at very low levels since the oil companies took voluntary action in reducing the lead content of petrol in the early eighties. Lead emissions from motor vehicles were further reduced as a result of the introduction of unleaded petrol in April 1992 and completely eliminated when the sale and supply of leaded petrol was banned in April 1999.

Figure 20 : Vehicle lead emission and lead concentration



Appendix A

Air Quality Objectives and their Compliance Status

Established in 1987, the Hong Kong Air Quality Objectives (AQO) for seven major air pollutants were set at levels to protect public health. The compliance status of the AQO has been used as the indicator of air quality in different districts in Hong Kong.

Table A1: Hong Kong Air Quality Objectives (AQO)

Concentration in micrograms per cubic metre [1]

Pollutant	Averaging Time				
	1 hour[2]	**8 hours[3]**	**24 hours[3]**	**3 months[4]**	**1 year[4]**
Sulphur dioxide (SO_2)	800		350		80
Total suspended particulates (TSP)			260		80
Respirable suspended particulates (RSP) [5]			180		55
Nitrogen dioxide (NO_2)	300		150		80
Carbon monoxide (CO)	30000	10000			
Photochemical oxidants (as ozone (O_3) [6])	240				
Lead (Pb)				1.5	

[1] Measured at 298K (25°C) and 101.325 kPa (one atmosphere).
[2] Not to be exceeded more than three times per year.
[3] Not to be exceeded more than once per year.
[4] Arithmetic means.
[5] Respirable suspended particulates mean suspended particulates in air with a nominal aerodynamic diameter of 10 micrometres or smaller.
[6] Photochemical oxidants are determined by measurement of ozone only.

Table A2: Percentage Time in compliance with Short-Term Air Quality Objectives in 2008

Station		O_3	NO_2		TSP	RSP	SO_2		CO	
		1-hr	**1-hr**	**24-hr**	**24-hr**	**24-hr**	**1-hr**	**24-hr**	**1-hr**	**8-hr**
General Station	Central/Western	99.95	100	99.72	100	100	99.99	100	--	--
	Eastern	100	100	100	--	100	100	100	--	--
	Kwai Chung	100	100	99.44	100	100	100	100	--	--
	Kwun Tong	100	100	100	100	100	100	100	--	--
	Sham Shui Po	99.99	100	99.73	100	100	100	100	--	--
	Tsuen Wan	99.99	100	99.72	100	100	100	100	100	100
	Sha Tin	99.9	100	100	100	100	100	100	--	--
	Tai Po	100	100	100	100	100	100	100	--	--
	Tung Chung	99.63	100	100	100	100	100	100	100	100
	Yuen Long	99.91	100	100	100	100	100	100	100	100
	Tap Mun	99.83	100	100	--	100	100	100	100	100
Roadside Station	Causeway Bay	--	100	95.28	--	100	100	100	100	100
	Central	--	99.9	90.11	--	100	100	100	100	100
	Mong Kok	--	99.99	95.33	100	100	100	100	100	100

Notes: "--" *Not measured*

Compliance with the short-term AQO

Table A2 shows the percentage time of compliance with the short-term AQO (i.e. 1-hour to 24-hour AQO) recorded at each of the monitoring stations in 2008. For NO_2, the compliance percentages of the 24-hour AQO were above 99% for general stations and between 90 to 95% for roadside stations; its 1-hour AQO compliance rates were above 99% at all stations. Regarding RSP, the compliance percentages for its 24-hour AQO achieved 100% at all stations. The compliance levels of 1-hour AQO for O_3 were over 99% at all monitoring stations. For TSP, the compliance percentage of its 24-hr AQO also achieved 100% at all stations. The compliance percentage of SO_2 nearly reached 100% for all stations. For CO, all monitoring stations achieved full compliance with those short-term AQO in 2008.

Compliance with the long-term AQO

Table A3 shows the compliance status of the long-term (annual) AQO for all 14 monitoring stations in 2008. Similar to previous years, all monitoring stations achieved full compliance with the long-term AQO for SO_2 and lead in 2008. Compliance with the annual AQO for NO_2 was recorded at 11 out of 14 stations, same as 2007. For TSP, seven out of the 10 stations complied with the annual AQO. The compliance rate with the annual AQO for RSP in 2008 increased as compared with the previous year. The annual AQO for RSP was complied at 10 out of 14 stations in 2008, as compared with a compliance rate of seven out of 14 stations in 2007.

Table A3: Compliance Status of Long-Term (Annual) Air Quality Objectives in 2008

Station		NO_2	TSP	RSP	SO_2	Lead
		1-year	1-year	1-year	1-year	3-months
General Station	Central/Western	✓	✓	✓	✓	✓
	Eastern	✓	--	✓	✓	--
	Kwai Chung	✓	✓	✓	✓	✓
	Kwun Tong	✓	✓	✓	✓	✓
	Sham Shui Po	✓	×	✓	✓	--
	Tsuen Wan	✓	✓	✓	✓	✓
	Sha Tin	✓	✓	✓	✓	--
	Tai Po	✓	✓	✓	✓	--
	Tung Chung	✓	✓	✓	✓	✓
	Yuen Long	✓	×	×	✓	✓
	Tap Mun	✓	--	✓	✓	--
Roadside Station	Causeway Bay	×	--	×	✓	--
	Central	×	--	×	✓	--
	Mong Kok	×	×	×	✓	✓

Notes: "✓" *Complied with the AQO* "×" *Violated the AQO* "--" *Not measured*

Appendix B

Air Quality Monitoring Operation

B.1 Network Operation

The air quality monitoring network of 14 monitoring stations is operated by the Air Science Group of the Environmental Protection Department. The measurement of ambient concentrations of total suspended particulates (TSP), respirable suspended particulates (RSP), sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3) and carbon monoxide (CO) have been accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) since August 1995.

In order to provide good representation of the air quality in areas of high population density, the locations of the 14 monitoring stations were carefully chosen by referencing to the United States Environmental Protection Agency's (USEPA) guidelines with practical consideration of the unique congested high-rise development of Hong Kong.

The details for the parameters monitored at each monitoring station and a list of equipment employed for measuring the air pollutants are summarised in Tables B2 and B3 respectively. In general, the concentration of gaseous pollutants and RSP are determined continuously by automatic analysers. Manually operated high volume samplers using the gravimetric methods are also used regularly to measure the TSP and RSP. In addition, meteorological parameters, including temperature and solar radiation, wind speed and direction, are also recorded continuously at each station as appropriate.

Wet and dry deposition samples are collected at three stations: Central/Western, Kwun Tong and Yuen Long. The parameters measured for all wet and dry samples include: pH, Na^+, K^+, NH_4^+, NO_3^-, SO_4^{2-}, Cl^-, F^-, Ca^{2+}, Mg^{2+}, formate and acetate in the filtrate.

B.2 Data Processing and Dissemination

At each monitoring station, signals from the continuous analysers and the meteorological instruments are first stored in a data logger and then sent back to the Data Processing Unit of the Air Science Group via dedicated telephone lines for further processing. After careful checking and validation, the monitoring data are disseminated to the public in the following manner:-

- Monthly release of the monitoring data recorded at the Mong Kok, Kwai Chung and Central/Western stations (up to June 1998)
- Monthly release of the Air Pollution Index (API) summary for all monitoring stations (since July 1998)
- Daily API reporting and forecast for three categories of land-use areas, viz., urban, industrial, and new development (from 6 June 1995 to 14 June 1998)
- Daily API reporting and forecast for individual station (from 15 June 1998 to 30 June 1999)
- Hourly API reporting for individual station (since 1 July 1999)
- Reporting of monitoring data in the annual reports "*Air Quality in Hong Kong"* and "*Environment Hong Kong"*
- Ad hoc provision of air quality data to the public, academics and environmental consultants upon request for the purposes of research and air quality assessment

- Establishment of the Environmental Protection Interactive Centre (EPIC) for the public to download air quality monitoring data (since March 2004)
  (http://www.epd.gov.hk/epd/epic/english/epichome.html)

The reporting and forecast of API will help the public (particularly susceptible groups such as the elderly, children and people with heart or respiratory illness) to decide on taking precautionary measures when necessary. The monitoring results are also regularly used to assist the formulation of air quality management plans and the evaluation on the effectiveness of the current air pollution control programmes.

B.3 Quality Control and Assurance

A quality policy is adopted to ensure that ambient air quality monitoring results from the monitoring stations attain a high degree of accuracy and precision. A quality system has been established in accordance with the HOKLAS criteria.

