AIR QUALITY
IN HONG KONG 2003

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 (2003) (AQMN)

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Summary

This report summarises the 2003 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 decreased over the past few years.

Over the past decade, concentrations of ozone have been on a 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 have formulated 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 2003.

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1. Introduction

The Environmental Protection Department (EPD) operated in 2003 a network of 14 air quality monitoring stations for measuring concentrations of 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 for collecting 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.

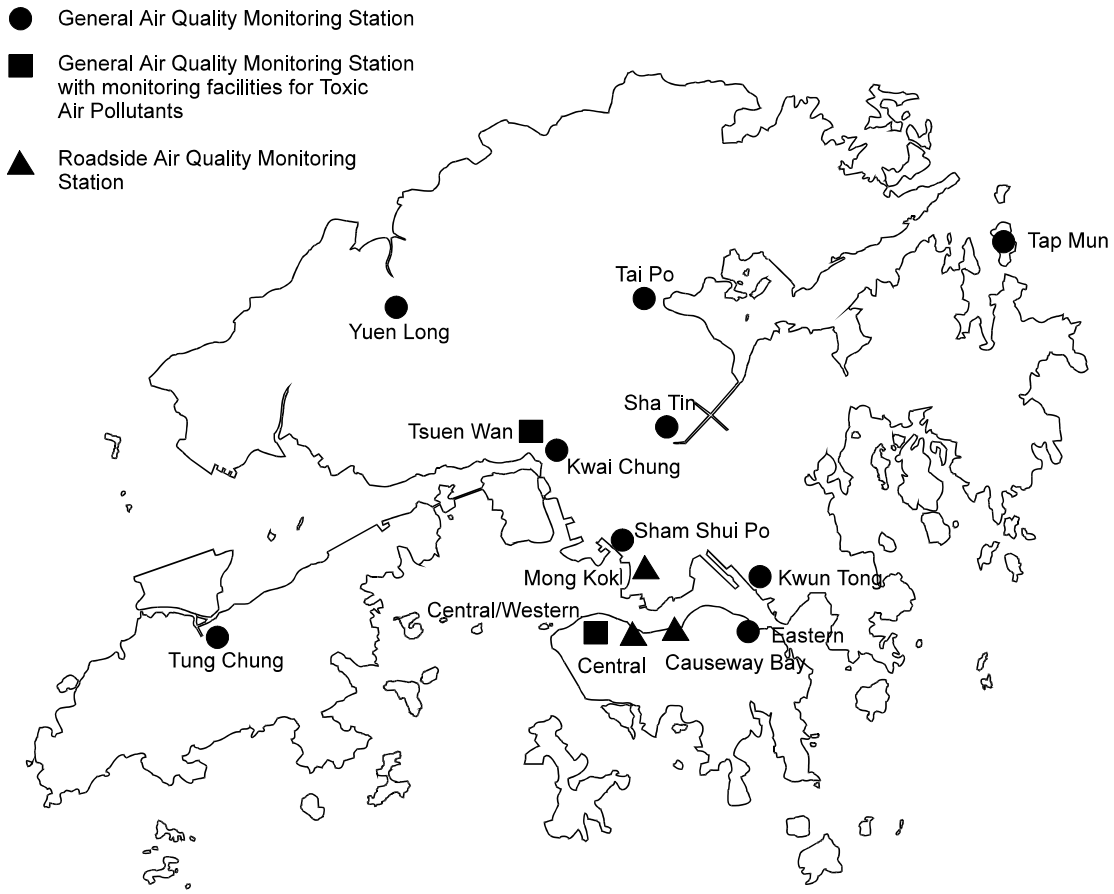


Figure 1: Location of EPD's Air Quality Monitoring Stations (2003)

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 2003 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.

