AIR QUALITY
IN HONG KONG 2002

Air Services 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 (2002) (AQMN)

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Summary

This report summarises the 2002 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 and nitrogen oxides at roadside have been dropping gradually over the past few years.

Over the past decade, concentrations of ozone have been on a slow rising trend which generally indicates a deterioration in regional air quality. On this front, the Hong Kong Special Administrative Region Government and the Guangdong Provisional Government are working together on a Regional Air Quality Management Programme 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 2002.

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1. Introduction

The Environmental Protection Department (EPD) operated in 2002 a network of 14 air quality monitoring stations for measuring major air pollutants. It consists of 11 stations for monitoring general air quality and 3 stations for roadside air quality across the territory (please refer to Table B1 in Appendix B for details of the monitoring stations).

Additional monitoring facilities specifically designed to collect Toxic Air Pollutants (TAPs) samples have been installed at the Tsuen Wan and Central/Western monitoring stations since 1997 to measure ambient levels of potentially important TAPs in Hong Kong.

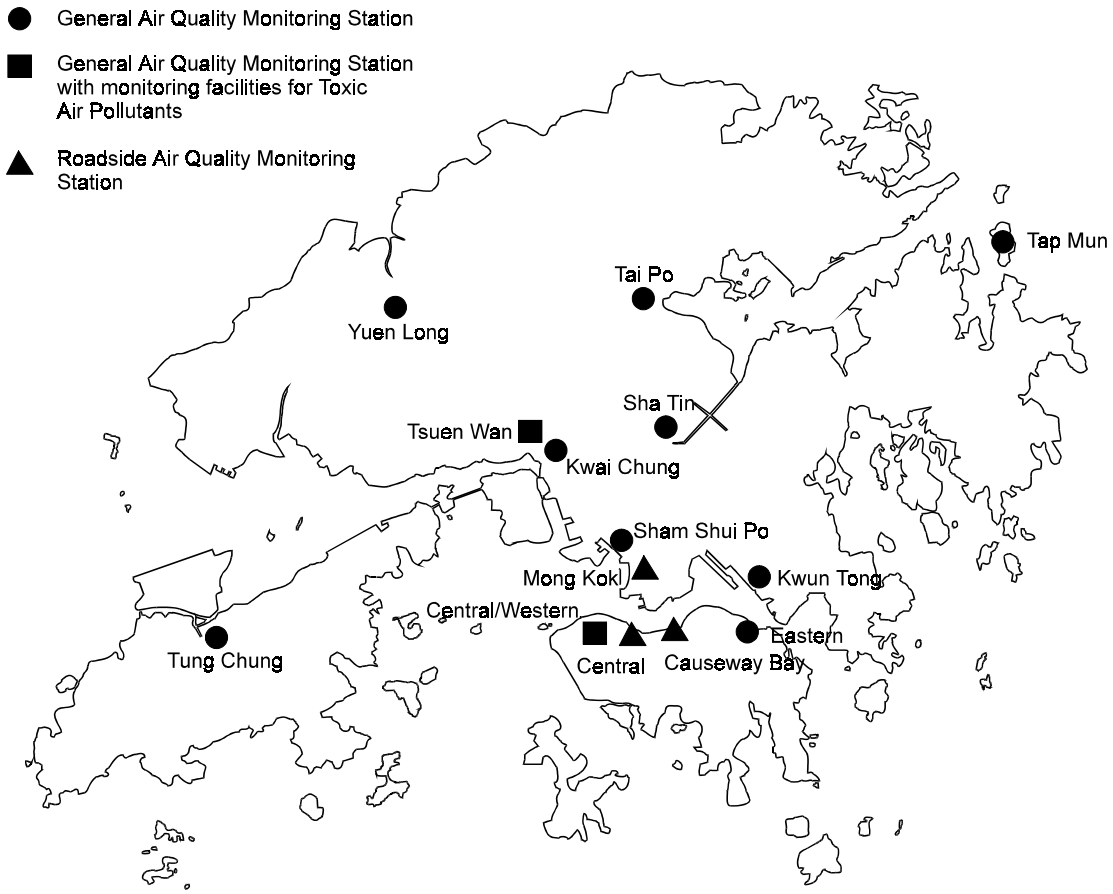


Figure 1: Location of EPD's Air Quality Monitoring Stations (2002)

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 2002 are at Appendix D.

2. Gaseous Pollutants

2.1 Sulphur Dioxide (SO_2)

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

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 2002
(1-Hour Average Statistics)

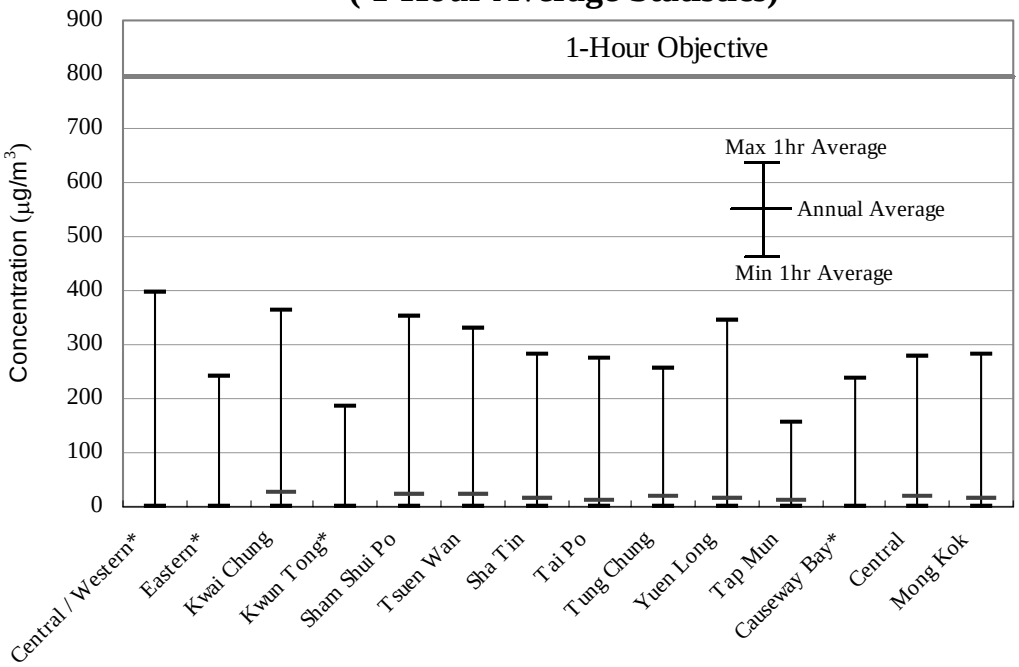
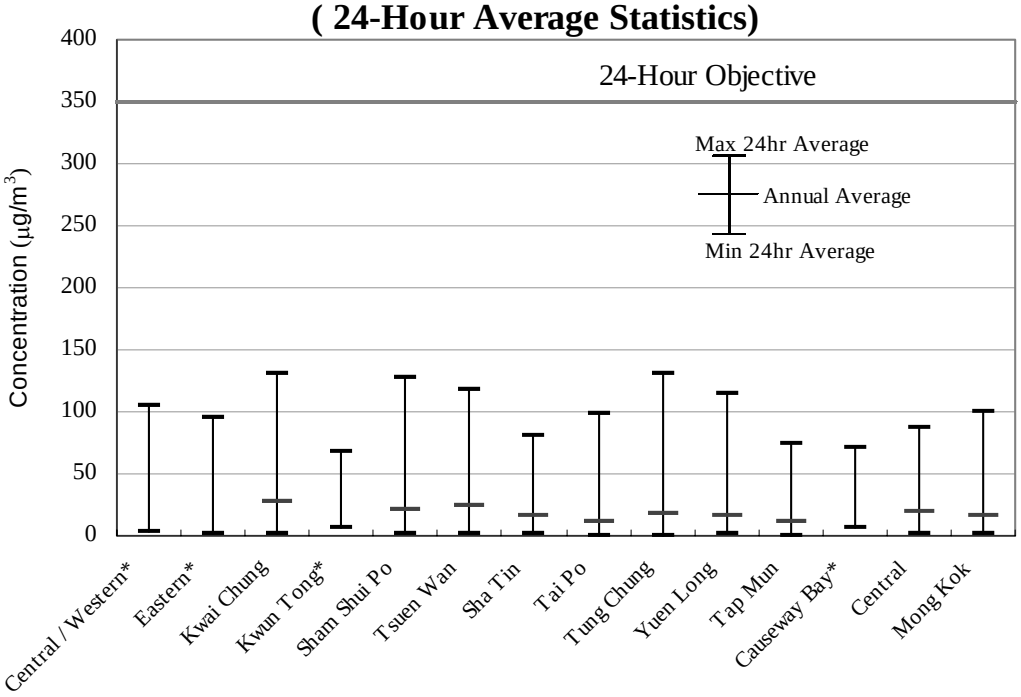
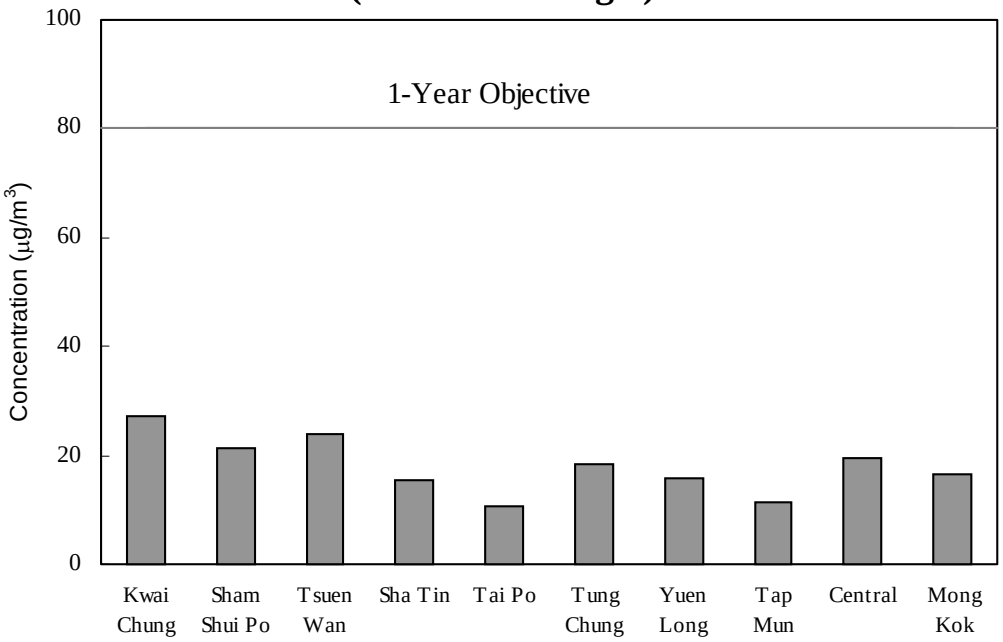


Figure 2b: Sulphur Dioxide Monitoring 2002
(24-Hour Average Statistics)



Note: The asterisked stations did not have sufficient data for the calculation of annual average in the year.

Figure 2c: Sulphur Dioxide Monitoring 2002
(Annual Average)



Sulphur dioxide was continuously measured at all 14 stations in the monitoring network during 2002. As in previous years, concentrations of SO_2 in Hong Kong remained very low in 2002. All of the 14 stations complied with all relevant AQOs for SO_2 during the year. The highest 1-hour average (395 $\mu g/m^3$) was recorded at Central/Western station and the highest 24-hour average (130 $\mu g/m^3$) was recorded at both Kwai Chung and Tung Chung station, while the highest annual average (27 $\mu g/m^3$) was recorded at Kwai Chung station. All these readings 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 (diesel vehicles in particular) are the two major sources of NO_x in Hong Kong. NO_x emissions from motor vehicles are of greater concern due to their dominant impact on the roadside air quality.

Nitrogen dioxide (NO_2) is 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 14 stations in the monitoring network during 2002. In 2002, there were total 7 counts and 1 count of exceedance of 1-hr AQO limit for roadside stations and general stations respectively, with the highest 1-hour average (356 $\mu g/m^3$) recorded at Central roadside station. There were 31 counts and 12 counts of exceedance of 24-hr AQO limit for roadside stations and general stations respectively, with the highest 24-hr average (208 $\mu g/m^3$) recorded at Causeway Bay roadside station.

As in last year, all general stations complied with the annual AQO for NO_2 while non-compliance was still observed at the roadside stations in 2002. The highest annual average (91 μg/m^3) was recorded at Mong Kok roadside station.

Figure 3a: Nitrogen Dioxide Monitoring 2002
(1-Hour Average Statistics)