The accuracy of the monitoring network is assessed by performance audits. Similar to overseas standards, control limits of ±15% and ±10% are adopted for the gaseous pollutants and particulates respectively. In 2008, 482 audit checks were carried out on the stations' analysers and samplers. As shown in Figure B1 and based on the 95% probability limits, the accuracy of the network was within the specified control limits.

The precision, a measure of the repeatability, of the measurements is checked in accordance with EPD's quality manuals. In 2008, 2030 precision checks were carried out on the analysers and samplers. As shown in Figure B2 and based on the 95% probability limits, the precision of the network varied between -7.3 % and 6.3 %, which was again within target limits.

In addition to the above operation, a system audit to review the quality assurance activities is carried out on an annual basis on the monitoring network. A report outlining the deficiencies and corrective actions is compiled at the end of the audit.

B.4 Toxic Air Pollutants Monitoring Operation

The Air Science Group has installed in July 1997 additional monitoring facilities at the Tsuen Wan and Central/Western stations to measure regularly the levels of Toxic Air Pollutants (TAPs) in Hong Kong. The TAPs being monitored can be broadly classified as volatile organic compounds (e.g. benzene, perchloroethylene and 1,3-butadiene), dioxins and furans (e.g. 2,3,7,8-TCDF and 2,3,7,8-TCDD), carbonyl compounds (e.g. formaldehyde), polycyclic aromatic hydrocarbons (e.g. benzo(a)pyrene), and hexavalent chromium. Five distinct methods were used to analyse the collected samples for target TAPs (please refer to Table B4 for details). All these methods have stringent QA/QC criteria to ensure the data quality. Sampling media used include stainless steel canisters, Sep-Pak cartridges, polyurethane foams and bicarbonate impregnated filters. TAP samples are analysed by the Government Laboratory.

Table B1. Fixed Network Monitoring Stations: Site Information

Monitoring Station	Address	Area Type	Sampling Height (Above P.D.H.K.)	Above Ground	Date Start Operation
Central/Western (Upper Level Police Station)	1 High Street, Sai Ying Pun	Urban : Mixed residential/commercial	78m	18m (4 floors)	Nov 83
Eastern (Sai Wan Ho Fire Station)	20 Wai Hang Street, Sai Wan Ho	Urban : Residential	28m	15m (4 floors)	Jan 99
Kwai Chung (Kwai Chung Police Station)	999 Kwai Chung Road, Kwai Chung	Urban : Mixed residential/ commercial/industrial	19m	13m (2 floors)	Jan 99
Kwun Tong (City District Office)	6 Tung Yan Street, Kwun Tong	Urban : Mixed residential/ commercial/industrial	34m	25m (6 floors)	Jul 83
Sham Shui Po (Police Station)	37A Yen Chow Street, Sham Shui Po	Urban : Mixed residential/commercial	21m	17m (4 floors)	Jul 84
Tsuen Wan (Princess Alexandra Community Centre)	60 Tai Ho Road, Tsuen Wan	Urban : Mixed residential/ commercial/industrial	21m	17m (4 floors)	Aug 88
Sha Tin (Sha Tin Govt. Secondary School)	11-17 Man Lai Road, Tai Wai, Sha Tin	New Town : Residential	31m	25m (6 floors)	Jul 91
Tai Po (Tai Po Govt. Office Bldg.)	1 Ting Kok Road, Tai Po	New Town : Residential	31m	25m (6 floors)	Feb 90
Tung Chung (Tung Chung Health Centre)	6 Fu Tung Street, Tung Chung	New Town : Residential	34.5m	27.5m (4 floors)	Apr 99
Yuen Long (Yuen Long District Branch Offices Bldg.)	269 Castle Peak Road Yuen Long	New Town : Residential	31m	25m (6 floors)	July 95
Tap Mun (Tap Mun Police Station)	Tap Mun	Background : Rural	26m	11m (3 floors)	Apr 98
Causeway Bay	1 Yee Woo Street, Causeway Bay	Urban Roadside : Mixed commercial/residential area surrounded by many tall buildings	6.5m	3m	Jan 98
Central	Junction of Des Voeux Road Central and Chater Road, Central	Urban Roadside : Busy commercial/financial area surrounded by many tall buildings	8.5m	4.5m	Oct 98
Mong Kok	Junction of Nathan Road and Lai Chi Kok Road	Urban Roadside : Mixed commercial/residential area surrounded by many tall buildings	8.5m	3m	Jan 01

Note: P.D. = Principal Datum

Table B2. Summary of the Parameters Monitored in the Network (2008)

	PARAMETERS									
STATIONS	SO_2	NO_x	NO	NO_2	CO	O_3	RSP		TSP	MET[3]
							Cont [1]	Hi-Vol [2]		
Central/Western	✓	✓	✓	✓		✓	✓	✓	✓	✓
Eastern	✓			✓		✓	✓			✓
Kwai Chung	✓	✓	✓	✓		✓	✓		✓	✓
Kwun Tong	✓	✓	✓	✓		✓	✓	✓	✓	✓
Sham Shui Po	✓	✓	✓	✓		✓	✓	✓	✓	✓
Tsuen Wan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sha Tin	✓	✓	✓	✓		✓	✓		✓	✓
Tai Po	✓			✓		✓	✓		✓	✓
Tung Chung	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Yuen Long	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tap Mun	✓	✓	✓	✓	✓	✓	✓			
Causeway Bay	✓	✓	✓	✓	✓		✓			
Central	✓	✓	✓	✓	✓		✓			
Mong Kok	✓	✓	✓	✓	✓		✓	✓	✓	✓

Note:
[1] "Cont" denotes continuous monitoring.
[2] "Hi-Vol" denotes high-volume sampling.
[3] "MET" denotes meteorological parameters such as temperature, wind speed, wind direction, etc.

Table B3 List of Equipment Used in Measuring Air Pollutant Concentration

Pollutants	**Measurement Principle**	**Commercial Instrument**
SO_2	UV fluorescence	TECO 43A API 100E, TECO 43I
NO, NO_2, NO_x	Chemiluminescence	API 200A
O_3	UV absorption	API 400, API 400A
SO_2, NO_2, O_3	Differential Optical Absorption Spectroscopy	Opsis AR 500 System
CO	Non-dispersive infra-red absorption with gas filter correlation	TECO 48C, API 300
TSP	Gravimetric	General Metal Works GS2310
RSP	a) Gravimetric b) Oscillating microbalance	Graseby Andersen PM10 R&P TEOM Series 1400a-AB-PM10

Table B4 Sampling and Analysis Methods Used in Measuring Toxic Air Pollutants

Toxic Air Pollutants	Sampling and Analysis method	Sampling Instrument	Sampling Media	Sampling Schedule	Sampling Period
Benzene	USEPA Method TO-14A	Xontech 910A / RM 910A	Canister	Twice per month	24 hours
Perchloroethylene	USEPA Method TO-14A	Xontech 910A / RM 910A	Canister	Twice per month	24 hours
1,3-Butadiene	USEPA Method TO-14A	Xontech 910A / RM 910A	Canister	Twice per month	24 hours
Formaldehyde	USEPA Method TO-11A	Xontech 925 / RM 925	DNPH coated silica gel cartridge	Once per month	24 hours
Benzo(a)pyrene	USEPA Method TO-13	Graseby GPS1 / Tisch TE-1000	Quartz fibre filter and polyurethane foam with XAD-2 resin	Once per month	24 hours
Dioxin	USEPA Method TO-9A	Graseby GPS1 / Tisch TE-1000	Quartz fibre filter and polyurethane foam	Once per month	24 hours
Hexavalent Chromium	CARB SOP MLD 039	Xontech 920	Bicarbonate Impregnated Filter	Once per month	24 hours