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 2003
(1-Hour Average Statistics)

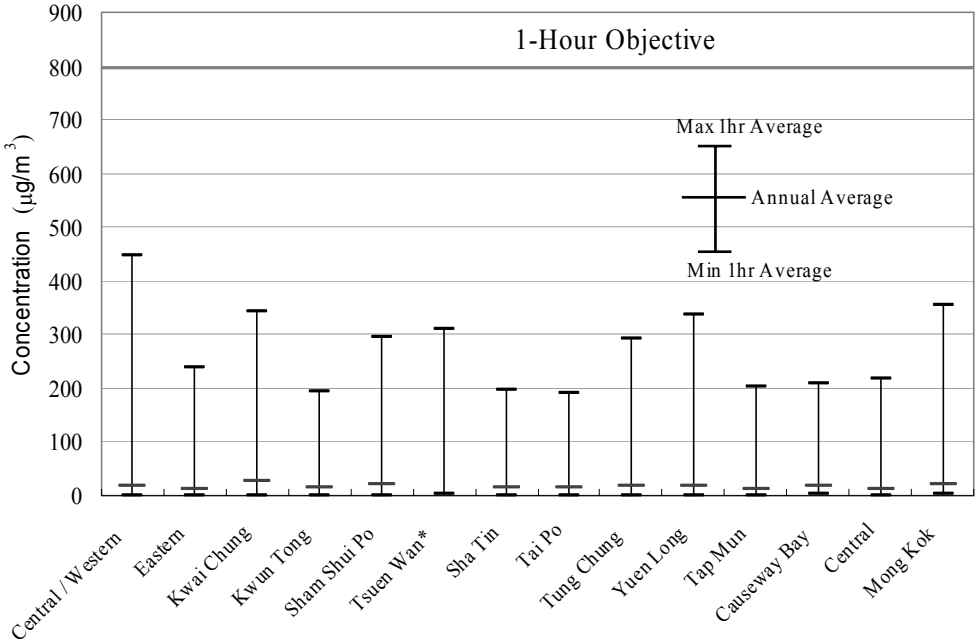
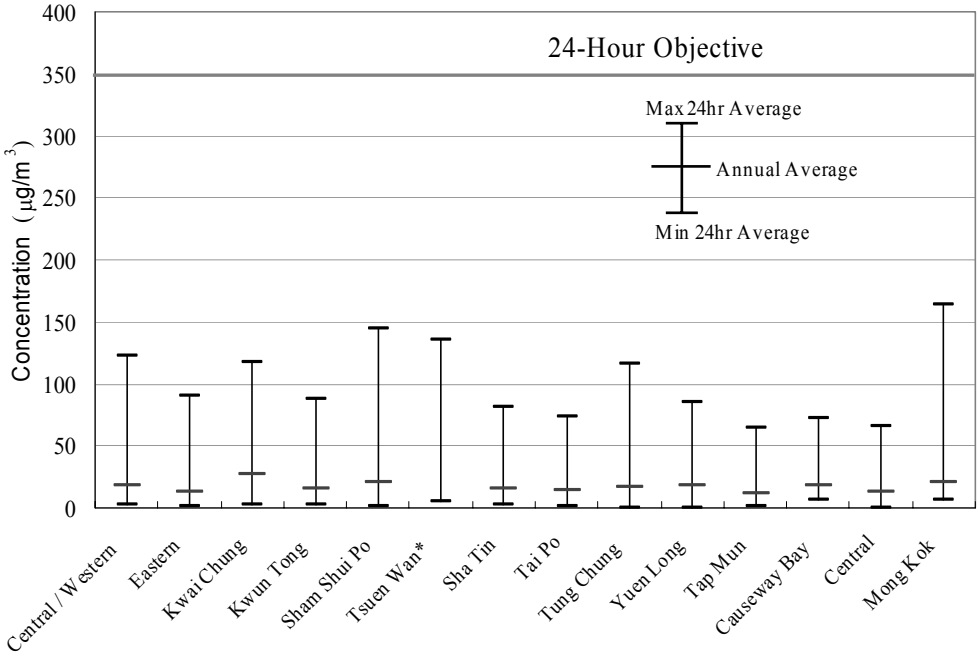
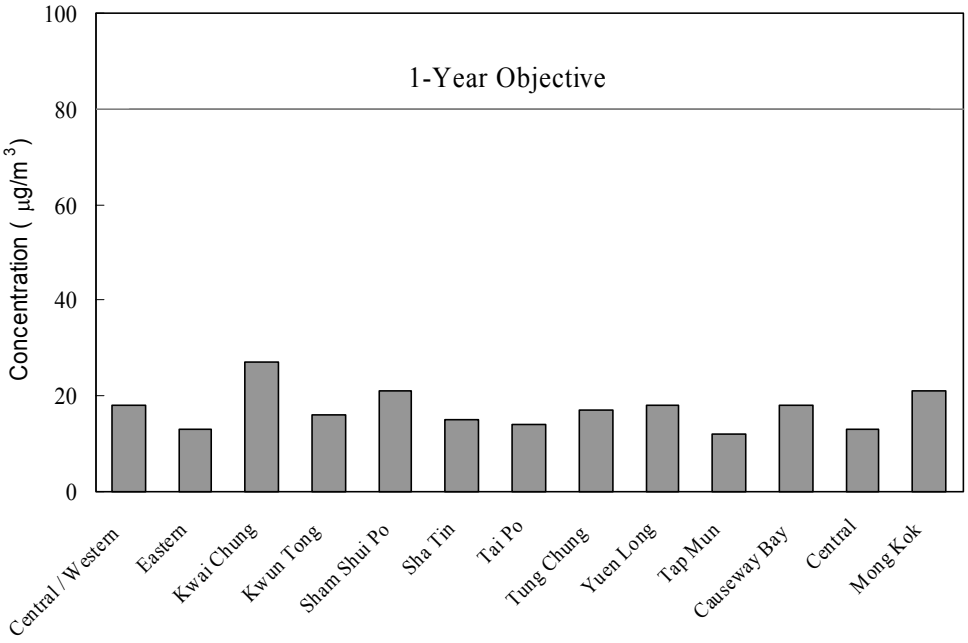