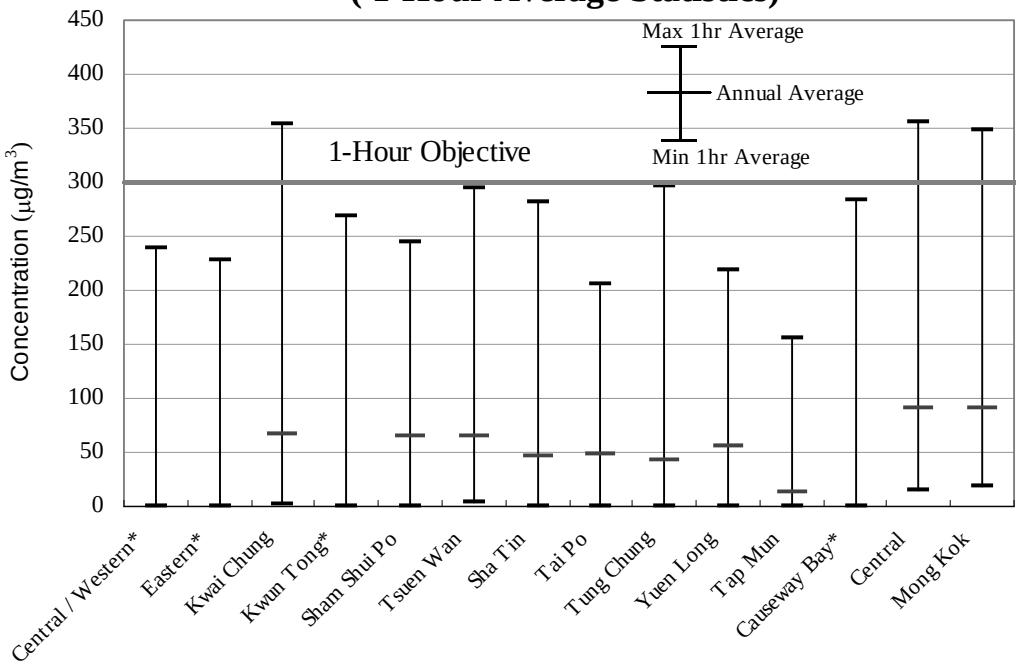
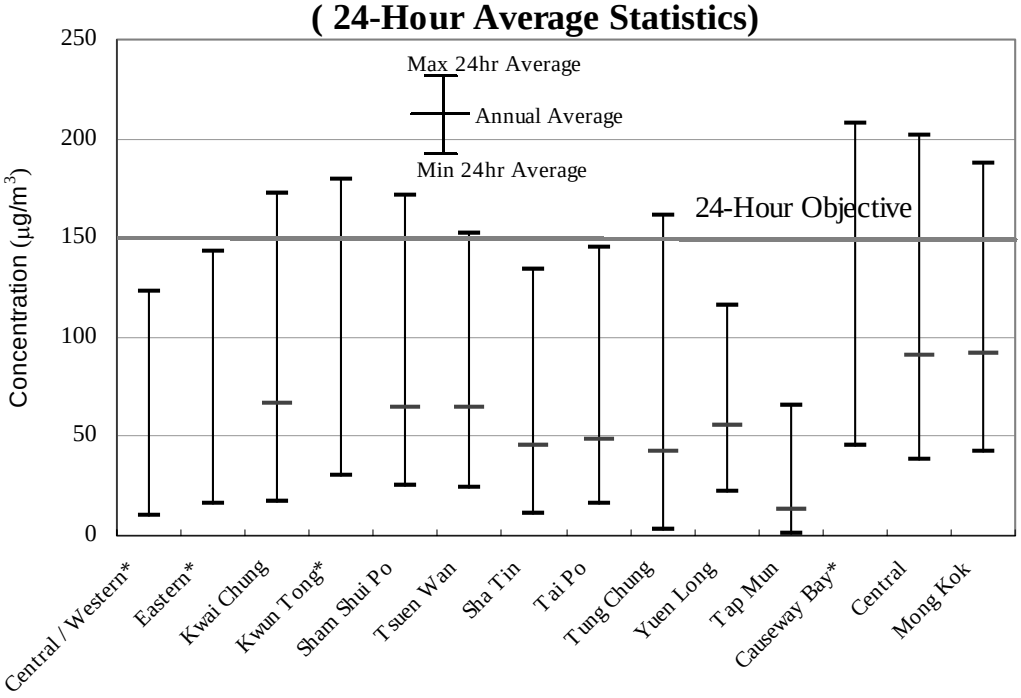
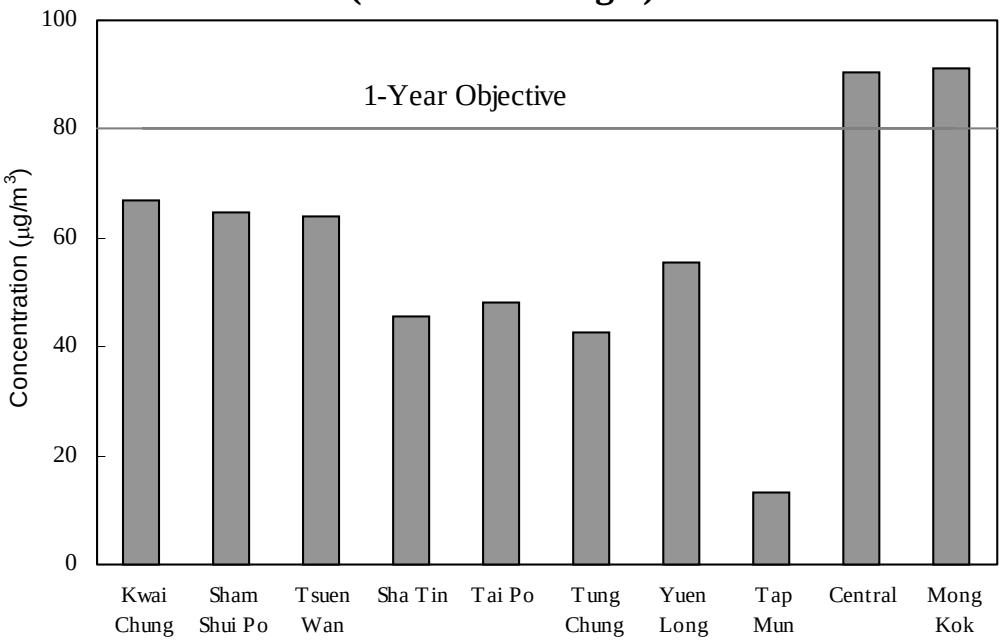


Figure 3b: Nitrogen Dioxide Monitoring 2002
(24-Hour Average Statistics)



Note: The asterisked stations did not have sufficient data for the calculation of annual average in the year.

Figure 3c: Nitrogen Dioxide Monitoring 2002
(Annual Average)

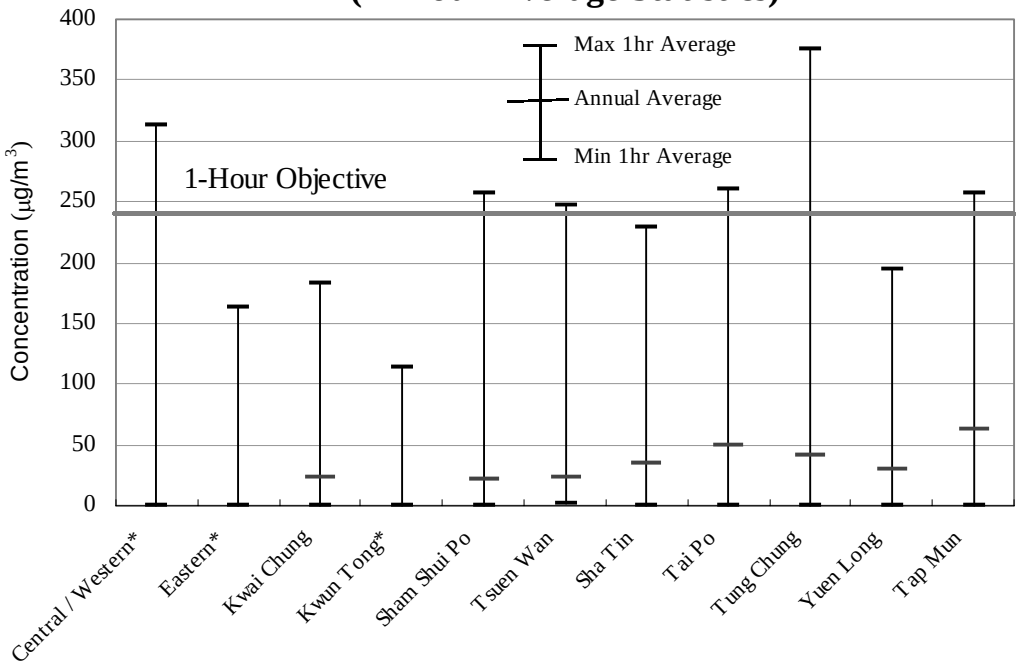


2.3 Ozone (O_3)

Ozone (O_3), a major constituent of photochemical smog, is formed by a series of complicated photochemical reactions of oxygen, nitrogen oxides and volatile organic compounds in the presence of sunlight and warm temperature. Being a strong oxidant, ozone can cause irritation to the eye, 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.

Ozone was measured at all the 11 general monitoring stations during 2002. Tung Chung Station breached the AQO for ozone with 35 counts of exceedance of 1-hr AQO limit in the year. The highest 1-hr average (376 $\mu g/m^3$) was also recorded at Tung Chung station in 2002. Tap Mun station recorded 3 counts of exceedance, with highest 1-hr average of 257 $\mu g/m^3$. Central/Western, Sham Shui Po, Tsuen Wan and Tai Po stations all recorded 1 count of exceedance, with highest 1-hr averages of 313 $\mu g/m^3$, 257 $\mu g/m^3$, 247 $\mu g/m^3$ and 260 $\mu g/m^3$ respectively during the year.

Figure 4a: Ozone Monitoring 2002
(1-Hour Average Statistics)



Note: The asterisked stations did not have sufficient data for the calculation of annual average in the year.

2.4 Carbon Monoxide (CO)

Carbon monoxide (CO) comes mainly from vehicular emissions although 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 disease.

Carbon monoxide was continuously monitored at 6 stations including 3 roadside stations and 3 general stations during 2002. Similar to previous years, both the ambient and roadside CO concentrations remained very low in 2002. During the year, all of the 6 stations complied with the 1-hour and 8-hour AQO. The highest 1-hour and 8-hour averages were recorded at Mong Kok roadside station (5980 $\mu g/m^3$) and Central roadside station (3739 $\mu g/m^3$) respectively, of about one fifth and one third of the respective AQO limits.

Figure 5a: Carbon Monoxide Monitoring 2002
(1-Hour Average Statistics)

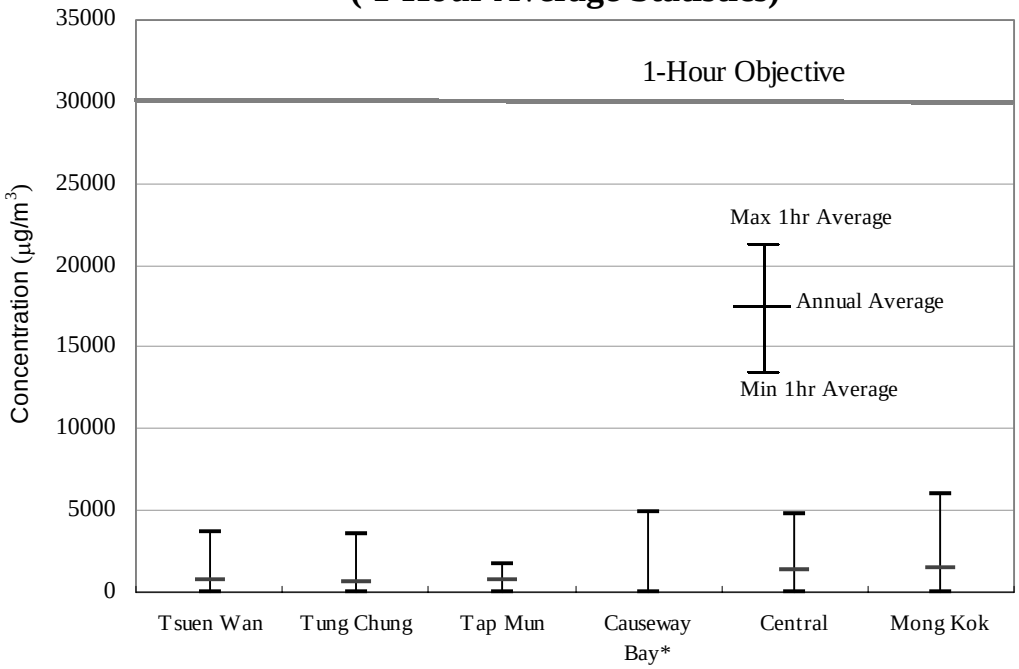
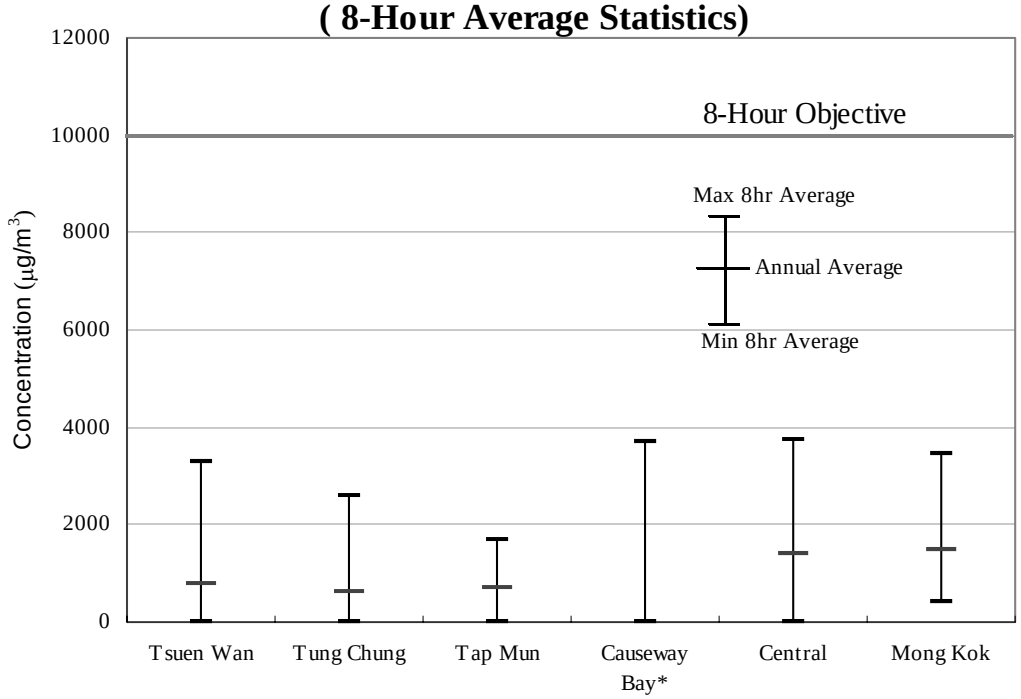


Figure 5b: Carbon Monoxide Monitoring 2002
(8-Hour Average Statistics)



Note: The asterisked stations did not have sufficient data for the calculation of annual average in the year.

3. Suspended Particulates

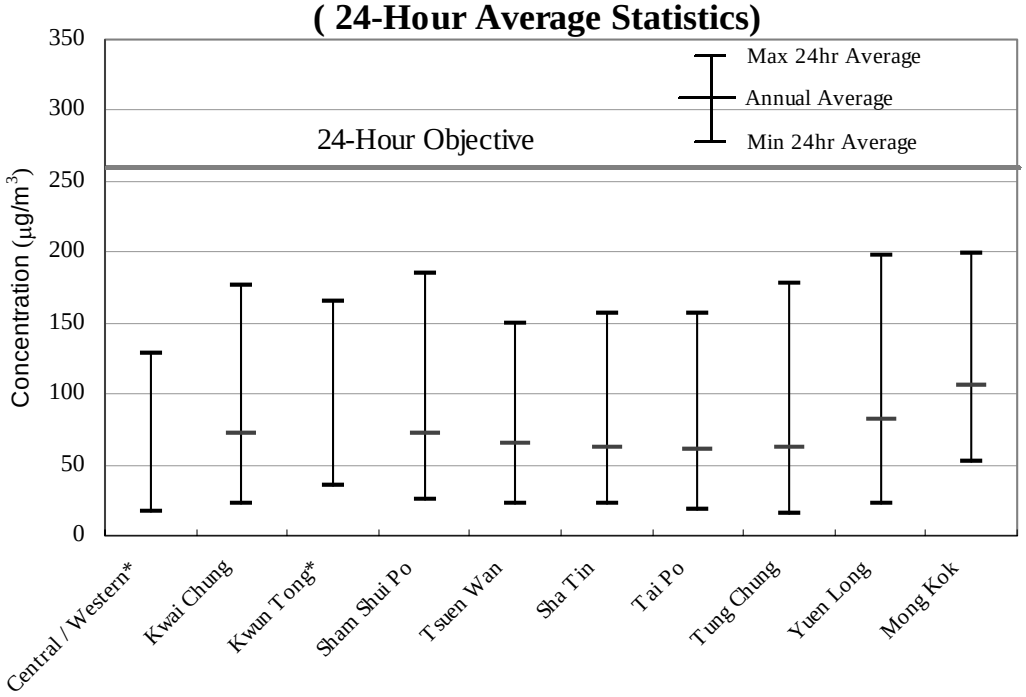
3.1 Total Suspended Particulates (TSP)

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 9 general and 1 roadside stations during 2002. The highest 24-hr average (199 $\mu g/m^3$) was recorded at Mong Kok roadside station, whilst second highest (198 $\mu g/m^3$) was recorded at Yuen Long station. No station had recorded any exceedance of the 24-hr AQO limit for TSP.