Figure B1: Accuracy of Air Quality Monitoring Network, 2008

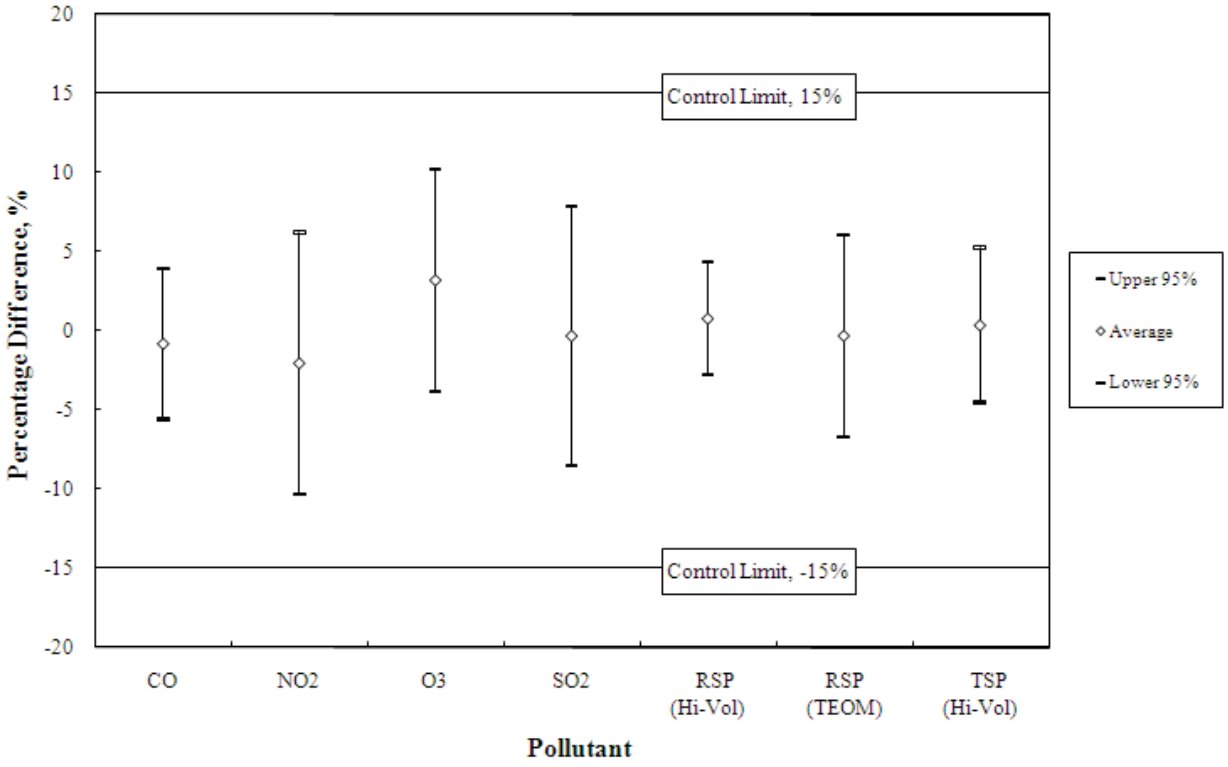
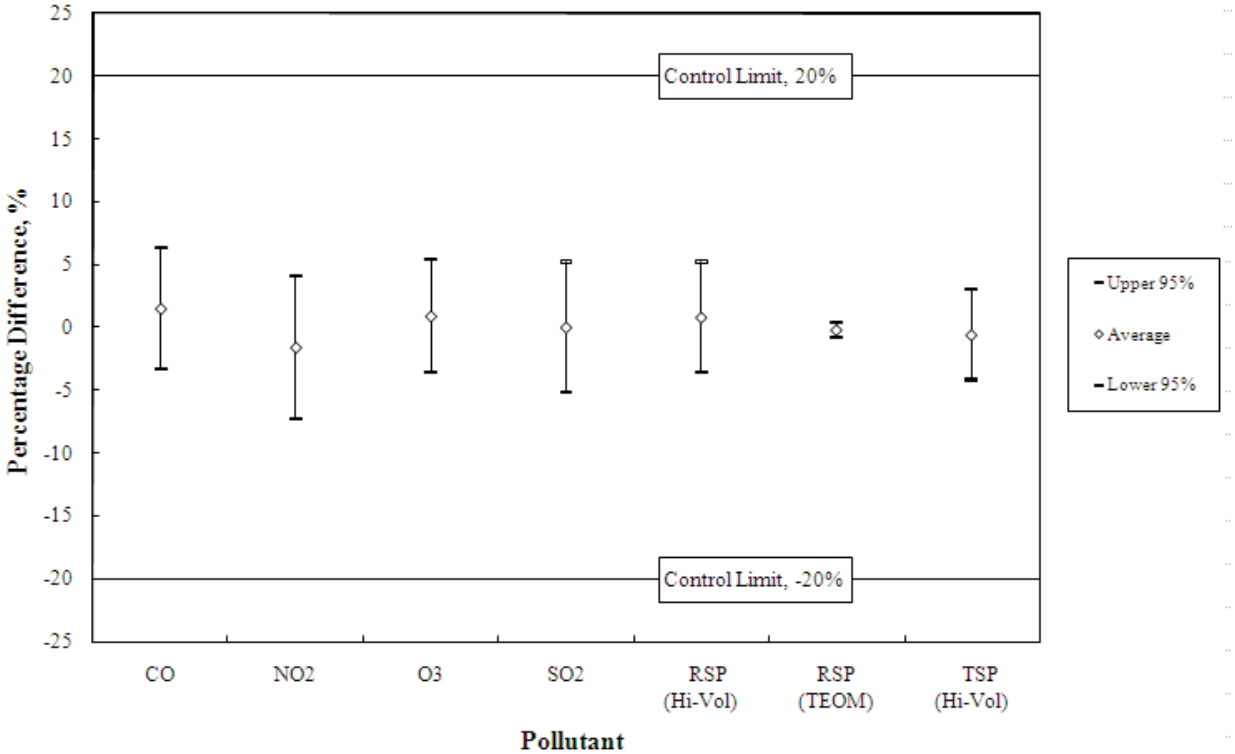


Figure B2: Precision of Air Quality Monitoring Network, 2008



Note: The Control Limits for RSP and TSP are ±10% for both Accuracy and Precision.

Appendix C

Tables of Air Quality Data

TABLE C1: THE HIGHEST 4 HOURLY POLLUTANT CONCENTRATIONS MEASURED IN 2008

Pollutant: Sulphur Dioxide *
(1-hour AQO = 800)

Station	1st High	2nd High	3rd High	4th High
Central / Western	904	510	387	348
Eastern	285	271	251	241
Kwai Chung	345	334	325	301
Kwun Tong	258	238	226	185
Sham Shui Po	305	219	215	214
Tsuen Wan	310	280	276	259
Sha Tin	224	181	175	173
Tai Po	182	180	178	176
Tung Chung	266	250	234	199
Yuen Long	263	221	213	209
Tap Mun	190	189	188	169
Causeway Bay	335	284	252	232
Central	500	496	472	447
Mong Kok	197	176	167	163

Pollutant: Nitrogen Oxides

Station	1st High	2nd High	3rd High	4th High
Central / Western	1165	1013	946	936
Kwai Chung	929	898	879	879
Kwun Tong	807	783	762	691
Sham Shui Po	900	844	826	810
Tsuen Wan	744	703	689	636
Sha Tin	606	578	565	559
Tung Chung	538	463	459	453
Yuen Long	712	682	682	673
Tap Mun	205	196	157	149
Causeway Bay	1400	1318	1303	1263
Central	1880	1620	1588	1511
Mong Kok	1144	1021	996	992

Pollutant: Nitric Oxide

Station	1st High	2nd High	3rd High	4th High
Central / Western	577	541	508	503
Kwai Chung	520	480	470	462
Kwun Tong	452	410	407	366
Sham Shui Po	440	416	414	412
Tsuen Wan	382	381	342	312
Sha Tin	315	309	307	285
Tung Chung	284	240	197	178
Yuen Long	346	340	340	335
Tap Mun	74	67	67	65
Causeway Bay	760	703	702	696
Central	1062	914	851	822
Mong Kok	617	557	546	530

Note: 1. All concentration units are in micrograms per cubic metre.
2. Shaded 1-hour averages are above their respective AQO.
3. Only the asterisked pollutants have hourly AQO.

Pollutant: Nitrogen Dioxide *
(1-hour AQO = 300)

Station	1st High	2nd High	3rd High	4th High
Central / Western	282	264	256	249
Eastern	222	214	210	200
Kwai Chung	263	262	254	252
Kwun Tong	243	225	223	221
Sham Shui Po	266	265	264	258
Tsuen Wan	243	231	230	225
Sha Tin	236	219	217	208
Tai Po	213	199	193	178
Tung Chung	256	251	250	240
Yuen Long	239	238	225	224
Tap Mun	119	105	103	97
Causeway Bay	298	293	292	289
Central	346	331	328	320
Mong Kok	308	289	271	266

Pollutant: Carbon Monoxide *
(1-hour AQO = 30000)

Station	1st High	2nd High	3rd High	4th High
Tsuen Wan	2500	2470	2390	2360
Tung Chung	2820	2740	2730	2660
Yuen Long	3220	3150	3120	3110
Tap Mun	2060	2050	1810	1790
Causeway Bay	5290	4710	4260	4260
Central	3220	2640	2640	2640
Mong Kok	3450	3220	2990	2880

Pollutant: Ozone *
(1-hour AQO = 240)