Figure 2b: Sulphur Dioxide Monitoring 2003
(24-Hour Average Statistics)



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

Figure 2c: Sulphur Dioxide Monitoring 2003
(Annual Average)



Sulphur dioxide was continuously measured at all 14 stations in the monitoring network during 2003. As in previous years, concentrations of SO_2 in Hong Kong remained very low in 2003. All of the 14 stations complied with all relevant AQOs for SO_2 during the year. The highest 1-hour average (446 $\mu g/m^3$) was recorded at Central/Western station and the highest 24-hour average (164 $\mu g/m^3$) was recorded at Mong Kok roadside 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 2003. In 2003, the highest 1-hour average (352 $\mu g/m^3$) was recorded at Tsuen Wan station, and the highest 24-hr average (224 $\mu g/m^3$) was recorded at Central roadside station.

As in previous year, all general stations complied with the annual AQO for NO_2 while non-compliance was still observed at the roadside stations in 2003. The highest annual average (98 $\mu g/m^3$) was recorded at Mong Kok roadside station.

Figure 3a: Nitrogen Dioxide Monitoring 2003
(1-Hour Average Statistics)

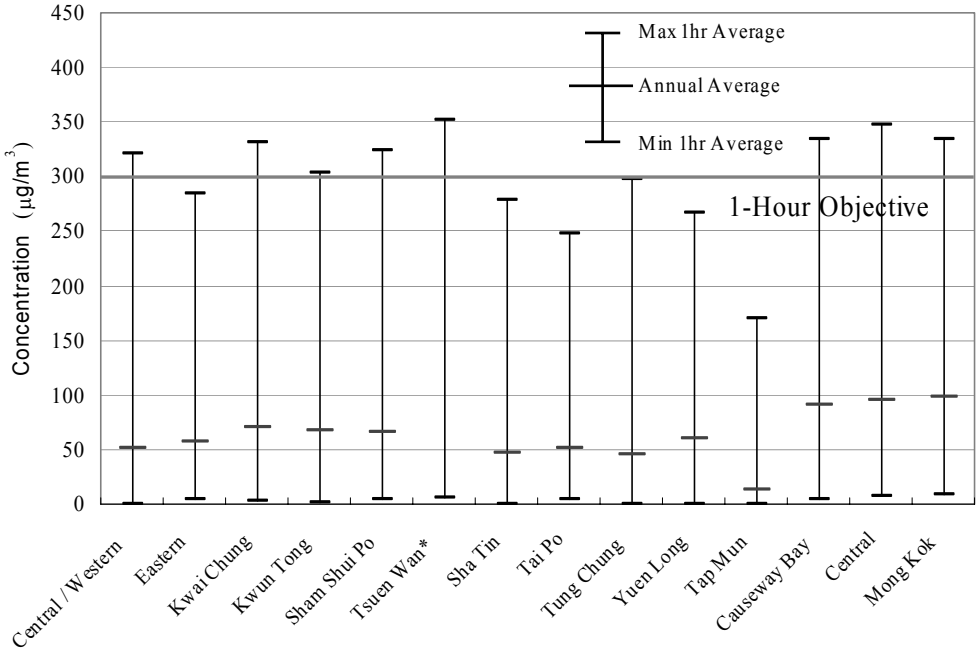
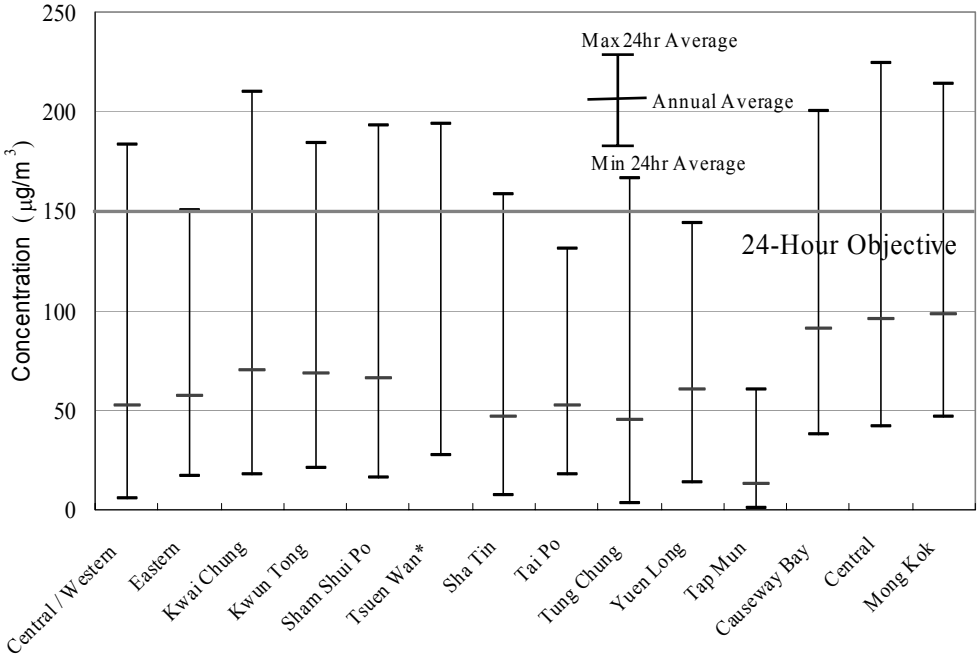
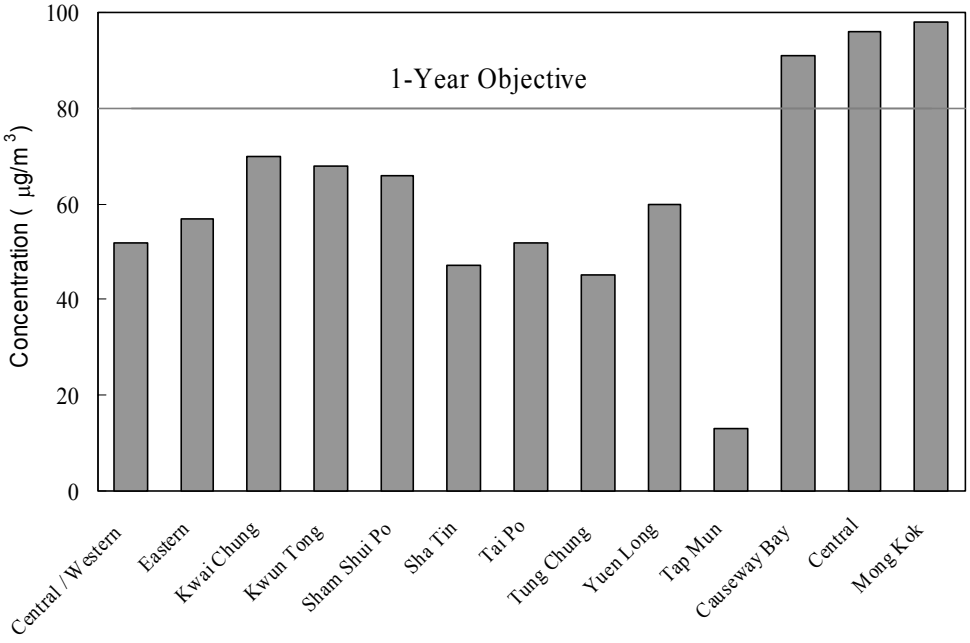