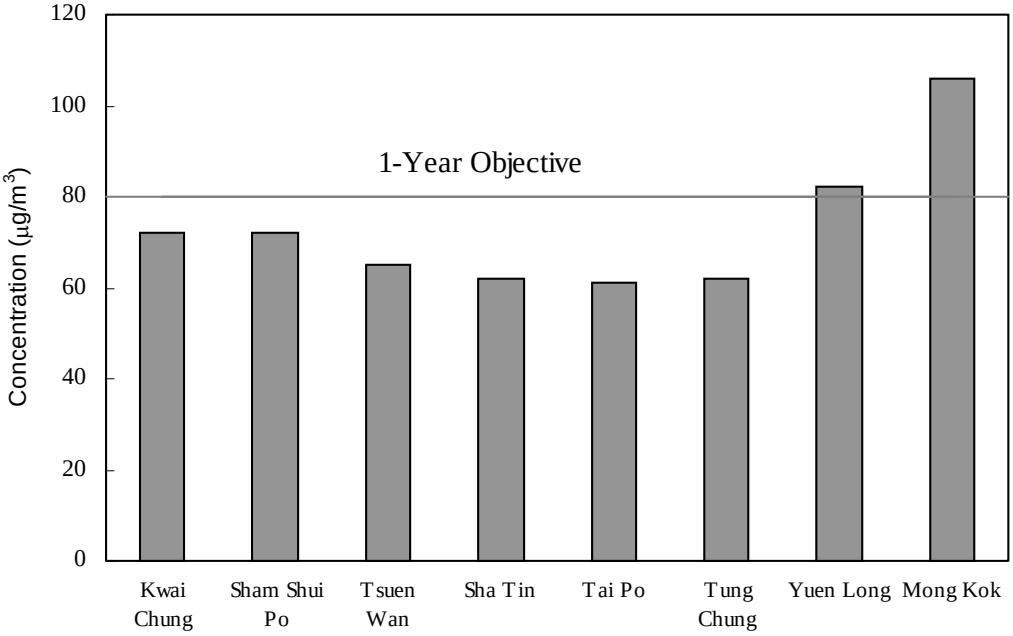
In 2002, the highest annual average (106 $\mu g/m^3$) was recorded at Mong Kok roadside station which breached the annual AQO value of 80 $\mu g/m^3$. Exceedance of annual AQO was also observed at Yuen Long station (82 $\mu g/m^3$).

Figure 6a: TSP Monitoring 2002
(24-Hour Average Statistics)



Note: The asterisked stations did not have sufficient data for the calculation of annual average in the year.

Figure 6b: TSP Monitoring 2002
(Annual Average)



3.2 Respirable Suspended Particulates (RSP)

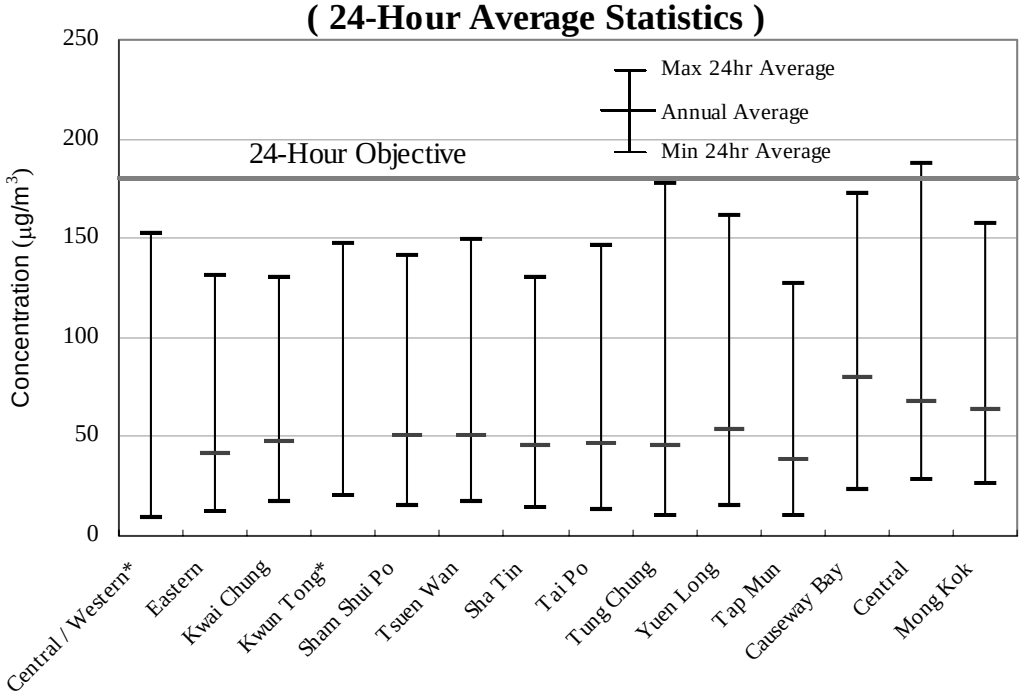
Respirable suspended particulates (RSP) refer to those suspended particulates with nominal aerodynamic diameters of 10 micrometres or less. Combustion sources, in particular diesel vehicle exhaust and emissions from power plants, are the major sources of RSP. Besides, RSP can be formed by atmospheric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

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 also have a major impact on visibility.

RSP was measured at all the 14 stations in the monitoring network in 2002. Most of these stations were also equipped with high-volume sampler to collect particulate samples for chemical analysis. In 2002, the highest 24-hr average (187 $\mu g/m^3$) was recorded at Central roadside station which also breached the 24-hr AQO limit of 180 $\mu g/m^3$ in the year. The second highest 24-hr average (177 $\mu g/m^3$) was recorded at Tung Chung station.

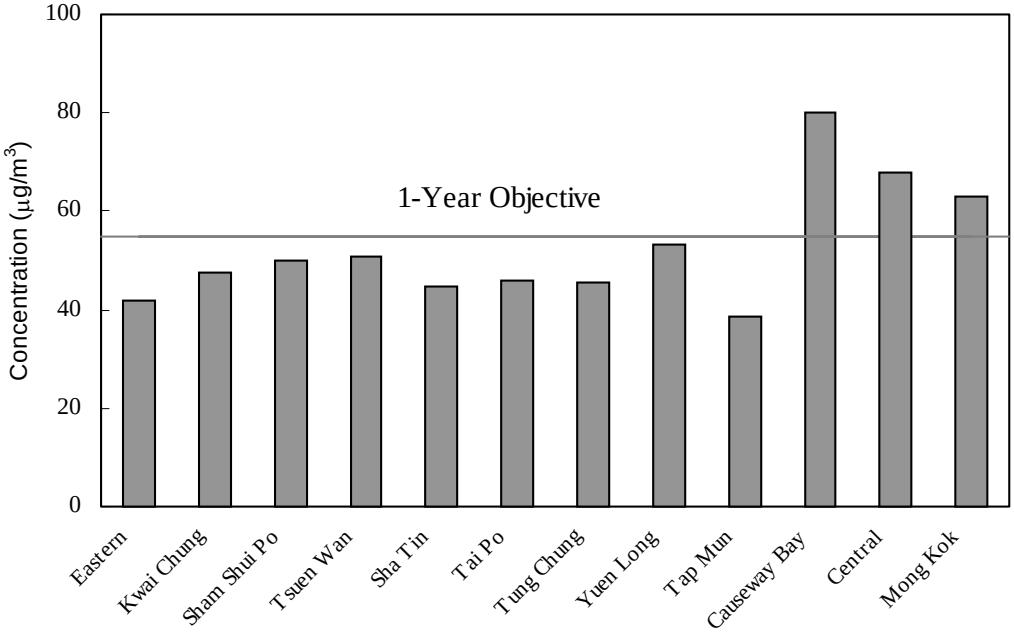
In 2002, the highest annual average (80 $\mu g/m^3$) was recorded at Causeway Bay roadside station, which exceeded the annual AQO for RSP. Other two roadside stations, viz Central and Mong Kok stations, also breached the annual AQO for RSP, with annual averages of 68 $\mu g/m^3$ and 63 $\mu g/m^3$ respectively.

Figure 7a: RSP Monitoring 2002
(24-Hour Average Statistics)



Note: The asterisked stations did not have sufficient data for the calculation of annual average in the year.

Figure 7b: RSP Monitoring 2002
(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 2002. The overall 3-month averages ranged from 25 ng/m^3 (second quarter) to 95 ng/m^3 (fourth quarter) and were well within the relevant 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 2002, 10 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 B.4. 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 follow the diurnal pattern of traffic. For instance, higher levels of NO_2 and RSP are usually observed in the early 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 patterns is much more distinct for roadside air pollutant levels.

Figure 8: 2002 Diurnal variations of NO_2

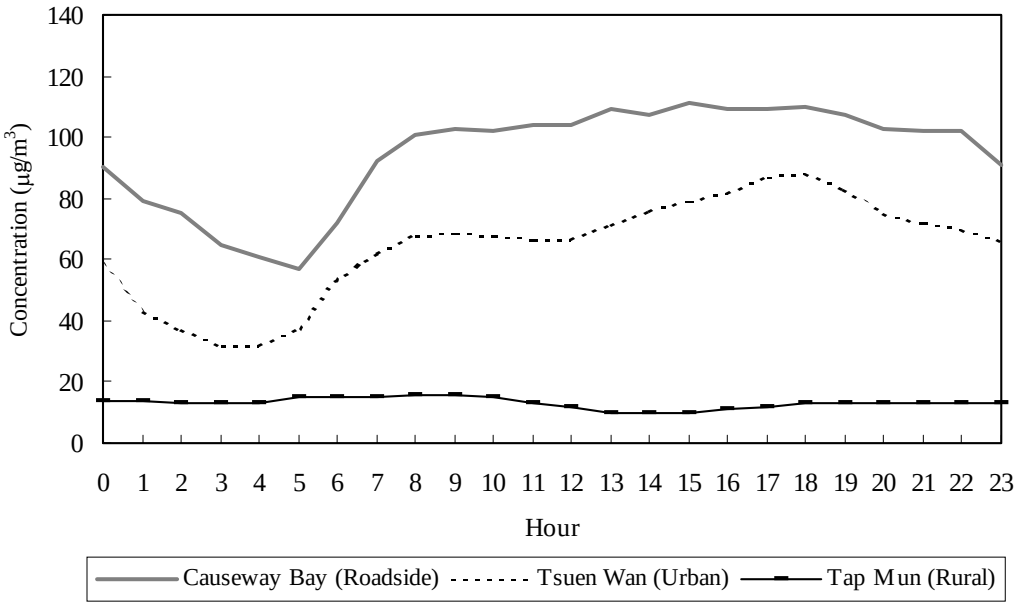
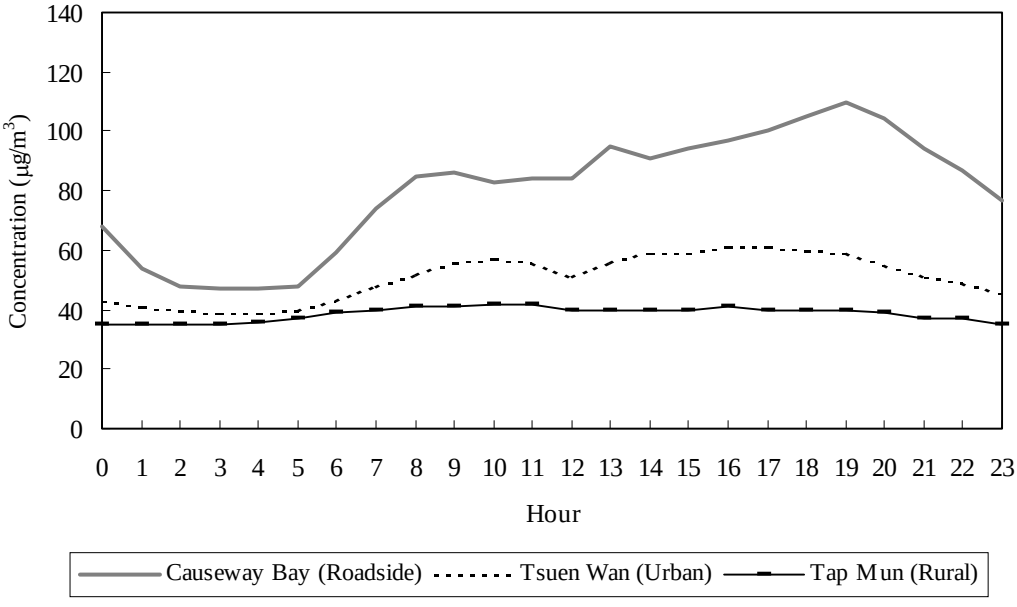
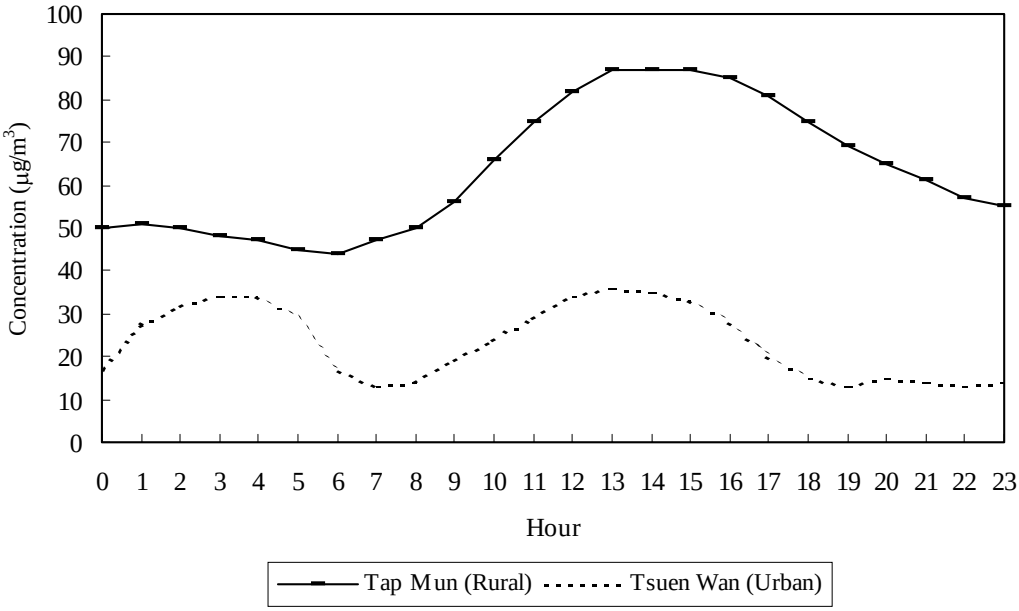


Figure 9: 2002 Diurnal variations of RSP



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 NO_2 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 also not strong enough for photochemical reactions to take place.

Figure 10: 2002 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 southwesterly prevailing wind in summer also helps to replenish the region with cleaner oceanic air.