Station	1st High	2nd High	3rd High	4th High
Central / Western	320	288	253	252
Eastern	239	190	177	176
Kwai Chung	210	209	193	192
Kwun Tong	185	176	166	161
Sham Shui Po	302	238	236	229
Tsuen Wan	255	230	227	219
Sha Tin	357	333	310	288
Tai Po	214	209	207	201
Tung Chung	310	306	297	291
Yuen Long	298	281	256	247
Tap Mun	407	381	365	331

Pollutant: Respirable Suspended Particulates

Station	1st High	2nd High	3rd High	4th High
Central / Western	224	217	216	214
Eastern	218	204	199	198
Kwai Chung	224	207	203	197
Kwun Tong	238	214	203	182
Sham Shui Po	229	211	205	204
Tsuen Wan	208	197	197	194
Sha Tin	253	246	223	218
Tai Po	295	270	269	253
Tung Chung	243	234	231	230
Yuen Long	261	261	259	256
Tap Mun	351	336	333	294
Causeway Bay	238	237	231	231
Central	217	215	210	207
Mong Kok	244	242	227	222

TABLE C2: THE HIGHEST 2 DAILY POLLUTANT CONCENTRATIONS MEASURED IN 2008

Pollutant: Sulphur Dioxide *
(24-hour AQO = 350)

Station	1st High	2nd High
Central / Western	149	136
Eastern	67	65
Kwai Chung	104	95
Kwun Tong	69	65
Sham Shui Po	93	84
Tsuen Wan	119	99
Sha Tin	65	56
Tai Po	53	49
Tung Chung	91	87
Yuen Long	103	100
Tap Mun	71	41
Causeway Bay	90	77
Central	157	93
Mong Kok	92	84

Pollutant: Nitrogen Dioxide *
(24-hour AQO = 150)

Station	1st High	2nd High
Central / Western	157	135
Eastern	129	123
Kwai Chung	158	153
Kwun Tong	139	129
Sham Shui Po	169	150
Tsuen Wan	152	139
Sha Tin	120	118
Tai Po	105	105
Tung Chung	134	131
Yuen Long	133	124
Tap Mun	49	47
Causeway Bay	203	178
Central	209	206
Mong Kok	180	178

Pollutant: Respirable Suspended Particulates *
(24-hour AQO = 180)

Station	1st High	2nd High
Central / Western	152	144
Eastern	135	121
Kwai Chung	145	137
Kwun Tong	136	126
Sham Shui Po	141	137
Tsuen Wan	143	135
Sha Tin	134	127
Tai Po	141	124
Tung Chung	146	145
Yuen Long	164	157
Tap Mun	147	143
Causeway Bay	161	152
Central	159	145
Mong Kok	154	139

Pollutant: Nitrogen Oxides

Station	1st High	2nd High
Central / Western	386	296
Kwai Chung	411	383
Kwun Tong	369	309
Sham Shui Po	418	355
Tsuen Wan	361	261
Sha Tin	283	265
Tung Chung	295	219
Yuen Long	267	263
Tap Mun	68	66
Causeway Bay	789	765
Central	718	702
Mong Kok	563	533

Pollutant: Nitric Oxide

Station	1st High	2nd High
Central / Western	150	142
Kwai Chung	181	165
Kwun Tong	194	130
Sham Shui Po	163	153
Tsuen Wan	166	133
Sha Tin	118	114
Tung Chung	112	94
Yuen Long	106	99
Tap Mun	19	19
Causeway Bay	447	385
Central	353	335
Mong Kok	255	251

Pollutant: Total Suspended Particulates *
(24-hour AQO = 260)

Station	1st High	2nd High
Central / Western	174	163
Kwai Chung	227	187
Kwun Tong	160	160
Sham Shui Po	165	153
Tsuen Wan	169	142
Sha Tin	151	150
Tai Po	212	189
Tung Chung	198	181
Yuen Long	217	190
Mong Kok	217	198

Pollutant: Ozone

Station	1st High	2nd High
Central / Western	130	122
Eastern	104	103
Kwai Chung	99	98
Kwun Tong	103	102
Sham Shui Po	101	96
Tsuen Wan	106	97
Sha Tin	147	138
Tai Po	117	104
Tung Chung	146	127
Yuen Long	128	111
Tap Mun	161	159

Pollutant: Carbon Monoxide *
(8-hour AQO = 10000)

Station	1st High	2nd High
Tsuen Wan	2289	2236
Tung Chung	2566	2563
Yuen Long	3034	2981
Tap Mun	1536	1533
Causeway Bay	3780	3780
Central	2217	2184
Mong Kok	2513	2484

Note: 1. *All concentration units are in micrograms per cubic metre.*
2. *Values for Carbon Monoxide are 8-hour averages.*
3. *Shaded 24-hour averages are above their respective AQO.*
4. *Only the asterisked pollutants have either 8-hour or 24-hour AQO.*

TABLE C3: 2008 MONTHLY AND ANNUAL AVERAGES OF GASEOUS POLLUTANTS

Pollutant: Sulphur Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	31	28	29	25	32	27	27	22	26	17	15	21	25
Eastern	21	23	20	20	16	15	20	16	16	11	11	14	17
Kwai Chung	22	26	30	30	32	44	46	40	25	14	13	18	28
Kwun Tong	15	20	18	15	16	18	26	17	17	13	14	16	17
Sham Shui Po	20	22	25	23	22	23	25	20	22	10	13	14	20
Tsuen Wan	28	30	32	24	30	38	39	31	27	21	20	21	28
Sha Tin	18	24	22	18	20	18	20	18	14	9	12	15	17
Tai Po	19	23	19	14	14	16	20	18	16	13	11	14	17
Tung Chung	29	31	23	16	13	9	10	16	27	12	15	20	18
Yuen Long	27	29	23	17	18	17	25	22	25	18	17	19	21
Tap Mun	23	19	16	11	10	5	11	11	12	13	16	19	14
Causeway Bay	23	26	24	18	15	20	29	23	25	7	7	12	19
Central	29	32	31	21	25	26	31	25	24	12	22	24	25
Mong Kok	27	29	31	27	28	28	30	23	25	17	18	23	25

Pollutant: Nitrogen Oxides

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	131	105	125	90	86	81	68	58	75	54	79	111	89
Kwai Chung	182	159	166	146	146	174	184	139	140	105	134	166	153
Kwun Tong	167	147	132	125	117	130	141	107	108	86	101	140	125
Sham Shui Po	170	145	167	129	119	121	119	100	110	104	109	155	129
Tsuen Wan	143	136	152	116	116	141	123	99	98	90	103	134	121
Sha Tin	111	81	94	65	69	89	89	68	78	42	73	123	82
Tung Chung	117	111	100	77	61	46	47	49	78	54	75	103	76
Yuen Long	144	106	121	96	90	91	93	79	90	69	98	145	102
Tap Mun	29	22	19	18	14	13	19	17	15	11	12	18	17
Causeway Bay	484	473	382	315	317	306	341	330	306	240	291	422	350
Central	420	391	378	321	316	339	337	285	363	256	374	424	350
Mong Kok	348	299	349	299	288	276	250	239	266	302	274	325	293

Pollutant: Nitric Oxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	40	25	34	24	21	31	25	21	18	8	15	26	24
Kwai Chung	71	56	54	55	54	81	84	61	50	31	42	54	57
Kwun Tong	64	50	37	44	40	54	59	45	35	23	28	42	43
Sham Shui Po	57	43	48	41	34	47	45	36	32	25	25	41	39
Tsuen Wan	47	40	44	34	32	59	48	37	28	20	24	33	37
Sha Tin	38	21	25	19	19	34	33	23	23	7	18	39	25
Tung Chung	36	29	23	21	13	14	13	14	17	6	13	16	18
Yuen Long	51	27	31	28	24	35	35	27	24	12	23	40	30
Tap Mun	4	3	2	3	2	1	2	2	2	1	1	1	2
Causeway Bay	245	230	171	148	147	158	177	170	141	96	123	189	166
Central	200	180	166	150	142	176	175	145	167	101	161	185	162
Mong Kok	161	130	148	134	124	138	124	116	113	122	107	131	129

Pollutant: Nitrogen Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	70	66	73	53	53	34	30	27	47	42	56	71	52
Eastern	70	69	77	60	56	43	38	37	54	54	55	71	57
Kwai Chung	73	73	84	61	64	51	56	46	64	58	70	84	66
Kwun Tong	70	71	75	58	56	47	51	38	55	51	58	76	59
Sham Shui Po	83	79	94	67	67	50	50	45	62	66	71	92	69
Tsuen Wan	71	75	85	64	67	51	49	43	55	59	66	84	64
Sha Tin	53	49	56	36	41	36	38	33	44	31	45	63	44
Tai Po	59	56	57	44	50	47	50	40	52	46	56	69	52
Tung Chung	62	67	66	44	41	25	27	28	52	44	56	77	49
Yuen Long	65	64	74	53	52	38	40	38	53	51	63	84	56
Tap Mun	23	17	16	13	11	10	16	14	12	9	11	17	14
Causeway Bay	110	122	120	88	93	65	70	69	91	93	103	132	96
Central	114	116	125	91	99	70	69	63	107	102	128	141	102
Mong Kok	102	101	124	94	98	64	60	62	94	115	111	126	96