Figure 3b: Nitrogen Dioxide Monitoring 2003
(24-Hour Average Statistics)



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

Figure 3c: Nitrogen Dioxide Monitoring 2003
(Annual Average)

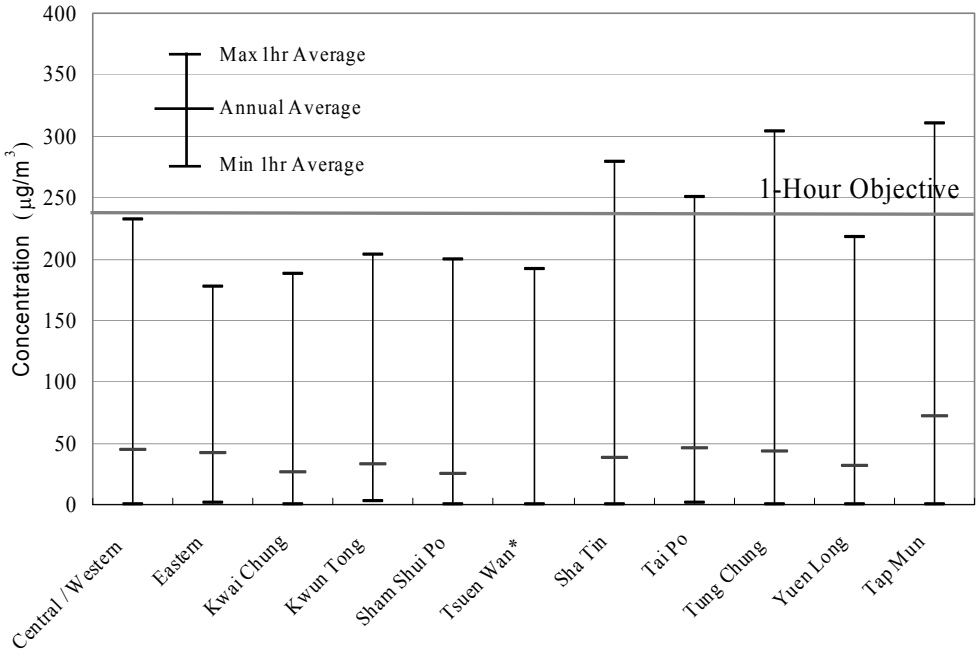


2.3 Ozone (O_3)

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 2003. Tung Chung Station recorded 26 counts of exceedance of 1-hr AQO limit in the year, with highest 1-hr average of 303 $\mu g/m^3$. Tap Mun station recorded 13 counts of exceedance, with the highest 1-hr average of 310 $\mu g/m^3$.

Figure 4a: Ozone Monitoring 2003
(1-Hour Average Statistics)



Note: The asterisked station 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 2003. Similar to previous years, both the ambient and roadside CO concentrations remained very low in 2003. During the year, all of the 6 stations complied with the 1-hour and 8-hour AQO. Both the highest 1-hour average (4710 $\mu g/m^3$) and 8-hour average (4155 $\mu g/m^3$) were recorded at Mong Kok roadside station which were 16% and 42% of the respective AQO limits.

Figure 5a: Carbon Monoxide Monitoring 2003
(1-Hour Average Statistics)