Figure 11: Monthly variations of NO_2 and RSP at Tsuen Wan in 2002

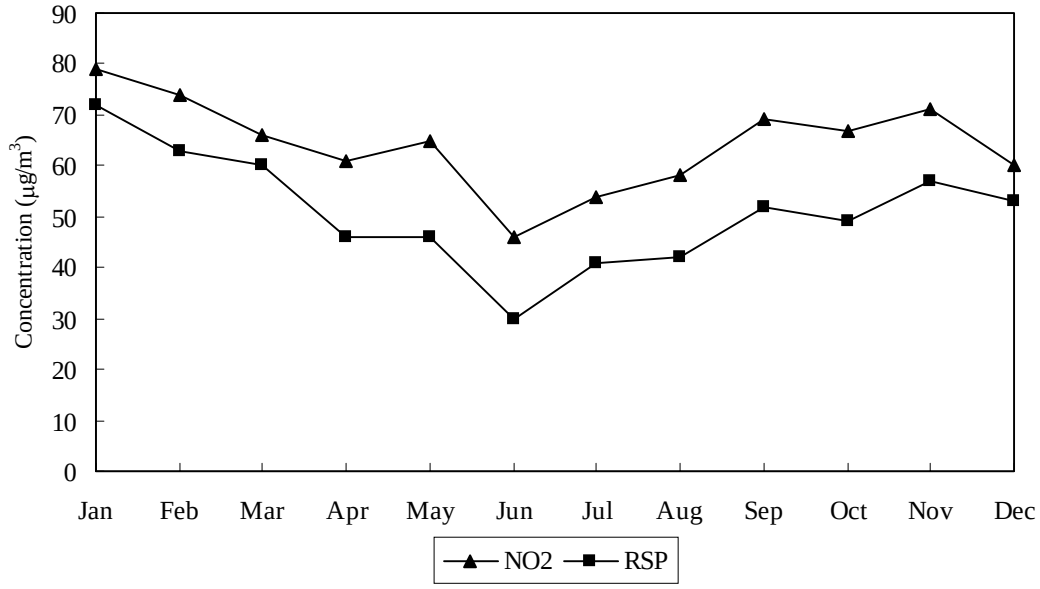
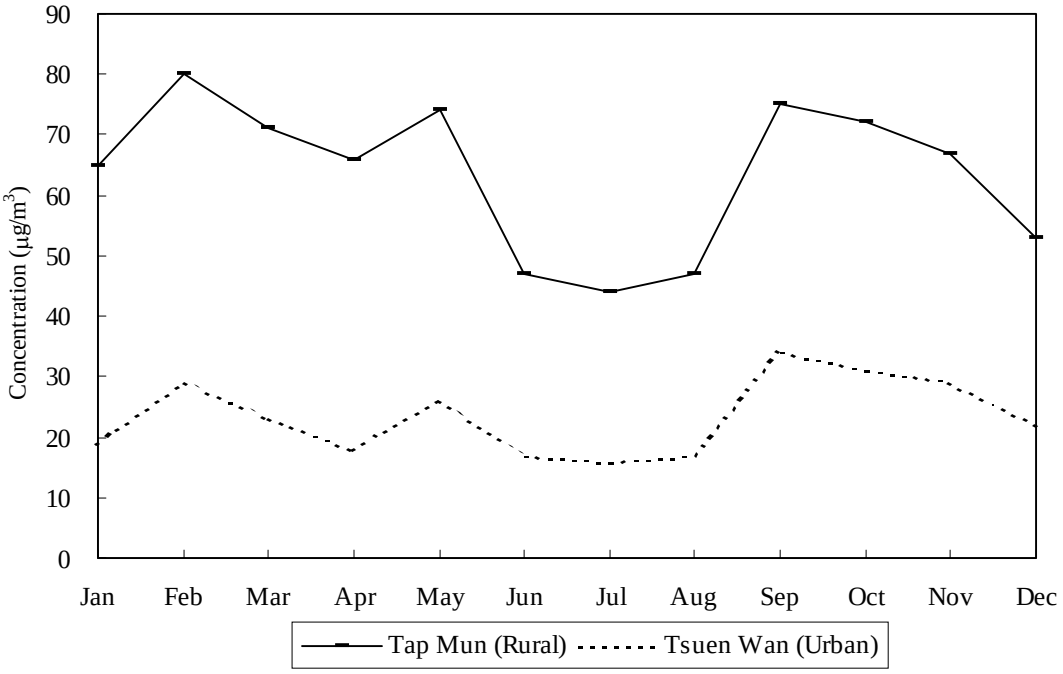


Figure 12: Monthly variations of O_3 in 2002



5.3 Long Term Trends

The long-term trends for various air pollutants presented in this section are based on annual average concentrations of pollutants recorded from various air quality monitoring stations categorised into 4 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	Station
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[1]	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)

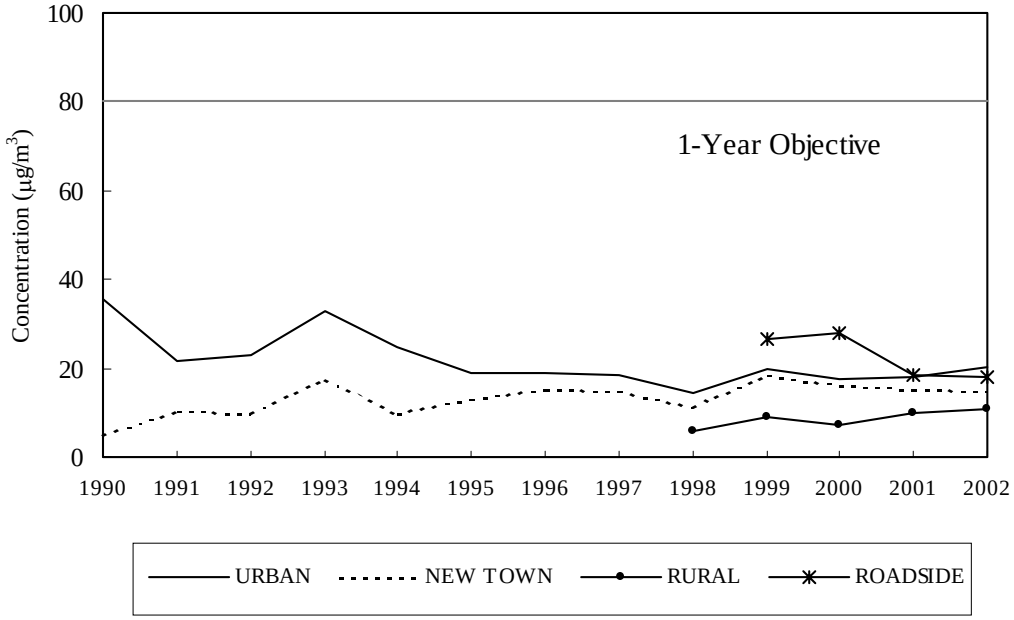
Since the implementation of the Air Pollution Control (Fuel Restriction) Regulations in 1990 for cutting sulphur content of industrial fuels and the Air Pollution Control (Motor Vehicle Fuel) Regulations in 1995 for controlling motor vehicle fuel quality, SO_2 concentrations in Hong Kong have reduced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

Over the past decade, SO_2 concentrations in urban areas have shown a downward trend.

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 2002 (18 $\mu g/m^3$) dropped by 36% compared with the 2000 value (28 $\mu g/m^3$).

[1] The current Mong Kok roadside station was commissioned in 2001. It only has two years data which are not sufficient for trend analysis. Therefore, the long-term trends for roadside stations are only based on data from the remaining 2 roadside stations, namely Causeway Bay and Central roadside stations. (The previous Mong Kok station was removed in 2000 as a result of the clearance of the site at which the station was located.)

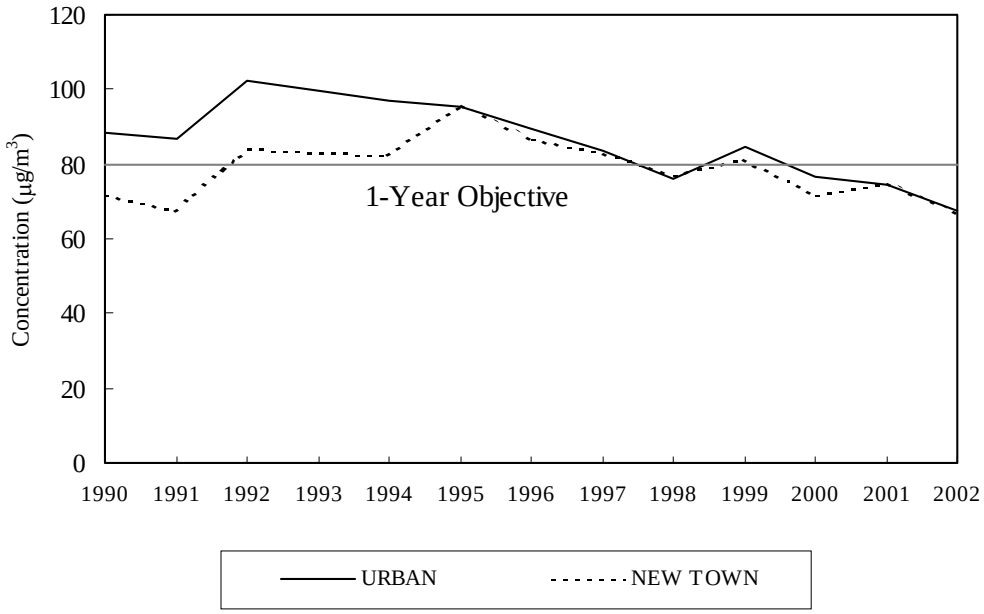
Figure 13: SO_2 long term trend



5.3.2 Total Suspended Particulates (TSP)

TSP levels in urban and new town areas remained high in the past 10 years but they have shown steady declining trends since 1995.

Figure 14: TSP long term trend

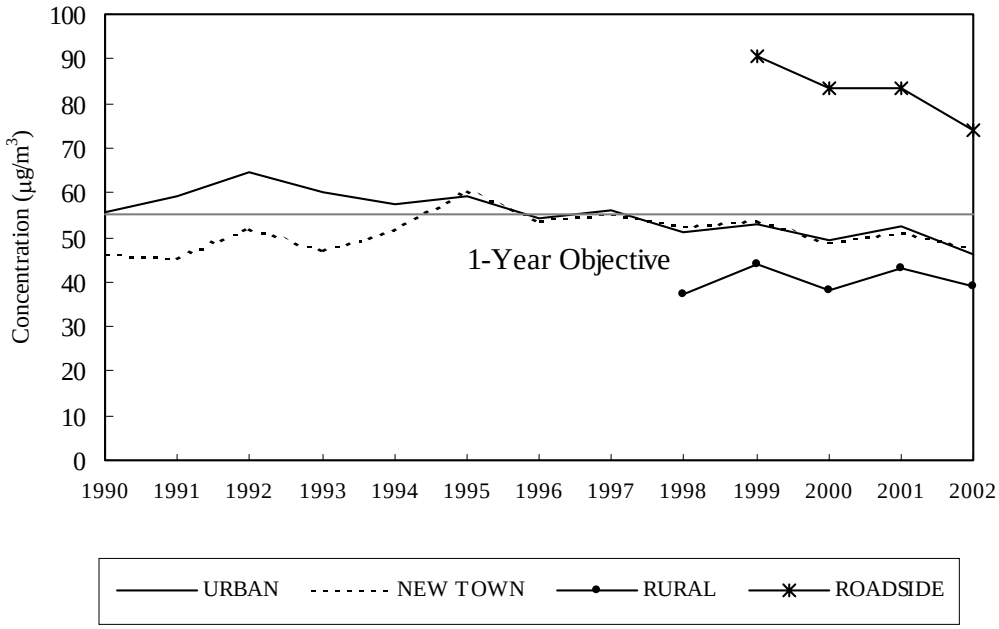


5.3.3 Respirable Suspended Particulates (RSP)

In Hong Kong, high level of RSP at roadside is a major air pollution concern, which is mainly attributed to the high concentration of vehicles especially diesel vehicles in urban areas. As a result of the implementation of various vehicle emission control measures in recent years, the annual average of RSP at roadside in 2002 reduced by 19% compared with 1999.

The annual average of RSP for urban stations has shown a steady decreasing trend over the past 10 years.

Figure 15: RSP long term trend



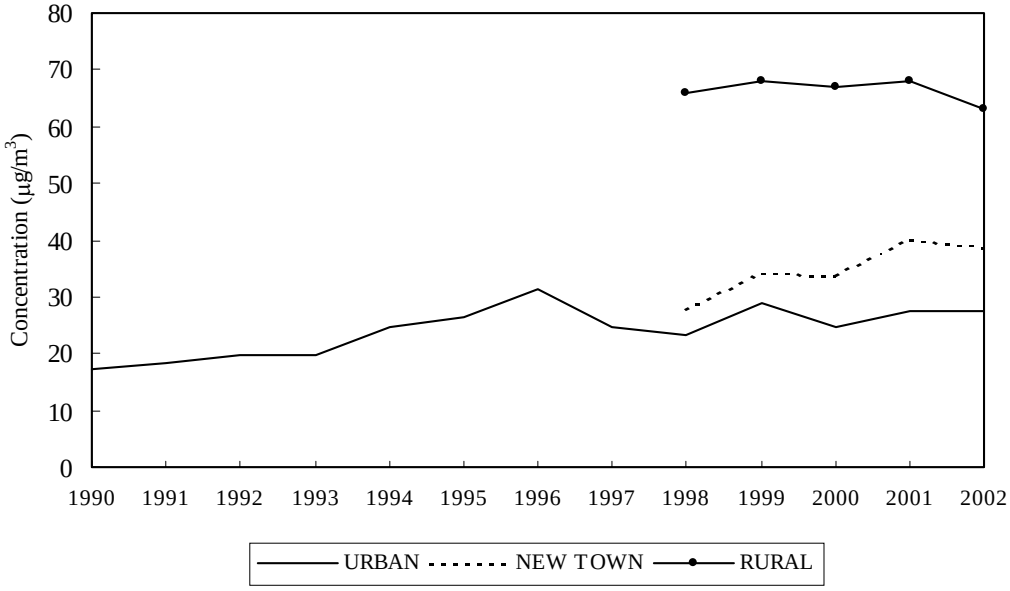
5.3.4 Ozone (O_3)

Compared with rural areas, ozone levels are lower in urban areas as it is readily scavenged by reaction with nitric oxide emitted from motor vehicles. The Tap Mun rural station has steadily recorded more than twice the ozone levels measured in urban areas since 1998.

During the past 10 years, ozone levels in the territory showed a slow rising trend. The annual average of ozone for urban stations in 2002 (27 $\mu g/m^3$) was 50% higher than the 1991 value (18 $\mu g/m^3$).

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 decade. The Hong Kong Special Administrative Region Government and Guangdong Provincial Government are jointly working on a plan to improve regional air quality.