Pollutant: Carbon Monoxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tsuen Wan	1050	910	670	550	450	550	460	430	610	630	590	740	636
Tung Chung	1380	1030	770	900	830	570	660	570	720	800	1000	1090	860
Yuen Long	1390	950	700	660	600	460	400	360	590	600	850	1150	726
Tap Mun	770	570	970	940	800	710	790	770	710	620	670	900	771
Causeway Bay	1980	1570	1630	1210	1010	990	1200	970	910	910	1050	1350	1233
Central	990	760	810	680	560	580	590	600	890	1010	1020	1110	802
Mong Kok	1480	1490	1320	1000	1010	770	750	750	890	1050	1040	1370	1076

Pollutant: Ozone

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	22	35	50	35	46	20	23	23	42	57	46	43	37
Eastern	31	39	51	36	47	26	24	22	38	47	52	50	38
Kwai Chung	21	34	42	32	36	13	15	19	32	46	42	35	31
Kwun Tong	25	35	52	33	38	12	10	15	32	51	46	43	33
Sham Shui Po	13	28	35	24	36	16	13	17	37	40	38	30	27
Tsuen Wan	20	31	40	31	36	16	16	20	38	47	41	35	31
Sha Tin	31	48	65	49	53	17	16	25	47	65	56	47	43
Tai Po	34	47	55	41	47	28	33	40	54	66	49	46	45
Tung Chung	21	36	55	36	51	26	27	30	52	61	49	50	41
Yuen Long	19	38	46	30	39	18	22	23	45	53	47	40	35
Tap Mun	55	72	92	65	79	40	40	41	69	94	90	90	69

Notes:

1. All units are in micrograms per cubic metre.

2. Asterisked values are below their respective minimum data requirement of 66% for number of data within the period.

3. Shaded monthly averages are below the minimum data requirements for number of data within a quarter.

4. Shaded annual averages are above their respective AQO.

TABLE C4: 2008 MONTHLY AND ANNUAL AVERAGES OF PARTICULATE POLLUTANTS

Pollutant: Total Suspended Particulates (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	93	95	124	88	73	33	40	45	51	80	92	118	78
Kwai Chung	122	97	109	73	71	44	57	34	81	71	99	103	79
Kwun Tong	61	93	95	78	59	35	60	46	63	77	78	102	72
Sham Shui Po	96	85	116	97	75	42	50	56	55	86	101	115	81
Tsuen Wan	108	110	86	50	61	34	40	42	48	61	89	82	67
Sha Tin	79	81	98	64	81	24	28	34	71	57	85	90	66
Tai Po	121	74	118	61	49	41	29	28	86	71	77	126	73
Tung Chung	123	132	82	49	54	21	25	22	71	61	90	115	69
Yuen Long	143	150	100	65	68	30	46	48	64	79	126	112	87
Mong Kok	124	113	160	112	107	57	63	69	113	104	127	146	108

Pollutant: Respirable Suspended Particulates (Annual AQO = 55)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	63	68	76	50	48	24	25	24	50	53	58	74	51
Eastern	56	59	68	47	45	21	22	21	42	49	50	66	46
Kwai Chung	61	68	73	51	48	32	33	30	49	52	56	74	52
Kwun Tong	57	61	72	50	49	23	22	19	35	52	56	72	47
Sham Shui Po	64	69	77	53	52	30	32	30	48	54	58	70	53
Tsuen Wan	63	72	71	46	42	30	35	32	52	57	60	75	53
Sha Tin	57	67	72	47	48	25	28	26	49	51	56	74	50
Tai Po	60	66 *	69	48	47	25	31	27	50	51	56	73	50
Tung Chung	68	79	73	45	44	18	24	23	53	52	63	84	52
Yuen Long	75	83	80	52	50	28	33	30	58	60	74	95	60
Tap Mun	56	72	78	51	49	25	28	25	46	57	58	79	52
Causeway Bay	85	86	97	77	78	55	61	62	86	84	83	94	79
Central	73	76	85	61	58	39	41	38	63	65	70	85	63
Mong Kok	71	70	83	63	60	38	42	39	64	68	65	80	62

Notes:

1. All units are in micrograms per cubic metre.

2. Asterisked values are below their respective minimum data requirement of 66% for number of data within the period.

3. Shaded monthly averages are below the minimum data requirements for number of data within a quater.

4. Shaded annual averages are above their respective AQO.

TABLE C5: 2008 HOURLY STATISTICS OF MAJOR AIR POLLUTANTS

Pollutant: Sulphur Dioxide

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
			10	25	50	75	90	95	98	99				
Central / Western	8525	97.1	7	10	17	28	50	73	105	129	18	25	904	149
Eastern	8307	94.6	5	8	13	19	30	45	70	94	13	17	285	67
Kwai Chung	8527	97.1	5	8	14	37	73	97	127	153	16	28	345	104
Kwun Tong	8663	98.6	6	8	12	18	31	48	80	100	13	17	258	69
Sham Shui Po	8679	98.8	4	6	12	21	47	72	108	135	12	20	305	93
Tsuen Wan	8493	96.7	13	15	20	32	54	73	99	122	23	28	310	119
Sha Tin	8672	98.7	3	7	13	21	35	53	75	91	12	17	224	65
Tai Po	8209	93.5	7	9	12	19	29	40	62	82	14	17	182	53
Tung Chung	8527	97.1	5	8	13	21	37	53	79	95	14	18	266	91
Yuen Long	8535	97.2	9	11	17	24	38	50	76	106	17	21	263	103
Tap Mun	8485	96.6	3	6	10	18	26	33	48	66	10	14	190	71
Causeway Bay	8527	97.1	4	8	13	21	39	56	86	109	13	19	335	90
Central	8556	97.4	7	11	18	30	49	69	102	129	18	25	500	157
Mong Kok	8625	98.2	13	15	20	28	44	61	82	101	22	25	197	92

Pollutant: Nitrogen Oxides

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
			10	25	50	75	90	95	98	99				
Central / Western	8566	97.5	24	41	68	110	178	232	313	377	66	89	1165	386
Kwai Chung	8483	96.6	49	86	133	196	277	340	423	495	124	153	929	411
Kwun Tong	8649	98.5	41	71	109	159	221	268	354	428	102	125	807	369
Sham Shui Po	8679	98.8	40	75	116	158	218	280	393	482	105	129	900	418
Tsuen Wan	8486	96.6	40	77	107	149	207	261	333	391	102	121	744	361
Sha Tin	8669	98.7	17	29	53	101	193	264	335	376	54	82	606	283
Tung Chung	8558	97.4	17	33	60	108	159	193	232	261	55	76	538	295
Yuen Long	8542	97.2	40	57	83	123	189	245	316	380	84	102	712	267
Tap Mun	8478	96.5	5	8	13	21	35	45	65	77	13	17	205	68
Causeway Bay	8523	97.0	129	205	317	453	612	730	862	967	297	350	1400	789
Central	8617	98.1	118	188	322	469	623	732	863	962	289	350	1880	718
Mong Kok	8601	97.9	130	201	288	369	450	513	600	680	262	293	1144	563

Pollutant: Nitric Oxide

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
			10	25	50	75	90	95	98	99				
Central / Western	8566	97.5	2	4	10	26	62	99	143	177	11	24	577	150
Kwai Chung	8483	96.6	7	19	43	80	124	160	202	233	37	57	520	181
Kwun Tong	8649	98.5	7	16	32	57	94	122	169	203	28	43	452	194
Sham Shui Po	8679	98.8	2	14	29	49	83	120	179	236	26	39	440	163
Tsuen Wan	8486	96.6	5	13	27	48	81	110	150	182	23	37	382	166
Sha Tin	8669	98.7	0	2	7	30	79	118	151	176	10	25	315	118
Tung Chung	8558	97.4	2	3	7	23	51	69	91	107	9	18	284	112
Yuen Long	8542	97.2	4	8	19	38	70	97	137	172	18	30	346	106
Tap Mun	8478	96.5	0	1	1	2	4	7	13	20	2	2	74	19
Causeway Bay	8523	97.0	44	81	143	227	318	386	464	523	129	166	760	447
Central	8617	98.1	37	73	141	226	314	380	454	502	120	162	1062	353
Mong Kok	8601	97.9	44	79	126	167	212	246	301	346	109	129	617	255