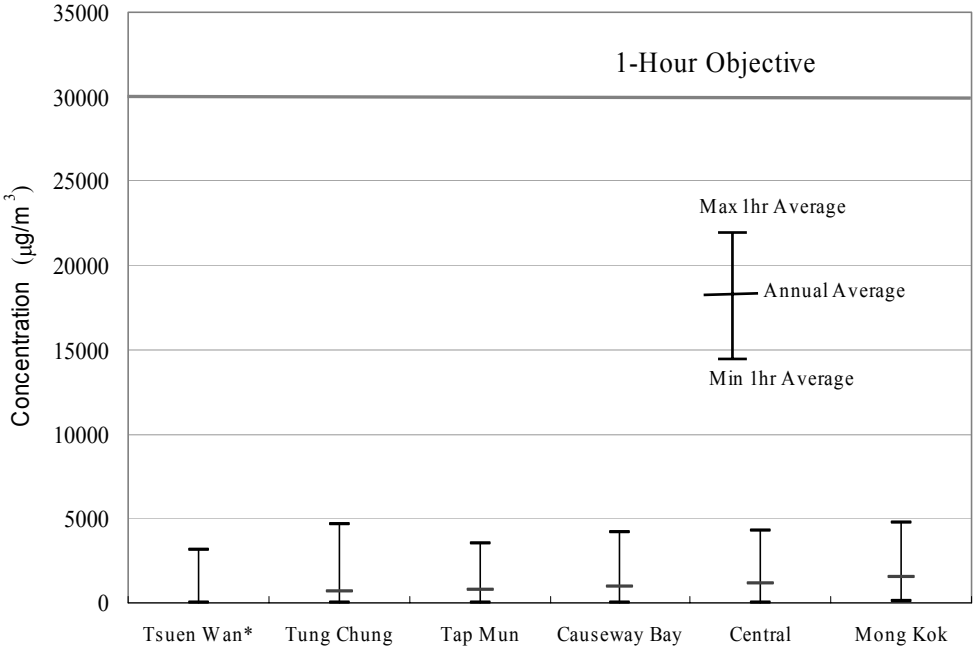
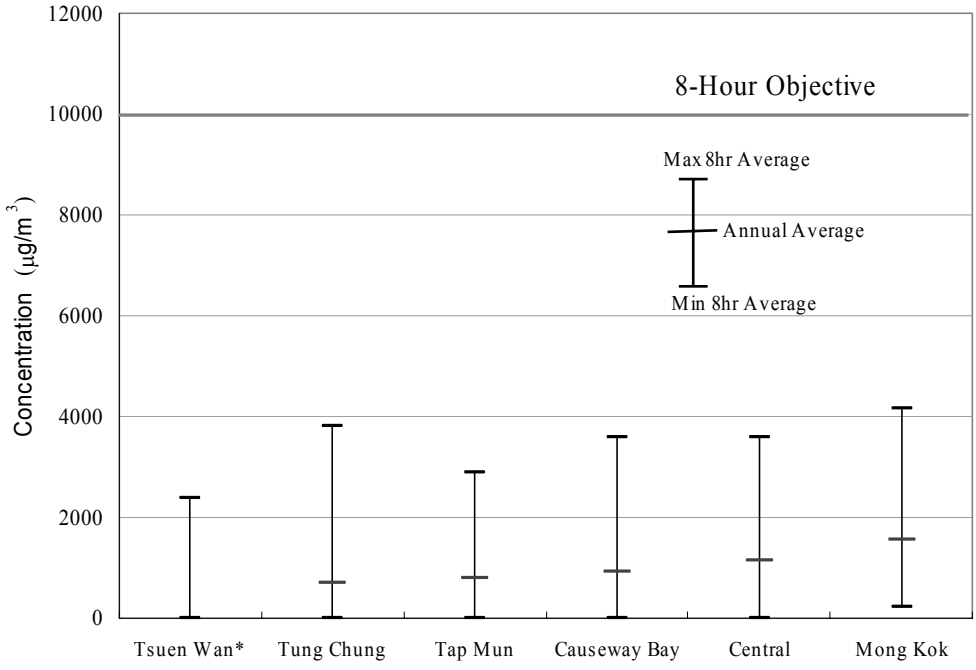


Figure 5b: Carbon Monoxide Monitoring 2003
(8-Hour Average Statistics)