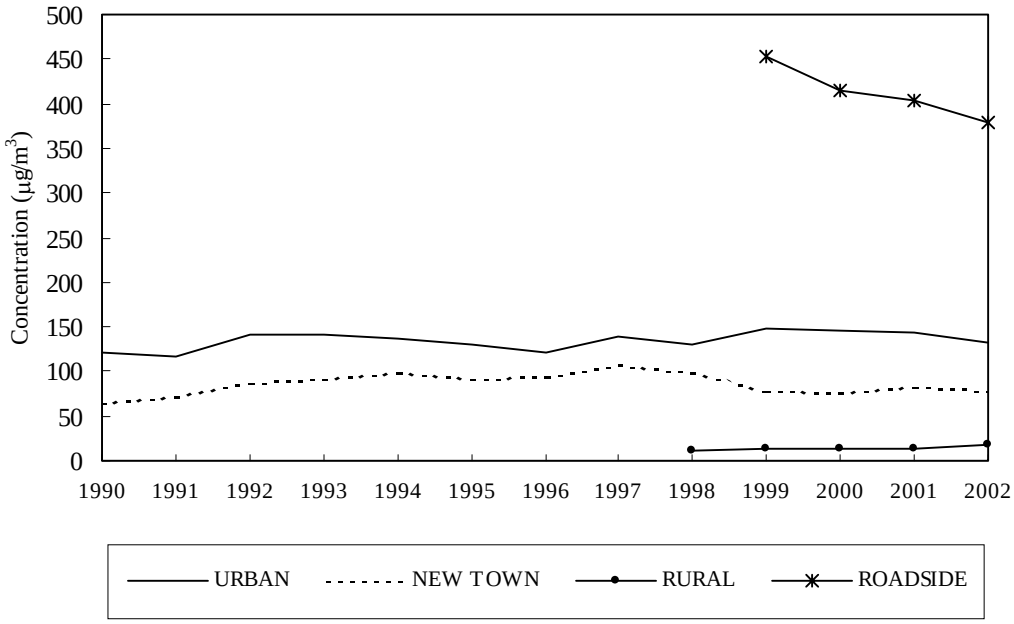
Figure 16: O_3 long term trend



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

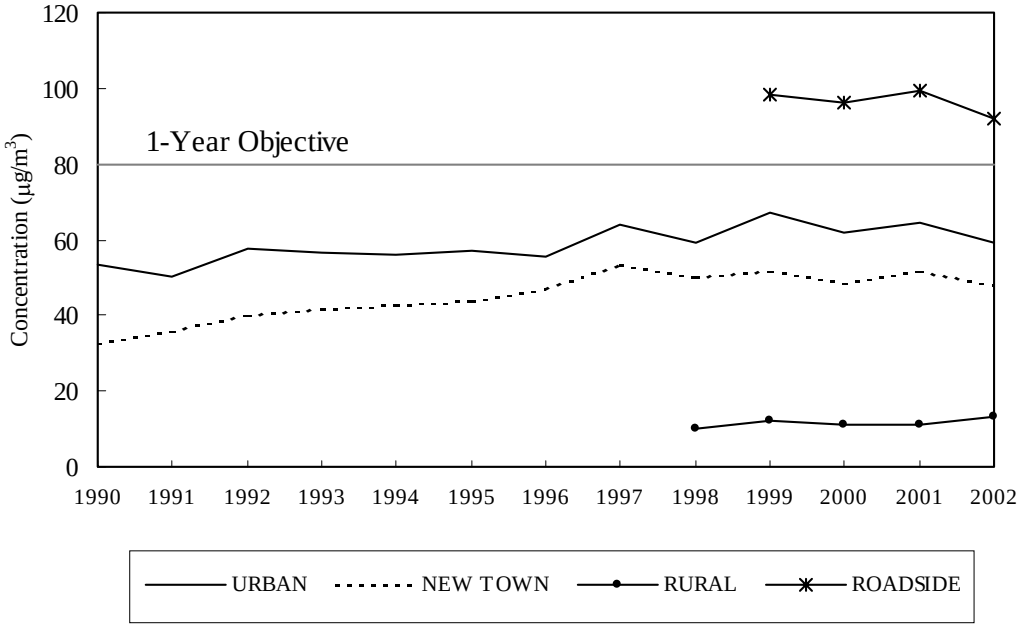
The annual average of NO_x in urban areas has remained quite constant over the past decade. The annual average of NO_x at roadside in 2002 reduced by 16% compared with 1999, which reflects a reduction in emission levels as a result of vehicle emission control measures implemented in recent years.

Figure 17: NOx long term trend



NO_2 is mainly formed from the oxidation of nitric oxide, a major component of NO_x. The concentration of NO_2 is dependent on the level of NO_x as well as the amount of oxidants such as ozone in the ambient air. Since 1990, the NO_2 levels in urban and new town areas have exhibited slow rising trends but they levelled off since1999.

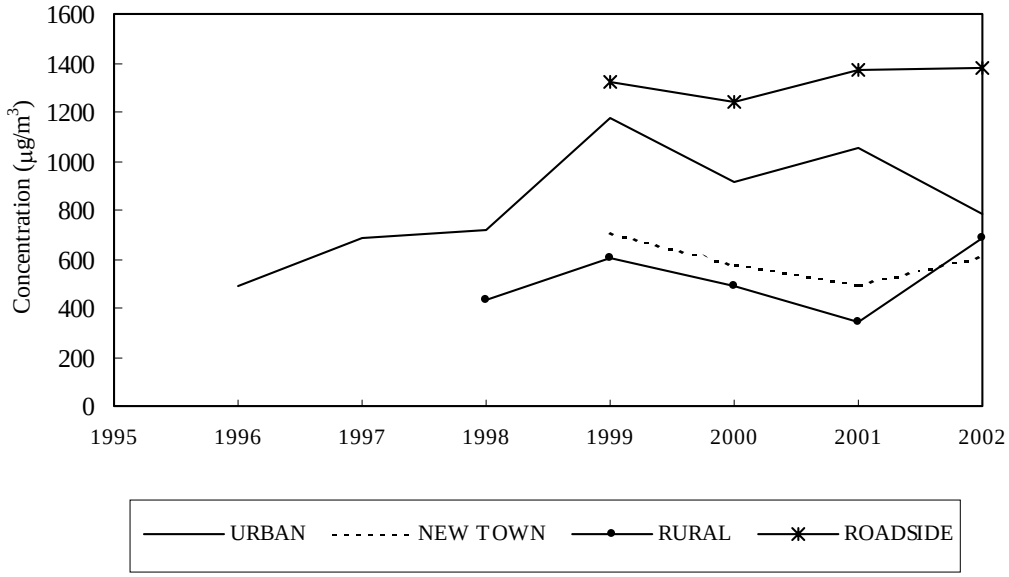
Figure 18: NO_2 long term trend



5.3.6 Carbon Monoxide (CO)

CO concentrations in Hong Kong remained very low in the past few years. Even at the roadside close to the vehicular emission sources, the levels were always well within the relevant AQOs.

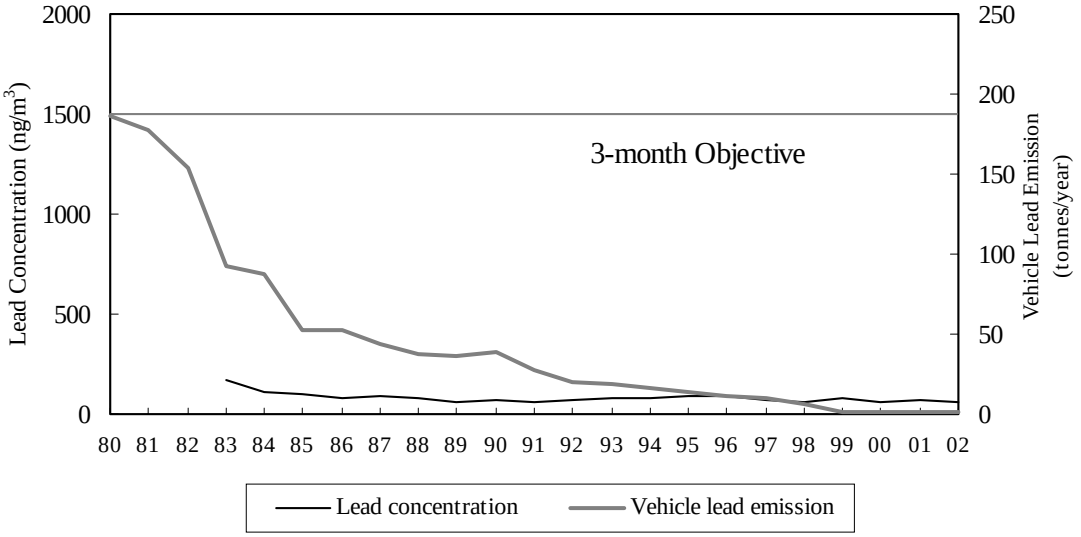
Figure 19: CO long term trend



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 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



5.4 Air Pollution Episodes

The concentrations of air pollutants occasionally rise to levels much higher than normal under very calm weather conditions. These incidents are called air pollution episodes. In Hong Kong, RSP and NO_2 episodes are often associated with stagnating high pressure systems in winter which bring subsiding air over the South China region hindering dispersion of pollutants. Elevated ozone incidents are mostly associated with very hot, fine and calm weather conditions in the region which favour the formation and accumulation of ozone. Such weather conditions are more prevalent in summer and early autumn, especially when there is a tropical cyclone hovering in the Western Pacific Ocean near Taiwan or Philippines while high pressure dominates over South China region.

Air pollution episodes in Hong Kong usually last for a short period ranging from a few hours to a few days.

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 2002†

Station		Ozone	Nitrogen Dioxide		Total Suspended Particulates	Respirable Suspended Particulates
		1-hour	**1-hour**	**24-hour**	**24-hour**	**24-hour**
General Station	Central/Western	99.99	100	100	100	100
	Eastern	100	100	100	--	100
	Kwai Chung	100	99.99	98.90	100	100
	Kwun Tong	100	100	98.21	100	100
	Sham Shui Po	99.99	100	99.16	100	100
	Tsuen Wan	99.99	100	99.73	100	100
	Sha Tin	100	100	100	100	100
	Tai Po	99.99	100	100	100	100
	Tung Chung	99.58	100	99.72	100	100
	Yuen Long	100	100	100	100	100
	Tap Mun	99.96	100	100	--	100
Roadside Station	Causeway Bay	--	100	97.41	--	100
	Central	--	99.93	95.62	--	99.45
	Mong Kok	--	99.99	98.07	100	100

Notes: "--" *Not measured*
"†" *For those stations with sufficient data, sulphur dioxide and carbon monoxide all achieved 100% compliance rate with their relevant short-term AQO.*

Compliance with the short-term AQO

Table A2 shows the percentage time of compliance with the short-term AQO (i.e. 1-hr and 24-hr AQO) recorded at each of the monitoring stations in 2002. For NO_2, the compliance percentages of 24-hr AQO were between 95% and 100% at all stations with six stations achieving 100% compliance; its 1-hr AQO compliance rates were all close to 100% at all stations with 11 stations achieving 100% compliance. Regarding RSP, the compliance percentages for 24-hr AQO achieved 100% for 13 out of 14 stations, and the 14th stations achieved a 99.45% compliance rate. The compliance levels for 1-hr AQO for O_3 were over 99.5% at all monitoring stations. TSP achieved 100% compliance with its 24-hr AQO at all monitoring stations. The compliance rates for the short-term AQO for SO_2 and CO not shown in Table A2 also achieved 100% at all monitoring stations.

Compliance with the long-term AQO

Table A3 shows the compliance status of various stations with the long-term (annual) AQO in 2002. The annual AQO for NO_2 and RSP were complied at 8 out of 10 stations and 9 out of 12 stations respectively. For TSP, 6 out of 8 stations complied with annual AQO.

Overall in 2002, the compliance rate with long-term AQO for all pollutants was recorded at 8 out of 12$^{@}$ stations, compared with 8 out of 13$^{\#}$ stations in 2001, 8 out of 14 stations in 2000 and 5 out of 13* stations in 1999. The improvement in the compliance rate since 1999 reflects that, taking aside the weather factor which cannot be controlled, various air pollution control measures launched by the Government have been taking effect.

Notes : $^{@}$ *Kwun Tong and Central/Western station did not have sufficient data for the assessment of annual AQO compliance in 2002. As a result, there were only 12 stations which had adequate data for assessing long-term AQO compliance in the year.*

$^{\#}$ *Central/Western station did not have sufficient data for the assessment of annual AQO compliance in 2001. As a result, there were only 13 stations which had adequate data for assessing long-term AQO compliance in the year.*

* *Tung Chung station did not have sufficient data for the assessment of annual AQO compliance in 1999. As a result, there were only 13 stations which had adequate data for assessing long-term AQO compliance in the year.*

Table A3: Compliance Status of Long-Term (Annual) Air Quality Objectives in 2002†

Station		Nitrogen Dioxide	Total Suspended Particulates	Respirable Suspended Particulates
		1-year	1-year	1-year
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*
"~" *Number of data collected is below the minimum required*
"†" *For those stations with sufficient data, sulphur dioxide and lead all complied with the relevant Long-term AQO.*

Appendix B

AIR QUALITY MONITORING OPERATION

B.1 Network Operation

The air quality monitoring network of 14 monitoring stations is operated by the Air Services 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 3 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 Services 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

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 2002, 382 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 varied between -9.3% and 9.4%, which 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 2002, 1721 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 -7.9% and 8.8%, which was again within the control limits of ±20% and ±10% for the gaseous pollutants and particulates respectively.

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 Services 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 : Residential	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	27m	21m (5 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	28m	21m (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 : Busy commercial 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 residential/commercial 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 (2002)

STATIONS	PARAMETERS									
	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 Model 43A Environnement S.A. AF21M
NO, NO_2, NO_x	Chemiluminescence	API 200A Monitor Laboratories 8840
O_3	UV absorption	TECO 49, 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 Model 48, 48C, API 300
TSP	Gravimetric	General Metals 2310
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/Media	Sampling Schedule	Sampling Period
Benzene	USEPA Method TO-14	Xontech 910A / Canister	Every 6 days	24 hours
Perchloroethylene	USEPA Method TO-14	Xontech 910A / Canister	Every 6 days	24 hours
1,3-Butadiene	USEPA Method TO-14	Xontech 910A / Canister	Every 6 days	24 hours
Formaldehyde	USEPA Method TO-11	Xontech 920 / DNPH coated Sep-Pak Cartridge	Every 12 days	24 hours
Benzo(a)pyrene	USEPA Method TO-13	Graseby GPSI / PUF/XAD-2 Sorbents	Twice per month	24 hours
Dioxin	USEPA Method TO-9A	Graseby GPSI / Polyurethane Foam	Twice per month	24 hours
Hexavalent Chromium	CARB SOP MLD 039	Xontech 925 / Bicarbonate Impregnated Filter	Every 12 days	24 hours