Pollutant: Nitrogen Dioxide

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
			10	25	50	75	90	95	98	99				
Central / Western	8566	97.5	16	28	47	69	93	114	139	156	42	52	282	157
Eastern	8307	94.6	26	37	54	72	92	105	123	140	51	57	222	129
Kwai Chung	8483	96.6	32	44	58	79	108	134	165	183	58	66	263	158
Kwun Tong	8649	98.5	27	38	54	73	96	112	135	152	52	59	243	139
Sham Shui Po	8679	98.8	32	43	63	88	113	133	155	168	61	69	266	169
Tsuen Wan	8486	96.6	30	43	58	78	106	127	150	167	57	64	243	152
Sha Tin	8669	98.7	15	24	36	54	83	105	131	150	35	44	236	120
Tai Po	8249	93.9	27	36	47	63	85	100	116	131	47	52	213	105
Tung Chung	8558	97.4	13	25	41	65	96	117	141	158	38	49	256	134
Yuen Long	8542	97.2	26	35	49	69	99	120	148	169	49	56	239	133
Tap Mun	8478	96.5	4	6	11	18	28	36	49	58	11	14	119	49
Causeway Bay	8523	97.0	49	67	90	120	150	170	196	218	88	96	298	203
Central	8617	98.1	47	64	93	132	171	193	220	239	91	102	346	209
Mong Kok	8601	97.9	47	63	87	124	157	175	196	211	86	96	308	180

Pollutant: Carbon Monoxide

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 8 hour
			10	25	50	75	90	95	98	99				
Tsuen Wan	8491	96.7	330	440	590	780	1000	1160	1350	1490	580	636	2500	2289
Tung Chung	8570	97.6	520	610	790	1000	1320	1580	1780	1990	802	860	2820	2566
Yuen Long	8542	97.2	290	400	620	950	1310	1560	1840	2040	619	726	3220	3034
Tap Mun	8485	96.6	480	620	760	910	1080	1210	1350	1430	726	771	2060	1536
Causeway Bay	8446	96.2	690	920	1150	1490	1840	2180	2530	2880	1140	1233	5290	3780
Central	8493	96.7	230	460	800	1030	1380	1490	1730	1960	705	802	3220	2217
Mong Kok	8593	97.8	580	800	1030	1270	1610	1730	1960	2180	1008	1076	3450	2513

Pollutant: Ozone

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
			10	25	50	75	90	95	98	99				
Central / Western	8504	96.8	4	12	28	55	82	96	119	138	23	37	320	130
Eastern	8307	94.6	13	20	34	53	71	81	93	107	32	38	239	104
Kwai Chung	8399	95.6	8	11	22	45	67	81	97	110	22	31	210	99
Kwun Tong	8607	98.0	4	8	26	51	72	84	99	111	20	33	185	103
Sham Shui Po	8615	98.1	3	7	20	39	61	77	101	120	18	27	302	101
Tsuen Wan	8425	95.9	8	10	21	45	67	81	103	115	22	31	255	106
Sha Tin	8617	98.1	2	6	31	70	103	119	142	164	21	43	357	147
Tai Po	8018	91.3	16	22	36	63	89	103	120	135	36	45	214	117
Tung Chung	8548	97.3	5	13	32	58	88	109	145	186	26	41	310	146
Yuen Long	8523	97.0	4	8	24	51	80	102	132	159	20	35	298	128
Tap Mun	8468	96.4	18	36	64	98	127	143	163	179	54	69	407	161

Pollutant: Respirable Suspended Particulates (Continuous monitoring)

Station	No. of hours	Data capture rate %	<----------Percentiles---------->								Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
			10	25	50	75	90	95	98	99				
Central / Western	8556	97.4	15	25	45	70	93	111	132	151	41	51	224	152
Eastern	8674	98.7	14	22	41	63	84	97	114	125	37	46	218	135
Kwai Chung	8453	96.2	21	30	46	68	92	110	132	146	45	52	224	145
Kwun Tong	8618	98.1	14	23	43	66	87	101	117	130	38	47	238	136
Sham Shui Po	8603	97.9	21	29	47	71	93	111	129	141	45	53	229	141
Tsuen Wan	8551	97.3	23	31	44	69	93	110	133	151	46	53	208	143
Sha Tin	8659	98.6	17	25	43	68	92	109	125	138	41	50	253	134
Tai Po	8271	94.2	17	26	44	68	90	105	125	145	41	50	295	141
Tung Chung	8579	97.7	14	22	42	73	105	125	148	167	40	52	243	146
Yuen Long	8424	95.9	21	30	51	83	110	130	157	176	50	60	261	164
Tap Mun	8391	95.5	16	25	46	73	94	108	126	135	42	52	351	147
Causeway Bay	8486	96.6	37	55	78	100	123	138	158	171	72	79	238	161
Central	8488	96.6	27	39	58	81	104	122	142	159	55	63	217	159
Mong Kok	8519	97.0	26	39	57	80	103	118	138	153	54	62	244	154

Note: *1. All concentration units are in micrograms per cubic metre.*

2. Annual averages calculated from less than 8 representative months are not published.

TABLE C6: 2008 TOTAL WET AND DRY DEPOSITION

(a) WET DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong	Yuen Long
	WET DEPOSITION (TON/HA)	31275	29112	25786
	WEIGHTED MEAN pH (based on volume-weighted mean hydrogen ion concentrations ($[H^+]$))	4.62	4.71	4.70
	WEIGHTED MEAN pH (based on volume-weighted mean pH)	4.83	5.00	4.90
	NO. OF SAMPLES	95	94	87
Filtrate (Kg/Ha)	**NH_4^+**	7.04	8.80	5.88
	NO_3^-	20.13	20.52	15.44
	$SO_4^=$	52.58	47.65	34.38
	Cl^-	65.49	62.36	26.83
	F-	0.84	0.80	0.68
	Na^+	36.79	34.18	15.27
	K^+	7.93	7.40	6.40
	Formate	5.50	5.34	4.27
	Acetate	5.07	4.81	4.11
	Ca^{++}	5.48	6.40	4.13
	Mg^{++}	4.40	4.12	1.89

(b) DRY DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong	Yuen Long
	NO. OF SAMPLES	26	26	26
Filtrate (Kg/Ha)	**NH_4^+**	0.99	0.57	0.60
	NO_3^-	12.14	12.16	8.52
	$SO_4^=$	14.72	11.36	9.44
	Cl^-	15.20	11.70	4.21
	F-	0.168	0.167	0.189
	Na^+	9.65	7.22	2.48
	K^+	0.81	0.80	0.51
	Formate	0.17	0.17	0.20
	Acetate	0.17	0.17	0.17
	Ca^{++}	7.51	7.33	6.67
	Mg^{++}	1.29	1.03	0.53

** Note: The weighted mean pH is calculated from the pH values measured by the Government Laboratory.*

TABLE C7: 2008 DIURNAL VARIATIONS OF AIR POLLUTANTS

Pollutant: Sulphur Dioxide

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	22	20	19	20	19	20	20	22	25	26	26	25	24	25	27	29	27	29	30	32	29	27	26	24
Eastern	15	15	15	15	14	14	14	17	18	18	18	18	17	18	18	18	18	18	19	19	19	19	16	15
Kwai Chung	24	24	23	24	21	20	21	22	23	26	28	31	32	33	36	37	36	35	35	35	32	29	27	24
Kwun Tong	15	15	15	16	14	14	14	16	17	18	18	19	18	18	19	18	20	21	20	17	17	16	16	16
Sham Shui Po	19	19	19	19	18	18	18	18	18	18	19	20	21	20	21	21	21	24	23	23	23	20	19	19
Tsuen Wan	26	24	24	25	22	22	22	24	27	30	31	32	33	34	33	36	36	33	31	29	28	28	27	26
Sha Tin	15	14	14	14	13	13	12	13	16	18	18	19	19	19	19	21	23	24	22	20	19	18	17	15
Tai Po	15	15	15	14	14	13	13	14	17	17	19	18	18	18	17	19	20	19	19	19	17	16	16	15
Tung Chung	15	15	15	19	15	14	14	15	18	21	21	21	22	23	23	23	23	21	19	18	17	17	17	16
Yuen Long	19	19	18	19	17	16	16	18	21	23	22	22	24	24	26	26	27	26	24	22	20	21	21	21
Tap Mun	12	12	12	13	12	12	12	13	15	18	20	22	18	17	15	14	14	13	12	11	11	11	11	11
Causeway Bay	16	16	16	15	14	14	16	19	23	23	21	21	20	20	21	22	23	22	21	20	19	18	17	17
Central	20	19	18	18	17	17	19	24	32	31	29	27	25	25	27	30	28	33	32	29	28	27	24	22
Mong Kok	24	23	22	21	21	21	22	24	26	27	28	26	26	27	29	28	28	29	29	27	26	25	25	24