Figure B1: Accuracy of Air Quality Monitoring Network, 2002

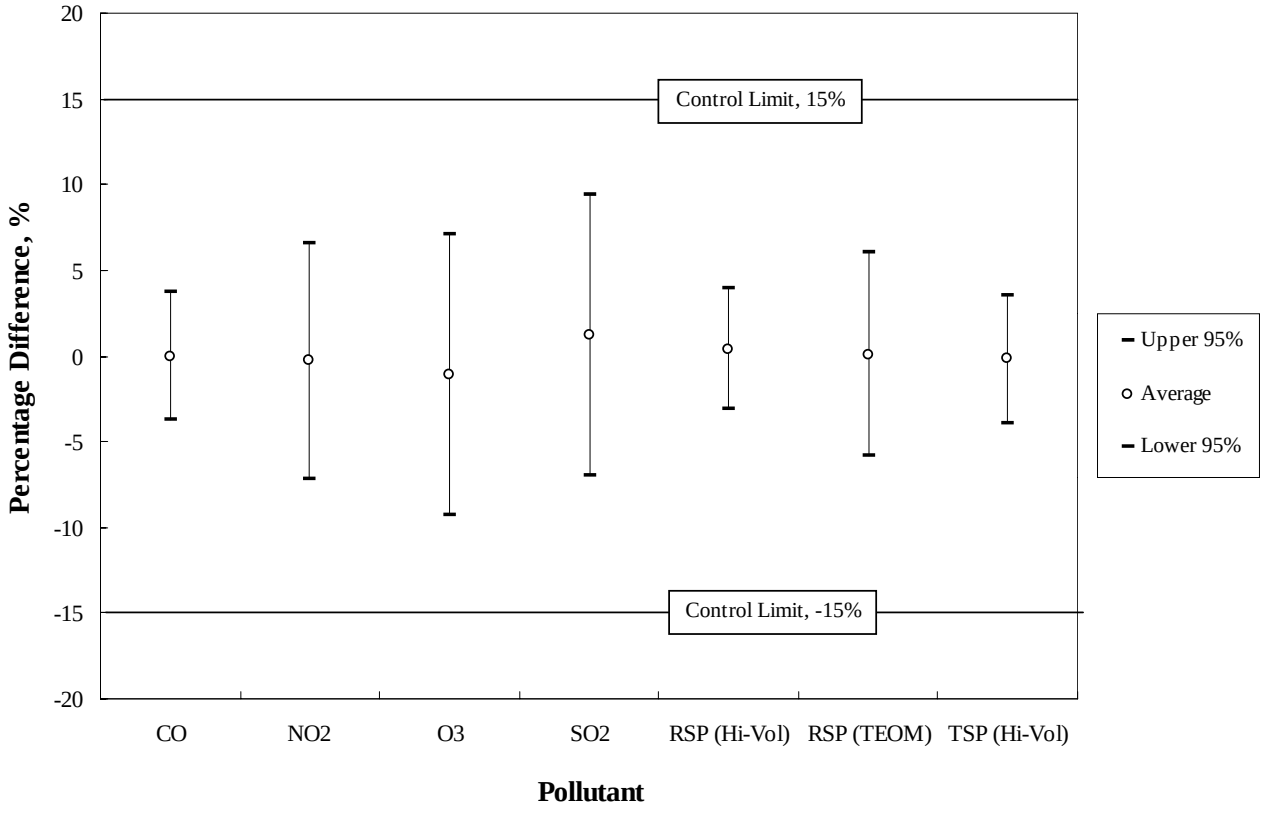
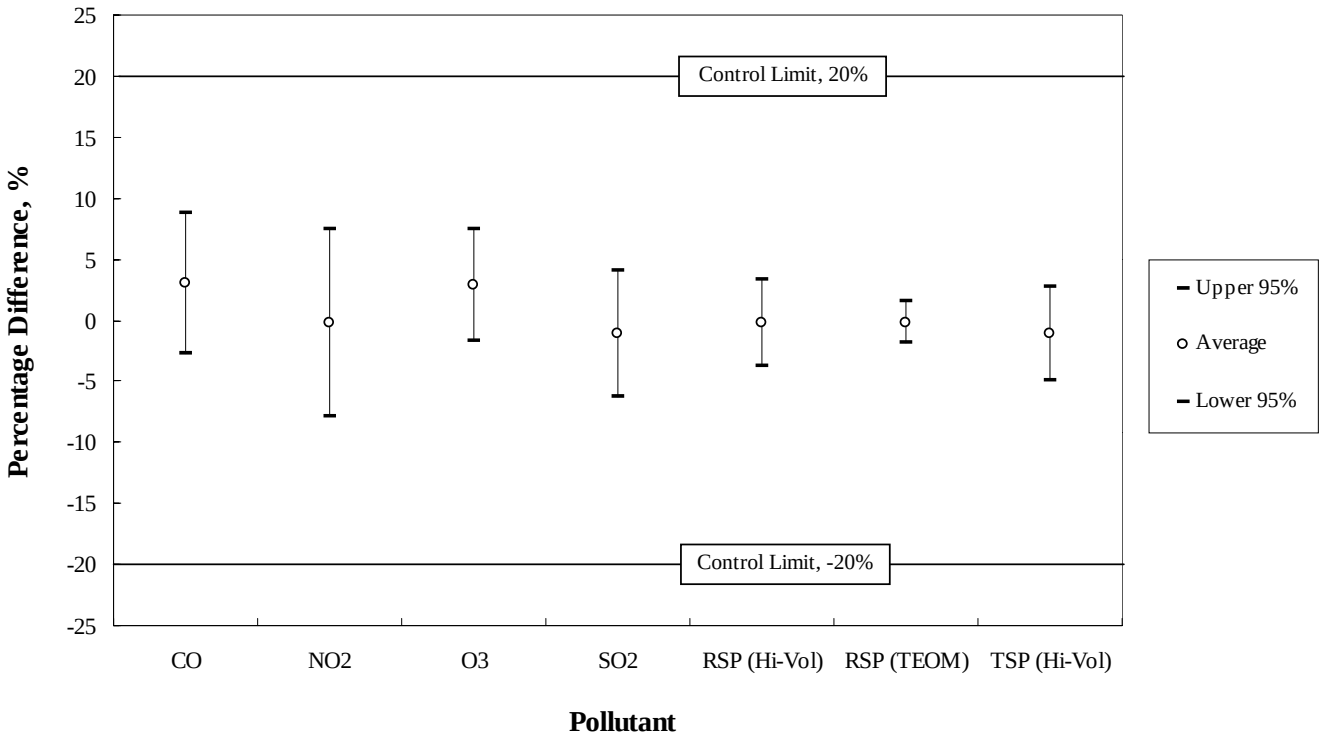


Figure B2: Precision of Air Quality Monitoring Network, 2002



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 2002

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	395	342	316	311
Eastern	240	237	201	199
Kwai Chung	362	344	309	307
Kwun Tong	185	163	160	155
Sham Shui Po	353	298	285	276
Tsuen Wan	331	305	285	285
Sha Tin	282	248	230	200
Tai Po	274	233	228	204
Tung Chung	257	240	236	235
Yuen Long	346	323	280	274
Tap Mun	154	154	152	146
Causeway Bay	238	224	223	209
Central	276	266	253	237
Mong Kok	282	269	205	202

Pollutant: Nitrogen Oxides

Station	1st High	2nd High	3rd High	4th High
Central / Western	679	620	594	580
Kwai Chung	1617	1095	1080	1051
Kwun Tong	1451	1356	1289	1095
Sham Shui Po	1202	1173	1161	1143
Tsuen Wan	1097	846	834	828
Sha Tin	1368	942	927	842
Tung Chung	422	412	387	384
Tap Mun	225	223	206	201
Causeway Bay	1961	1950	1831	1770
Central	2183	2049	2030	1991
Mong Kok	1795	1449	1427	1396

Pollutant: Nitric Oxide

Station	1st High	2nd High	3rd High	4th High
Central / Western	353	334	333	320
Kwai Chung	876	601	574	559
Kwun Tong	774	735	694	583
Sham Shui Po	680	647	614	611
Tsuen Wan	629	477	450	443
Sha Tin	744	512	475	461
Tung Chung	232	174	170	170
Tap Mun	100	88	81	80
Causeway Bay	1125	1106	1053	1026
Central	1244	1169	1138	1123
Mong Kok	1031	811	807	787

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	239	234	233	229
Eastern	228	203	196	188
Kwai Chung	354	290	284	283
Kwun Tong	268	252	245	241
Sham Shui Po	244	242	239	237
Tsuen Wan	294	288	267	266
Sha Tin	282	252	232	225
Tai Po	206	199	194	191
Tung Chung	296	287	281	265
Yuen Long	218	214	213	205
Tap Mun	156	136	132	126
Causeway Bay	283	278	278	271
Central	356	349	318	315
Mong Kok	348	297	279	278

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

Station	1st High	2nd High	3rd High	4th High
Tsuen Wan	3680	3680	3560	3560
Tung Chung	3610	3040	2960	2890
Tap Mun	1760	1760	1750	1750
Causeway Bay	4950	4950	4830	4830
Central	4830	4490	4140	4140
Mong Kok	5980	5980	5640	5060

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	313	239	225	224
Eastern	163	139	138	138
Kwai Chung	182	172	169	167
Kwun Tong	113	112	103	102
Sham Shui Po	257	221	213	201
Tsuen Wan	247	237	232	229
Sha Tin	228	226	219	199
Tai Po	260	234	197	194
Tung Chung	376	370	352	352
Yuen Long	194	188	186	173
Tap Mun	257	250	248	231

Pollutant: Respirable Suspended Particulates

Station	1st High	2nd High	3rd High	4th High
Central / Western	216	212	210	196
Eastern	192	181	180	180
Kwai Chung	234	227	214	212
Kwun Tong	212	207	206	196
Sham Shui Po	253	230	230	224
Tsuen Wan	256	253	249	246
Sha Tin	219	204	203	202
Tai Po	264	226	211	208
Tung Chung	320	306	301	284
Yuen Long	268	262	254	251
Tap Mun	164	163	159	158
Causeway Bay	247	240	235	234
Central	391	384	375	362
Mong Kok	252	252	238	236

TABLE C2: THE HIGHEST 2 DAILY POLLUTANT CONCENTRATIONS MEASURED IN 2002

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

Station	1st High	2nd High
Central / Western	105	103
Eastern	95	69
Kwai Chung	130	121
Kwun Tong	68	64
Sham Shui Po	128	118
Tsuen Wan	118	98
Sha Tin	80	76
Tai Po	99	74
Tung Chung	130	82
Yuen Long	114	108
Tap Mun	74	56
Causeway Bay	71	68
Central	87	87
Mong Kok	100	85

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

Station	1st High	2nd High
Central / Western	123	123
Eastern	143	133
Kwai Chung	172	160
Kwun Tong	179	167
Sham Shui Po	171	155
Tsuen Wan	152	146
Sha Tin	134	125
Tai Po	145	121
Tung Chung	161	144
Yuen Long	116	113
Tap Mun	66	64
Causeway Bay	208	198
Central	202	193
Mong Kok	187	176

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

Station	1st High	2nd High
Central / Western	152	145
Eastern	131	129
Kwai Chung	130	130
Kwun Tong	147	122
Sham Shui Po	141	140
Tsuen Wan	149	145
Sha Tin	130	122
Tai Po	146	134
Tung Chung	177	145
Yuen Long	161	150
Tap Mun	127	125
Causeway Bay	172	154
Central	187	186
Mong Kok	157	152

Pollutant: Nitrogen Oxides

Station	1st High	2nd High
Central / Western	261	232
Kwai Chung	549	536
Kwun Tong	600	500
Sham Shui Po	622	585
Tsuen Wan	405	357
Sha Tin	389	364
Tung Chung	216	215
Tap Mun	101	86
Causeway Bay	1036	988
Central	1095	873
Mong Kok	906	803

Pollutant: Nitric Oxide

Station	1st High	2nd High
Central / Western	116	99
Kwai Chung	264	238
Kwun Tong	276	218
Sham Shui Po	305	271
Tsuen Wan	172	157
Sha Tin	177	161
Tung Chung	79	78
Tap Mun	24	21
Causeway Bay	548	543
Central	584	464
Mong Kok	470	413

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

Station	1st High	2nd High
Central / Western	129	124
Kwai Chung	176	170
Kwun Tong	165	163
Sham Shui Po	185	139
Tsuen Wan	149	124
Sha Tin	156	135
Tai Po	157	140
Tung Chung	178	170
Yuen Long	198	187
Mong Kok	199	172

Pollutant: Ozone

Station	1st High	2nd High
Central / Western	115	105
Eastern	99	97
Kwai Chung	99	98
Kwun Tong	60	60
Sham Shui Po	80	80
Tsuen Wan	88	80
Sha Tin	119	115
Tai Po	119	108
Tung Chung	123	118
Yuen Long	91	76
Tap Mun	161	157

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

Station	1st High	2nd High
Tsuen Wan	3275	3261
Tung Chung	2604	2463
Tap Mun	1703	1696
Causeway Bay	3680	3665
Central	3739	3695
Mong Kok	3466	3438

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: 2002 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			19 *	22	21	14	24	34	18	13	19	13	20 *
Eastern	16	10 *	9 *	9	10	6	11	18	8	8	9	8	10 *
Kwai Chung	33	16	25	40	29	33	34	41	18	14	25	17	27
Kwun Tong	21	16	17	18							16	18	NA
Sham Shui Po	30	17	18	27	20	16	28	35	16	12	21	15	21
Tsuen Wan	30	17	21	36	23	22	30	28	20	18	27	16	24
Sha Tin	18	7	9	18	17	17	17	25	16	14	17	10	15
Tai Po	19	8	9	7	10	10	9	15	12	9	12	8	11
Tung Chung	30	21	14	10	22	6	11	22	14	23	24	24	18
Yuen Long	21 *	14	13	13	15	9	18	22	16	14	19	17	16
Tap Mun	16	13	8	4	7	5	7	18	10	14	19	13	11
Causeway Bay	23	18	14	15	16	12	17	22	16	12		17 *	17 *
Central	30	19	22	20	19	11	23	28	15	13	19	15	19
Mong Kok	30	18	17	23	20	12	16	24	12	8	12	7	17

Pollutant: Nitrogen Oxides

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western			128 *	82	70	42	79	91	79	76	100	106	83 *
Kwai Chung	243	168	181	165	151	166	185	197	145	144	171	163	174
Kwun Tong	267	205	187	165							172	183	NA
Sham Shui Po	223	160	136	120	120	92	133	140	126	118	140	143	138
Tsuen Wan	178	151	149	134	124	110	133	135	124	117	134	138	136
Sha Tin	167	90	85	75	73	53	79	90	80	91	117	98	92
Tung Chung	119	83	74	47	51	20	45	52	54	74	89	96	67
Tap Mun	25	15	15	13	14	10	16	26	15	17	19	17	17
Causeway Bay	570	456	406	395	405	348	398	424	385	365		420 *	417 *
Central	465	346	318	314	294	263	339	363	321	343	383	358	342
Mong Kok	433	358	344	352	336	291	331	312	327	304	341	349	339

Pollutant: Nitric Oxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western			43 *	24	18	13	28	30	19	18	26	33	24 *
Kwai Chung	101	61	73	68	57	77	83	84	53	52	64	64	70
Kwun Tong	112	81	76	71							64	69	NA
Sham Shui Po	88	52	44	42	38	34	52	53	40	34	44	51	48
Tsuen Wan	65	50	55	48	39	42	52	50	36	33	41	51	47
Sha Tin	67	28	27	24	20	18	29	29	21	29	38	32	30
Tung Chung	29	18	18	12	11	5	11	13	9	17	20	28	16
Tap Mun	3	1	2	2	3	2	4	5	2	2	2	1	2
Causeway Bay	293	222	201	202	200	183	212	223	185	175		216 *	211 *
Central	231	161	151	154	137	134	173	181	145	158	181	172	165
Mong Kok	211	162	163	174	159	149	170	155	148	135	157	168	162

Pollutant: Nitrogen Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western			62 *	46	42	22	36	44	49	49	61	56	46 *
Eastern	76	61 *	60 *	50	51	33	39	42	57	59	60	60	53 *
Kwai Chung	88	75	70	62	64	49	59	69	64	64	74	65	67
Kwun Tong	96	81	71	57							74	77	NA
Sham Shui Po	88	79	69	57	62	40	54	58	65	66	73	65	65
Tsuen Wan	79	74	66	61	65	46	54	58	69	67	71	60	64
Sha Tin	65	48	44	38	42	26	35	45	49	47	59	49	45
Tai Po	71	51	47	37	42	31	40	42	53	56	61	48	48
Tung Chung	74	56	46	29	34	13	27	32	40	48	59	53	43
Yuen Long	65 *	67	61	49	51	36	46	50	59	61	70	64	56
Tap Mun	21	13	12	10	10	7	10	18	12	14	16	15	13
Causeway Bay	122	116	98	86	98	68	75	83	102	97		90 *	94 *
Central	112	101	87	78	84	58	75	87	100	101	106	96	90
Mong Kok	111	109	96	86	93	63	71	76	101	97	101	93	91

Pollutant: Carbon Monoxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tsuen Wan	1460	1390	1100	470	580	480	500	620	670	620	760	770	783
Tung Chung	390	350	300	110	220	240	440	490	1230	1160	1090	1320	612
Tap Mun	380	370	580	510	860	600	690	630	830	1010	950	790	688
Causeway Bay	1490	1430	1620	1610	1460	1030	1280	1220	1060	1000		1830 *	1351 *
Central	1760	1570	1400	1380	1300	1080	1410	1410	1320	1370	1460	1390	1404
Mong Kok	1410	1850	1460	1220	1360	1380	1410	1440	1250	1390	1810	1950	1492

Pollutant: Ozone

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western			22 *	27	39	27	25	25	48	44	36	23	32 *
Eastern	35	35 *	37 *	33	43	37	34	37	55	46	41	37	39 *
Kwai Chung	23	36	26	19	26	15	10	12	34	32	26	20	23
Kwun Tong	22	31	26	19							29	21	NA
Sham Shui Po	20	28	24	18	23	16	15	15	30	28	22	15	21
Tsuen Wan	19	29	23	18	26	17	16	17	34	31	29	22	23
Sha Tin	27	49	40	35	40	27	22	23	46	43	30	29	34
Tai Po	46	70	66	48	53	36	33	38	54	54	54	44	49
Tung Chung	29	48	40	42	51	42	41	38	59	47	40	25	42
Yuen Long	27 *	40	25	25	34	25	23	23	36	42	42	22	30
Tap Mun	65	80	71	66	74	47	44	47	75	72	67	53	63

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.

5. NA - insufficient data for calculation of annual average values

TABLE C4: 2002 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			69 *	64	50	32	38	48	70	68	98	84	61 *
Kwai Chung	126	86	91	55	64	47	61	50	56	62	88	73	72
Kwun Tong	122	96	98	71 *									NA
Sham Shui Po	95	107	92	62	57	42	45	56	72	67	88	81	72
Tsuen Wan	87	97	77	65	51	35	52	52	52	70	77	69	65
Sha Tin	87	61	67	44	61	29	38	74	71	52	76	75	62
Tai Po	85	65	77	56	53	27	42	44	71	62	62	88	61
Tung Chung	112	83	83	43	43	22	42	31	49	67	92	77	62
Yuen Long	131	81	96	57	65	32	60	57	81	101	107	116	82
Mong Kok	126	126	108	87	110	70	75	98	127	99	129	122	106

Pollutant: Respirable Suspended Particulates (Annual AQO = 55)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western			59 *	46	39	17	29	34	44	46	57	51	41 *
Eastern	63	58	54	38	34	19	27	30	42	42	48	45	42
Kwai Chung	68	61	55	43	41	32	41	42	46	45	51	47	48
Kwun Tong	73	64	61	47							56	54	NA
Sham Shui Po	75	66	61	43	43	28	37	40	49	49	58	53	50
Tsuen Wan	72	63	60	46	46	30	41	42	52	49	57	53	51
Sha Tin	68	57	51	38	38	24	35	41	46	46	51	47	45
Tai Po	70	58	54	37	36	23	33	39	49	47	54	52	46
Tung Chung	73	60	53	32	35	17	31	33	48	49	61	54	46
Yuen Long	85	67	60	40	43	25	38	44	54	55	69	59	53
Tap Mun	55	54	51	34	31	19	24	31	40	41	46	39	39
Causeway Bay	86	92	90	77	78	66	76	72	84	85	84	70	80
Central	90	78	75	58	54	40	57	66	75	75	77	71	68
Mong Kok	87	75	69	55	61	44	53	52	63	64	72	64	63

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.

5. NA - insufficient data for calculation of annual average values

TABLE C5: 2002 HOURLY STATISTICS OF MAJOR AIR POLLUTANTS

Pollutant: Sulphur Dioxide

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Central / Western	6765	77.2	5	6	10	18	47	77	118	145	12	20	395	105
Eastern	6844	78.1	3	4	6	10	18	31	60	85	7	10	240	95
Kwai Chung	8639	98.6	4	7	13	33	71	97	137	164	15	27	362	130
Kwun Tong	4053	46.3	6	9	14	19	29	44	77	97	14		185	68
Sham Shui Po	8554	97.6	6	8	11	18	48	86	132	162	13	21	353	128
Tsuen Wan	8630	98.5	7	11	16	27	49	71	107	133	17	24	331	118
Sha Tin	8470	96.7	5	7	10	16	31	49	78	103	11	15	282	80
Tai Po	7992	91.2	1	3	6	12	22	35	61	81	7	11	274	99
Tung Chung	8440	96.3	3	5	11	21	42	64	92	119	11	18	257	130
Yuen Long	7659	87.4	2	5	10	19	32	45	78	103	10	16	346	114
Tap Mun	8319	95.0	1	3	8	15	25	33	43	56	8	11	154	74
Causeway Bay	7333	83.7	6	7	10	17	34	54	83	100	12	17	238	71
Central	8494	97.0	5	9	14	21	38	59	93	113	14	19	276	87
Mong Kok	8587	98.0	3	6	10	16	37	61	95	120	11	17	282	100

Pollutant: Nitrogen Oxides

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Central / Western	6737	76.9	20	36	64	107	170	220	287	338	61	83	679	261
Kwai Chung	8624	98.4	47	92	148	226	321	396	497	601	135	174	1617	549
Kwun Tong	4011	45.8	50	116	183	256	331	393	509	675	158		1451	600
Sham Shui Po	8546	97.6	39	84	125	168	223	283	409	559	112	138	1202	622
Tsuen Wan	8635	98.6	40	84	123	170	231	283	374	439	112	136	1097	405
Sha Tin	8422	96.1	18	32	61	117	205	283	359	430	60	92	1368	389
Tung Chung	8380	95.7	11	24	52	95	146	179	214	242	45	67	422	216
Tap Mun	8215	93.8	5	7	10	20	37	51	71	93	12	17	225	101
Causeway Bay	7335	83.7	161	256	374	532	722	852	1007	1154	358	417	1961	1036
Central	8489	96.9	113	183	308	450	615	735	869	982	282	342	2183	1095
Mong Kok	8589	98.0	131	249	345	423	502	562	658	793	304	339	1795	906

Pollutant: Nitric Oxide

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Central / Western	6737	76.9	3	5	12	28	64	90	126	160	13	24	353	116
Kwai Chung	8624	98.4	8	25	52	97	149	191	249	304	44	70	876	264
Kwun Tong	4011	45.8	8	35	67	107	150	185	258	349	51		774	276
Sham Shui Po	8546	97.6	4	20	38	60	89	124	195	275	30	48	680	305
Tsuen Wan	8635	98.6	5	18	38	62	95	127	171	208	30	47	629	172
Sha Tin	8422	96.1	0	3	12	37	85	126	174	213	14	30	744	177
Tung Chung	8380	95.7	1	3	7	21	44	64	85	101	8	16	232	79
Tap Mun	8215	93.8	0	1	1	2	4	7	14	21	2	2	100	24
Causeway Bay	7335	83.7	65	115	184	277	391	468	567	647	171	211	1125	548
Central	8489	96.9	38	74	140	226	320	392	471	537	123	165	1244	584
Mong Kok	8589	98.0	47	107	161	210	258	297	356	426	136	162	1031	470

Pollutant: Nitrogen Dioxide

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Central / Western	6737	76.9	13	23	42	61	83	102	128	148	36	46	239	123
Eastern	6852	78.2	23	34	51	68	84	96	117	133	47	53	228	143
Kwai Chung	8624	98.4	30	45	61	81	107	131	168	191	59	67	354	172
Kwun Tong	4011	45.8	35	53	75	96	117	132	154	179	69		268	179
Sham Shui Po	8546	97.6	30	43	61	82	103	118	144	164	58	65	244	171
Tsuen Wan	8635	98.6	30	43	59	79	101	121	147	169	57	64	294	152
Sha Tin	8422	96.1	15	24	39	58	82	103	132	150	37	45	282	134
Tai Po	7992	91.2	20	29	42	61	83	101	126	141	41	48	206	145
Tung Chung	8380	95.7	8	18	37	60	83	100	126	145	30	43	296	161
Yuen Long	7661	87.5	27	37	51	69	91	108	127	141	49	56	218	116
Tap Mun	8213	93.8	3	5	8	16	31	41	54	65	9	13	156	66
Causeway Bay	7335	83.7	52	68	89	116	143	161	190	208	87	94	283	208
Central	8489	96.9	45	62	86	113	139	161	195	216	82	90	356	202
Mong Kok	8589	98.0	50	65	87	113	136	152	177	196	85	91	348	187

Pollutant: Carbon Monoxide

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 8 hour
Tsuen Wan	8605	98.2	350	460	690	920	1380	1730	1960	2180	678	783	3680	3275
Tung Chung	8392	95.8	0	180	430	1020	1430	1630	1890	2140	440	612	3610	2604
Tap Mun	8380	95.7	310	460	660	890	1160	1270	1390	1470	600	688	1760	1703
Causeway Bay	7329	83.7	800	1030	1270	1610	1960	2180	2530	2880	1274	1351	4950	3680
Central	8581	98.0	800	1030	1380	1730	2070	2300	2640	2760	1322	1404	4830	3739
Mong Kok	8501	97.0	920	1150	1380	1730	2070	2300	2530	2760	1423	1492	5980	3466

Pollutant: Ozone

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Central / Western	6701	76.5	3	10	25	45	71	91	110	126	20	32	313	115
Eastern	6852	78.2	20	27	36	48	62	73	87	97	36	39	163	99
Kwai Chung	8625	98.5	3	5	14	34	57	71	86	98	14	23	182	99
Kwun Tong	4007	45.7	6	10	19	34	51	64	76	83	18		113	60
Sham Shui Po	8543	97.5	3	5	14	28	50	65	84	97	13	21	257	80
Tsuen Wan	8557	97.7	4	7	16	32	53	67	83	99	15	23	247	88
Sha Tin	8344	95.3	4	7	23	54	82	96	113	124	20	34	228	119
Tai Po	7993	91.2	21	27	40	66	93	105	119	131	42	49	260	119
Tung Chung	8394	95.8	4	13	35	58	86	102	143	184	26	42	376	123
Yuen Long	7661	87.5	7	13	22	41	64	79	97	113	22	30	194	91
Tap Mun	8225	93.9	19	34	57	89	114	129	147	161	50	63	257	161

Pollutant: Respirable Suspended Particulates (Continuous monitoring)

Station	No. of hours	Data capture rate %	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Central / Western	6804	77.7	13	21	34	53	81	97	119	139	33	41	216	152
Eastern	8594	98.1	15	22	35	54	79	95	117	130	35	42	192	131
Kwai Chung	8672	99.0	21	29	41	59	83	101	126	140	41	48	234	130
Kwun Tong	4037	46.1	28	38	52	74	101	120	141	157	53		212	147
Sham Shui Po	8604	98.2	21	30	42	63	90	109	133	144	43	50	253	141
Tsuen Wan	8683	99.1	23	31	42	63	89	108	132	151	44	51	256	149
Sha Tin	8415	96.1	18	26	37	57	82	100	123	136	38	45	219	130
Tai Po	8441	96.4	18	26	37	60	85	104	127	145	38	46	264	146
Tung Chung	8476	96.8	14	20	35	61	91	111	136	155	35	46	320	177
Yuen Long	8575	97.9	21	29	43	69	100	120	145	164	45	53	268	161
Tap Mun	8452	96.5	14	20	32	50	75	89	108	127	32	39	164	127
Causeway Bay	8477	96.8	36	56	79	100	123	138	160	175	72	80	247	172
Central	8484	96.8	30	42	60	84	114	135	163	191	59	68	391	187
Mong Kok	8643	98.7	29	42	58	78	104	122	142	156	56	63	252	157

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: 2002 TOTAL WET AND DRY DEPOSITION

(a) WET DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong[@]	Yuen Long
	WET DEPOSITION (TON/HA)	16061	1118	15749
	WEIGHTED MEAN pH (based on volume-weighted mean hydrogen ion concentrations ($[H^+]$))	4.65	4.72	4.64
	WEIGHTED MEAN pH (based on volume-weighted mean pH)	4.90	5.03	4.88
	NO. OF SAMPLES	63	22	84
Filtrate (Kg/Ha)	**NH_4^+**	4.10	0.61	6.99
	NO_3^-	12.43	1.29	14.84
	$SO_4^=$	27.30	2.25	31.41
	Cl^-	25.49	0.88	10.58
	F-	0.43	0.10	0.55
	Na^+	13.80	0.52	6.41
	K^+	4.03	0.29	4.07
	Formate	3.34	0.30	3.21
	Acetate	3.30	0.29	3.94
	Ca^{++}	2.62	0.32	2.81
	Mg^{++}	1.52	0.06	0.76

(b) DRY DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong[@]	Yuen Long
	NO. OF SAMPLES	15	11	27
Filtrate (Kg/Ha)	**NH_4^+**	0.26	0.10	0.34
	NO_3^-	6.38	4.26	8.38
	$SO_4^=$	8.88	6.87	15.41
	Cl^-	11.32	6.13	6.59
	Na^+	6.50	3.10	3.63
	K^+	0.53	0.43	0.78
	Formate	0.12	0.10	0.34
	Acetate	0.38	0.45	1.46
	Ca	5.41	4.76	9.52
	Mg	0.77	0.45	0.68

Note: 1. The weighted mean PH is calculated from the PH values measured by the Government Laboratory.