Pollutant: Nitrogen Oxides

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	83	66	54	47	46	46	57	93	116	122	106	94	83	82	85	90	92	100	113	121	119	111	103	97
Kwai Chung	134	98	84	73	71	82	132	184	212	202	173	158	151	148	161	171	180	183	211	208	180	166	159	154
Kwun Tong	113	79	66	59	57	66	116	163	180	165	146	131	120	120	128	133	147	165	169	155	137	127	129	132
Sham Shui Po	116	88	75	64	63	70	112	153	175	166	145	130	124	125	128	133	142	156	169	168	159	150	146	140
Tsuen Wan	110	78	64	54	50	58	99	136	162	160	145	135	130	127	125	132	139	147	161	155	140	135	133	130
Sha Tin	100	84	69	59	56	61	86	112	108	86	68	59	51	50	52	58	67	79	95	107	113	113	116	114
Tung Chung	82	64	53	46	45	53	75	88	86	77	77	78	77	76	76	74	73	80	92	95	94	91	90	88
Yuen Long	114	94	80	68	63	66	101	135	126	102	87	82	79	80	84	91	102	111	124	134	132	128	133	130
Tap Mun	17	17	16	16	15	15	16	18	21	22	23	22	18	16	15	15	16	17	17	17	17	17	17	17
Causeway Bay	298	229	199	178	167	170	268	420	479	463	437	411	377	375	360	375	368	388	416	424	414	404	415	370
Central	291	216	182	156	152	154	225	379	526	502	453	403	358	363	363	392	400	438	473	450	420	395	370	351
Mong Kok	280	200	180	155	147	145	228	311	345	340	313	296	302	319	338	339	354	378	401	358	320	324	337	334

Pollutant: Nitric Oxide

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	22	17	13	11	11	11	15	29	40	43	34	28	22	20	20	21	20	22	27	32	33	31	29	27
Kwai Chung	50	34	27	23	23	28	53	80	94	87	69	59	54	49	53	56	60	63	80	80	68	63	61	59
Kwun Tong	39	24	19	16	16	20	42	67	76	68	56	48	41	39	41	42	47	55	57	52	45	42	44	47
Sham Shui Po	34	24	20	16	16	19	36	56	67	62	50	41	36	35	34	35	38	43	49	50	48	46	46	44
Tsuen Wan	34	21	16	12	11	14	32	50	63	62	52	45	40	36	33	35	37	40	47	46	42	42	42	42
Sha Tin	35	28	21	17	16	19	30	43	40	28	19	15	12	11	11	12	13	15	23	30	36	38	41	41
Tung Chung	22	15	11	9	9	12	22	29	26	21	19	19	17	14	13	12	11	12	17	20	22	23	24	24
Yuen Long	39	29	24	19	17	18	36	53	47	32	25	22	20	19	19	19	21	24	30	37	39	40	45	45
Tap Mun	2	2	2	2	2	2	2	3	4	4	4	4	3	2	2	2	2	2	1	1	1	1	1	2
Causeway Bay	140	104	88	78	72	75	127	212	244	232	216	199	177	174	163	170	167	178	196	203	199	196	203	179
Central	134	94	77	64	62	63	100	186	268	252	219	187	160	160	158	172	177	200	222	212	201	188	175	167
Mong Kok	126	85	75	62	58	57	101	147	165	160	142	129	128	135	142	142	151	165	180	158	140	144	153	154

Pollutant: Nitrogen Dioxide

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	50	40	34	30	29	29	35	49	55	57	54	52	49	51	55	58	62	67	72	72	68	64	59	56
Eastern	54	45	38	35	33	36	49	61	63	61	58	56	54	56	59	62	68	73	75	72	69	67	62	60
Kwai Chung	58	47	42	38	36	40	51	62	68	68	67	67	69	72	79	85	87	87	90	85	77	70	66	64
Kwun Tong	54	42	37	33	32	36	52	61	64	62	60	58	58	61	66	69	75	81	81	75	68	64	62	61
Sham Shui Po	64	51	45	40	39	41	57	67	72	71	68	67	68	72	76	79	84	91	94	90	85	80	76	73
Tsuen Wan	58	46	40	35	33	37	51	60	65	66	65	66	69	71	74	78	82	86	89	84	76	71	69	66
Sha Tin	46	41	36	33	31	33	40	45	46	43	39	35	32	33	35	40	47	56	60	60	58	55	53	51
Tai Po	55	49	44	40	39	40	47	54	54	49	44	41	40	42	43	47	55	66	73	73	68	64	62	60
Tung Chung	48	41	36	32	31	34	40	44	46	46	47	49	51	54	56	56	56	62	66	64	61	56	53	51
Yuen Long	55	49	44	39	38	39	46	54	55	53	49	49	49	52	56	61	69	75	79	78	72	67	64	61
Tap Mun	14	14	14	13	12	13	13	14	15	16	17	16	14	13	12	12	13	14	15	15	15	14	14	14
Causeway Bay	84	71	65	59	56	57	74	97	106	109	106	108	106	110	111	115	113	116	116	113	110	104	105	96
Central	86	72	65	58	58	58	72	95	116	117	119	117	114	118	122	129	129	132	134	125	113	107	102	96
Mong Kok	87	70	65	60	58	57	73	86	92	96	96	100	106	113	121	121	124	126	125	116	106	104	103	98

Pollutant: Carbon Monoxide

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Tsuen Wan	620	580	550	520	520	530	610	680	700	670	640	610	610	610	600	610	630	660	720	750	730	720	700	680
Tung Chung	840	830	830	820	820	830	840	850	860	860	860	870	880	890	890	880	870	870	880	890	890	870	860	860
Yuen Long	780	720	690	650	630	620	690	800	800	720	680	650	650	660	660	660	690	720	780	830	850	820	830	810
Tap Mun	770	770	760	750	750	750	770	790	790	800	780	780	780	780	770	770	760	760	770	770	770	770	770	770
Causeway Bay	1390	1410	1290	1250	1140	1090	1030	1050	1150	1210	1290	1290	1240	1240	1190	1200	1180	1170	1250	1310	1350	1330	1300	1260
Central	820	690	600	540	510	490	550	670	840	910	950	840	810	870	830	850	800	870	960	970	1020	1020	940	910
Mong Kok	1110	1170	1130	1020	1000	940	910	930	1010	1040	1030	1080	1090	1100	1130	1120	1110	1110	1160	1180	1150	1130	1100	1080

Pollutant: Ozone

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	32	40	44	46	47	45	37	26	23	25	32	39	48	52	53	51	46	38	30	27	26	27	28	29
Eastern	35	39	42	44	45	41	33	25	26	30	36	42	48	52	51	50	44	40	36	35	33	31	33	32
Kwai Chung	29	38	39	41	40	37	28	21	20	23	28	34	39	41	39	36	32	29	23	22	24	26	26	26
Kwun Tong	28	37	40	42	41	37	25	19	19	24	30	37	43	45	44	43	36	29	26	26	28	29	27	27
Sham Shui Po	24	33	36	39	38	35	23	16	16	20	26	33	39	41	41	38	32	24	18	17	17	18	18	19
Tsuen Wan	26	36	39	42	42	37	25	20	21	24	29	35	40	43	44	42	38	30	21	20	22	23	22	23
Sha Tin	31	35	37	38	37	34	28	25	29	37	48	59	69	74	74	69	61	49	40	36	33	33	31	30
Tai Po	35	37	38	39	39	38	32	30	34	43	53	62	70	73	74	70	62	49	40	36	35	35	34	33
Tung Chung	31	36	37	39	39	34	28	27	29	34	39	46	55	64	70	73	67	53	38	32	30	31	30	30
Yuen Long	23	26	28	30	29	27	22	19	23	30	42	52	62	67	67	62	52	41	29	23	22	22	21	21
Tap Mun	58	56	55	53	52	50	49	51	54	60	69	78	89	95	98	98	95	91	83	77	70	66	62	59

Pollutant: Respirable Suspended Particulates (Continuous Monitoring)

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	48	46	45	44	44	43	45	49	51	54	53	53	51	53	55	56	56	57	57	58	57	54	51	50
Eastern	43	42	41	41	41	41	42	44	45	46	47	47	47	48	49	49	48	49	50	50	49	47	45	44
Kwai Chung	48	46	44	44	44	46	48	50	50	49	49	49	51	54	56	59	63	64	65	63	59	55	52	50
Kwun Tong	44	42	41	41	40	41	43	46	49	50	49	49	48	49	52	52	53	54	54	54	51	48	46	45
Sham Shui Po	49	47	46	45	46	46	48	50	51	52	52	53	52	54	57	57	59	61	62	64	61	56	53	51
Tsuen Wan	49	47	45	44	44	45	46	49	51	53	54	54	54	56	58	59	61	61	61	60	58	54	52	50
Sha Tin	49	47	46	45	46	45	46	48	47	47	47	49	48	49	50	52	54	56	57	57	55	54	52	50
Tai Po	48	47	46	45	45	45	47	51	51	49	48	49	49	50	50	50	52	53	54	55	55	53	51	50
Tung Chung	49	47	46	45	45	46	46	47	48	49	50	53	56	60	64	65	61	59	56	55	54	52	51	49
Yuen Long	58	55	54	53	52	51	53	58	64	63	62	63	63	64	65	65	64	63	65	66	64	61	60	59
Tap Mun	49	49	49	49	49	48	50	50	52	53	54	55	54	54	55	55	54	55	55	53	51	51	50	49
Causeway Bay	72	58	55	52	51	52	62	76	82	84	80	80	78	85	87	88	92	95	103	105	99	93	91	85
Central	56	51	49	47	48	50	55	65	72	72	67	64	61	64	66	70	70	74	76	73	70	67	63	61
Mong Kok	54	48	46	46	46	47	51	59	64	64	66	64	63	68	70	68	71	73	75	77	73	68	63	59

Note: All concentration units are in micrograms per cubic metre.

TABLE C8: 2008 AMBIENT LEVELS OF TOXIC AIR POLLUTANTS

Toxic Air Pollutants	Concentration Unit	Annual Averages [1]	
		Tsuen Wan	Central/Western
Heavy Metals			
Hexavalent chromium	ng/m^3	0.10	0.11
Lead [2]	ng/m^3	49	50
Organic Substances			
Benzene	$\mu g/m^3$	1.5	1.29
Benzo[a]pyrene	ng/m^3	0.25	0.28
1,3-Butadiene	$\mu g/m^3$	0.2	0.18
Formaldehyde	$\mu g/m^3$	5.29	3.62
Perchloroethylene	$\mu g/m^3$	0.68	0.72
Dioxins [3]	$pgI\text{-}TEQ/m^3$	0.062	0.041

Note:

[1] For TAP concentrations that are lower than the method detection limit (MDL), one half of the MDL is used in calculating the annual averages.

[2] For lead the reported figures are the respective 2008 annual average concentrations in the elemental analysis of total suspended particulates.

[3] The ambient level of dioxins is expressed here as toxic equivalent (I-TEQ) concentration of 2,3,7,8-Tetrachlorodibenzodioxin (TCDD) based on the International Toxic Equivalent Factors (I-TEF) of the North Atlantic Treaty Organisation (NATO/CCMS).

Appendix D

Monitoring Results of Sulphur Dioxide and Nitrogen Dioxide by HEC and CLP

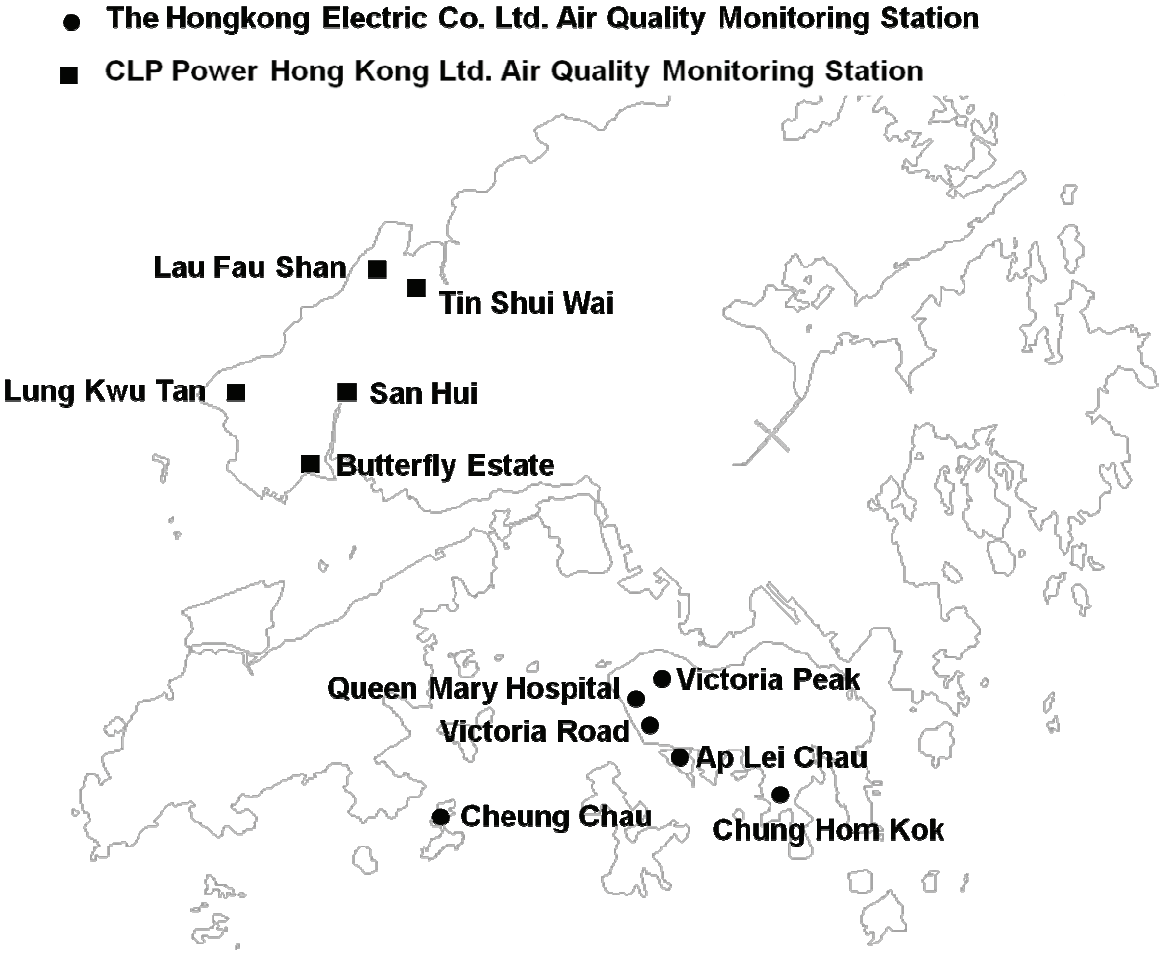


Figure D1 Location of HEC's & CLP's Air Quality Monitoring Stations for Sulphur Dioxide and Nitrogen Dioxide

D.1 The Hongkong Electric Co. Ltd. (HEC)

Air Quality Monitoring Stations	Annual Mean Concentration [1]	Range of Monthly Mean Concentration [1]
Sulphur Dioxide (SO_2) [2]		
Victoria Peak [4]	--	7 - 11
Chung Hom Kok	14	9 - 24
Victoria Road	21	13 - 26
Queen Mary Hospital	13	6 - 17
Ap Lei Chau	14	9 - 19
Cheung Chau	14	3 - 26
Nitrogen Dioxide (NO_2) [2]		
Victoria Peak [4]	--	44 - 52
Chung Hom Kok	19	11 - 29
Victoria Road	38	21 - 57
Queen Mary Hospital	30	15 - 48
Ap Lei Chau	22	9 - 40
Cheung Chau	28	7 - 49

D.2 CLP Power Hong Kong Ltd. (CLP)

Air Quality Monitoring Station	Annual Mean Concentration [1]	Range of Monthly Mean Concentration [1]
Sulphur Dioxide (SO_2) [2]		
San Hui	13	3 - 31
Tin Shui Wai	9	3 - 19
Butterfly Estate	16	7 - 27
Lung Kwu Tan	11	2 - 22
Lau Fau Shan	30	21 - 42
Nitrogen Dioxide (NO_2) [3]		
San Hui	71	41 - 109
Tin Shui Wai	35	15 - 58
Butterfly Estate	42	23 - 65
Lung Kwu Tan	32	16 - 47
Lau Fau Shan	34	22 - 54

Notes:

[1] All pollutant units are in micrograms per cubic metre.

[2] There was no exceedance of AQO limit for the pollutant in 2008.

[3] San Hui recorded three counts of exceedance of 24-hr AQO limit for NO_2, and two counts of exceedance of 1-hr AQO limit for NO_2

[4] Air monitoring commenced in Nov 2008. There were insufficient data for the calculation of annual average.