TABLE C7: 2002 DIURNAL VARIATIONS OF AIR POLLUTANT

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	18	17	17	16	15	15	16	18	21	23	24	22	21	22	24	25	24	21	20	20	21	21	19	18
Eastern	9	9	8	8	9	8	9	11	14	12	12	13	12	11	11	11	11	11	11	9	9	11	9	9
Kwai Chung	23	22	21	20	18	17	18	22	27	29	34	34	33	35	35	34	34	36	34	29	27	24	24	23
Kwun Tong	13	13	13	13	12	12	12	14	20	22	24	22	19	22	22	23	22	22	22	19	18	16	14	13
Sham Shui Po	19	20	19	19	17	18	19	20	23	23	24	24	23	22	20	21	24	25	24	24	22	21	21	20
Tsuen Wan	20	19	19	18	18	18	18	22	25	27	30	29	28	28	29	30	29	29	27	25	22	21	21	21
Sha Tin	13	12	12	12	11	10	11	13	16	18	17	18	17	18	18	19	20	20	19	18	17	15	15	14
Tai Po	10	9	8	8	7	8	8	10	13	12	12	12	11	11	11	12	12	13	12	13	12	11	10	10
Tung Chung	15	15	14	16	14	14	14	16	19	22	24	23	23	25	24	22	22	19	17	17	17	17	17	16
Yuen Long	13	12	11	11	11	11	13	15	18	21	20	19	17	18	18	19	19	19	18	16	15	14	14	14
Tap Mun	10	10	9	9	10	12	11	12	15	15	15	13	12	12	11	10	10	11	11	10	10	10	10	10
Causeway Bay	13	15	14	14	14	13	14	17	20	21	21	19	19	21	20	21	18	17	16	15	15	14	14	13
Central	16	16	16	16	15	14	15	18	23	23	23	24	22	21	23	23	24	23	22	21	19	19	17	16
Mong Kok	14	13	13	13	12	12	13	15	18	19	21	20	19	19	18	19	19	21	19	18	17	16	15	15

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	73	58	49	42	40	41	54	87	114	117	109	96	81	82	86	88	92	97	105	104	99	94	92	86
Kwai Chung	138	96	76	66	64	79	146	208	243	238	222	198	182	177	187	195	209	231	249	226	195	181	184	175
Kwun Tong	164	106	87	75	72	84	166	262	303	283	248	221	190	206	211	222	241	259	277	253	212	197	193	189
Sham Shui Po	124	92	77	65	62	72	122	167	190	182	162	147	135	136	138	144	157	169	181	176	159	154	151	143
Tsuen Wan	112	71	58	48	46	57	110	158	191	189	170	151	137	142	148	152	164	182	193	179	153	149	152	142
Sha Tin	105	82	66	56	51	55	89	125	131	106	82	70	58	63	69	74	83	95	112	121	123	128	131	120
Tung Chung	70	56	49	43	39	42	59	75	81	81	77	72	67	67	65	65	68	71	76	77	78	77	77	73
Tap Mun	17	16	16	16	17	19	20	21	23	24	21	18	16	14	13	13	13	15	15	16	16	16	16	16
Causeway Bay	361	286	257	219	194	179	295	490	567	548	506	471	453	472	446	463	458	487	502	496	481	483	486	405
Central	267	204	171	144	142	140	219	364	499	479	442	403	372	368	387	402	405	429	443	417	406	403	379	349
Mong Kok	310	195	177	152	145	147	294	426	455	434	374	338	334	356	371	381	409	443	456	413	366	372	397	400

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	21	16	14	11	11	11	15	29	42	43	37	30	23	22	23	23	24	24	27	28	28	27	27	26
Kwai Chung	53	33	24	20	18	26	61	94	113	109	97	81	71	67	70	73	79	93	104	93	78	72	75	72
Kwun Tong	60	35	28	24	22	26	65	118	142	130	109	92	74	82	82	86	95	103	114	102	81	74	73	72
Sham Shui Po	42	30	23	19	17	21	44	67	79	74	62	52	45	44	43	45	50	56	62	61	54	53	52	50
Tsuen Wan	36	18	14	10	9	13	38	63	81	79	67	55	46	46	47	48	53	62	69	63	51	51	53	50
Sha Tin	39	29	21	16	14	16	32	51	52	38	26	19	14	16	17	18	20	24	33	40	43	47	51	46
Tung Chung	19	13	10	8	7	8	16	23	25	24	22	18	15	14	13	12	13	13	15	16	18	19	20	20
Tap Mun	2	2	2	2	2	3	3	4	5	5	4	3	3	2	2	2	2	2	1	1	2	2	2	2
Causeway Bay	178	135	119	100	87	80	146	260	305	291	265	240	228	238	222	231	228	248	257	254	247	249	251	205
Central	123	90	71	59	58	57	99	182	261	247	222	196	176	173	183	191	194	209	219	205	199	196	184	169
Mong Kok	148	83	74	61	57	58	143	221	237	220	182	157	152	164	170	176	194	215	225	202	176	181	197	201

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	40	33	28	25	23	24	31	43	50	52	52	51	46	48	51	53	56	61	63	61	56	53	51	47
Eastern	48	40	33	31	31	34	46	58	59	57	55	56	53	56	58	60	65	67	68	65	61	60	56	54
Kwai Chung	57	45	40	36	36	39	52	65	71	73	73	74	74	75	79	84	87	89	90	84	76	71	69	65
Kwun Tong	71	53	44	38	38	44	67	82	86	84	82	80	77	82	86	90	96	101	102	97	89	84	82	79
Sham Shui Po	60	47	41	37	36	40	56	65	69	69	68	67	67	69	72	75	80	83	86	82	77	74	71	67
Tsuen Wan	58	43	37	32	32	37	53	62	68	69	68	67	67	71	76	79	82	87	88	83	75	72	70	66
Sha Tin	45	38	34	31	29	31	40	48	51	47	43	40	36	39	43	47	52	58	61	61	57	56	54	50
Tai Po	49	41	35	33	32	35	45	53	52	46	42	38	38	38	41	44	53	63	69	69	64	59	58	54
Tung Chung	41	36	33	30	28	29	35	39	43	44	45	44	44	46	46	47	48	51	53	52	51	48	45	43
Yuen Long	53	47	40	35	34	38	46	54	56	56	54	53	51	53	55	61	67	73	78	75	70	65	61	58
Tap Mun	14	14	13	13	13	15	15	15	16	16	15	13	12	10	10	10	11	12	13	13	13	13	13	13
Causeway Bay	90	79	75	65	61	57	72	92	101	103	102	104	104	109	107	111	109	109	110	107	103	102	102	91
Central	78	67	61	54	54	53	67	85	100	101	102	103	102	104	108	110	109	110	108	104	102	104	98	91
Mong Kok	84	68	64	59	58	58	75	88	93	97	97	98	101	106	111	112	114	114	112	104	97	95	95	93

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	790	750	710	680	680	680	730	790	850	840	810	750	740	750	760	760	790	820	870	890	850	840	840	830
Tung Chung	590	570	570	590	560	560	570	600	620	620	630	630	640	660	630	630	630	620	630	630	620	620	620	610
Tap Mun	680	680	670	670	680	690	700	720	720	720	710	710	700	700	690	680	680	680	670	670	670	670	670	670
Causeway Bay	1410	1460	1410	1380	1270	1170	1080	1160	1300	1340	1390	1340	1340	1380	1340	1350	1330	1360	1450	1500	1500	1470	1400	1300
Central	1340	1190	1100	1040	1010	1000	1070	1190	1400	1590	1610	1520	1450	1490	1500	1540	1510	1580	1650	1560	1680	1630	1580	1480
Mong Kok	1410	1390	1340	1260	1230	1290	1350	1410	1510	1510	1510	1490	1520	1550	1600	1630	1650	1650	1680	1640	1580	1570	1560	1480

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	30	36	38	40	41	39	31	22	19	22	28	34	43	45	44	41	39	31	25	23	24	24	25	26
Eastern	38	41	44	44	44	42	35	30	31	35	39	43	46	48	47	45	41	39	37	36	35	34	35	35
Kwai Chung	22	30	33	34	34	30	20	15	14	17	22	26	30	31	30	28	24	19	15	15	17	17	17	18
Kwun Tong	24	35	40	43	42	36	19	13	13	17	22	27	32	32	31	28	23	17	14	15	17	18	17	18
Sham Shui Po	18	27	30	33	32	28	16	11	12	16	21	26	30	31	31	29	23	17	12	12	12	12	12	13
Tsuen Wan	17	27	32	34	34	29	17	13	14	19	24	29	34	36	35	33	28	20	15	13	15	14	13	14
Sha Tin	27	30	32	33	33	31	23	20	23	30	39	47	54	56	55	51	45	36	31	27	26	24	23	24
Tai Po	41	44	46	47	46	43	36	34	40	49	57	66	70	72	72	69	62	52	43	40	40	40	39	39
Tung Chung	31	36	36	35	36	35	29	27	29	35	42	51	60	67	71	70	63	52	41	36	32	31	31	31
Yuen Long	22	25	28	30	29	26	22	20	23	29	37	44	51	52	49	45	39	30	24	20	20	21	21	21
Tap Mun	50	51	50	48	47	45	44	47	50	56	66	75	82	87	87	87	85	81	75	69	65	61	57	55

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	35	34	33	33	32	33	34	39	44	46	47	47	44	45	47	47	47	47	47	46	44	41	39	37
Eastern	38	37	36	37	37	37	38	40	42	45	45	44	44	44	45	45	45	46	47	46	44	43	40	38
Kwai Chung	41	39	38	38	38	39	43	47	51	50	51	50	49	50	50	52	55	56	57	56	53	49	46	43
Kwun Tong	54	52	51	50	49	50	54	60	65	66	64	63	58	61	64	64	65	67	70	69	64	60	57	56
Sham Shui Po	43	42	41	41	40	42	44	48	51	53	53	54	52	52	53	55	56	58	60	62	56	52	48	45
Tsuen Wan	43	41	40	39	39	40	43	48	52	56	57	56	51	56	59	59	61	61	60	59	55	51	49	46
Sha Tin	41	39	38	38	37	38	40	44	47	49	48	47	43	46	47	49	51	51	50	51	49	47	46	43
Tai Po	44	42	41	40	40	41	44	49	49	47	46	44	45	45	45	45	47	51	52	53	52	49	47	45
Tung Chung	40	39	38	37	36	37	39	42	45	49	50	50	51	55	57	56	55	52	48	47	46	44	43	41
Yuen Long	47	44	43	42	42	44	49	56	60	62	59	57	56	56	56	57	59	58	59	61	59	55	52	50
Tap Mun	35	35	35	35	36	37	39	40	41	41	42	42	40	40	40	40	41	40	40	40	39	37	37	35
Causeway Bay	68	54	48	47	47	48	59	74	85	86	83	84	84	95	91	94	97	100	105	110	104	94	87	77
Central	55	51	49	47	47	48	51	63	77	84	85	81	68	73	81	79	80	86	80	74	70	68	67	62
Mong Kok	51	45	43	42	42	44	52	64	70	73	71	69	67	71	72	72	74	77	78	77	72	67	62	58

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

TABLE C8: 2002 AMBIENT LEVELS OF TOXIC AIR POLLUTANTS

Toxic Air Pollutants	Concentration Unit	Annual Averages [1]	
		Tsuen Wan	Central/Western
Heavy Metals [2]			
Cadmium	ng/m^3	1.43	1.23
Hexavalent chromium	ng/m^3	0.28	0.26
Lead	ng/m^3	56	43
Nickel	ng/m^3	7.7	7.7
Organic Substances			
Benzene	µg/m^3	2.21	1.84
Benzo[a]pyrene	ng/m^3	0.36	0.20
1,3-Butadiene	µg/m^3	0.33	0.23
Formaldehyde	µg/m^3	4.55	5.25
Perchloroethylene	µg/m^3	0.94	1.97
Dioxins [3]	pgI-TEQ/m^3	0.063	0.057

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 cadmium, lead and nickel the reported figures are the respective 2002 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), 1988

Appendix D

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

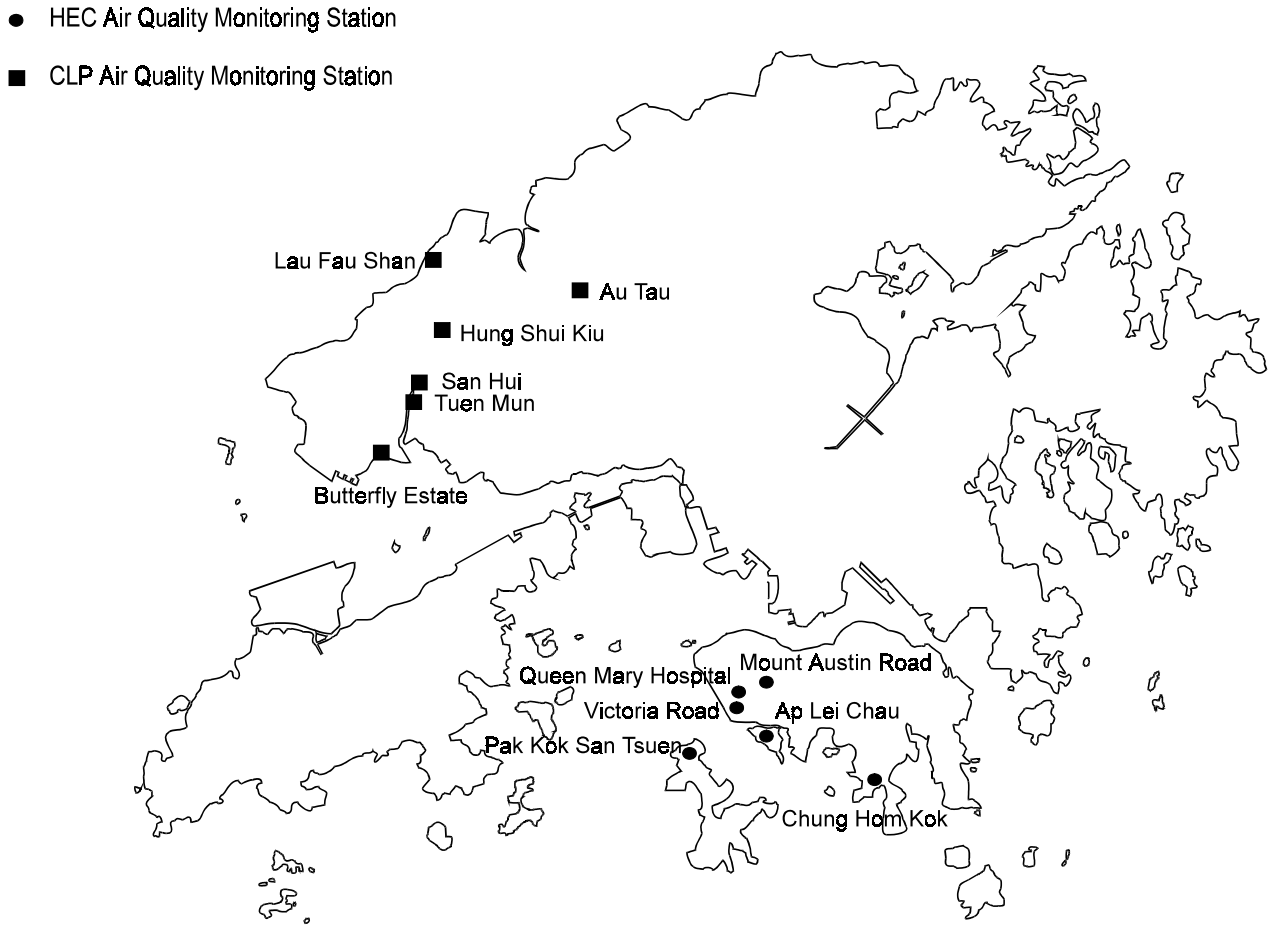


Figure D1 LOCATION OF HEC & CLP AIR QUALITY MONITORING STATIONS

D.1 The Hongkong Electric Co. Ltd.

Air Quality Monitoring Stations	Annual Mean Concentration [1]	Range of Monthly Mean Concentration
Sulphur Dioxide (SO_2) [2]		
Mount Austin Road	14	7 - 27
Chung Hom Kok	7	2 - 13
Victoria Road	13	6 - 29
Queen Mary Hospital	12	6 - 22
Ap Lei Chau	13	6 - 24
Pak Kok San Tsuen	11	4 - 23
Nitrogen Dioxide (NO_2) [3]		
Mount Austin Road	23	9 - 35
Chung Hom Kok	20	12 - 32
Victoria Road	34	15 - 59
Queen Mary Hospital	29	12 - 45
Ap Lei Chau	28	10 - 51
Pak Kok San Tsuen	25	6 - 45

D.2 CLP Power Hong Kong Limited.

Air Quality Monitoring Station	Annual Mean Concentration [1]	Range of Monthly Mean Concentration
Sulphur Dioxide (SO_2) [2]		
San Hui [4]	22	6 - 32
Tuen Mun	19	6 - 32
Hung Shui Kiu	14	6 - 23
Au Tau	28	21 - 36
Butterfly Estate	15	4 - 27
Lau Fau Shan [5]	11	6 - 19
Nitrogen Dioxide (NO_2) [3]		
San Hui [4]	69	51 - 82
Tuen Mun	54	25 - 85
Butterfly Estate	48	27 - 74
Lau Fau Shan [5]	33	15 - 62

Notes:

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

[2] There was no exceedance of AQO level for SO_2.

[3] Tuen Mun and Lau Fau Shan both recorded 1 count of exceedance of 24-hr AQO limit.

[4] Monitoring resumed in August 2002.

[5] Monitoring was de-commissioned on 18 December 2002.