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

3. Suspended Particulates

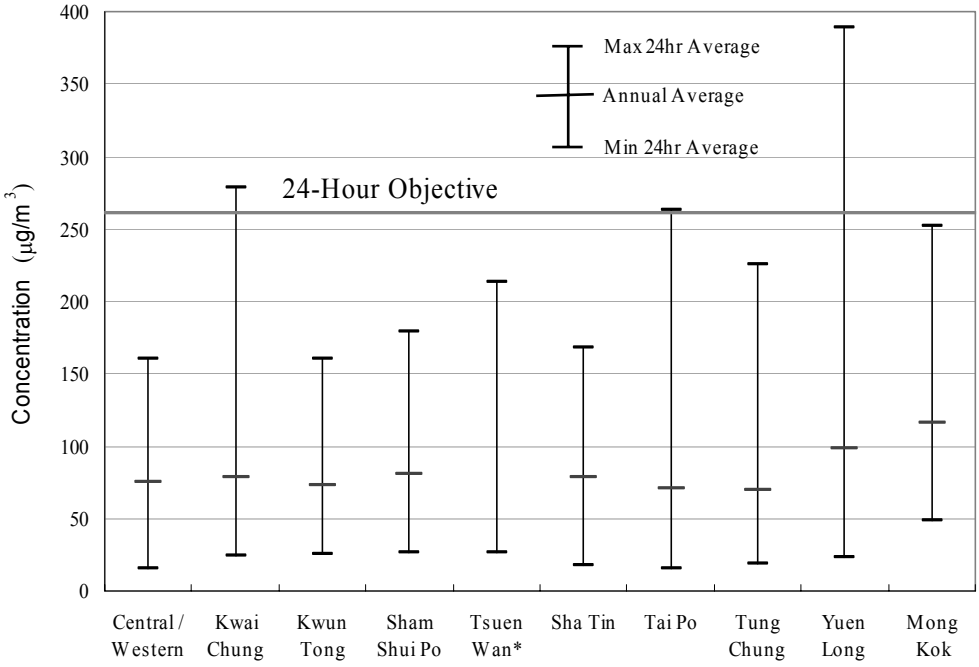
3.1 Total Suspended Particulates (TSP)

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 2003. The highest 24-hr average (389 $\mu g/m^3$) was recorded at Yuen Long station.

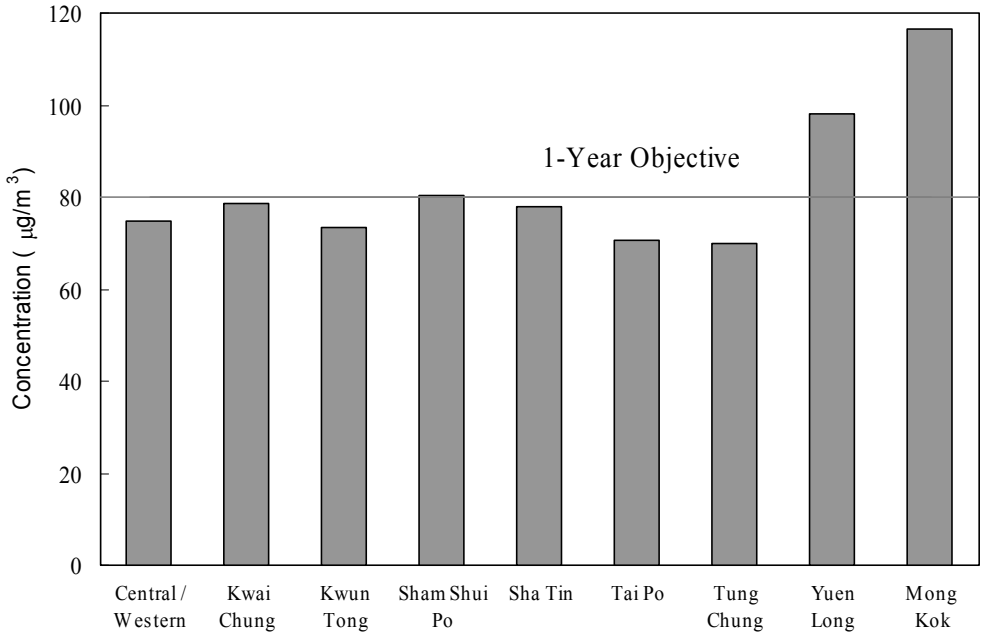
In 2003, the highest annual average (116 $\mu g/m^3$) was recorded at Mong Kok roadside station which breached the annual AQO value of 80 $\mu g/m^3$. Exceedance of annual AQO was also observed at Yuen Long station (98 $\mu g/m^3$).

Figure 6a: TSP Monitoring 2003
(24-Hour Average Statistics)



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

Figure 6b: TSP Monitoring 2003
(Annual Average)



3.2 Respirable Suspended Particulates (RSP)

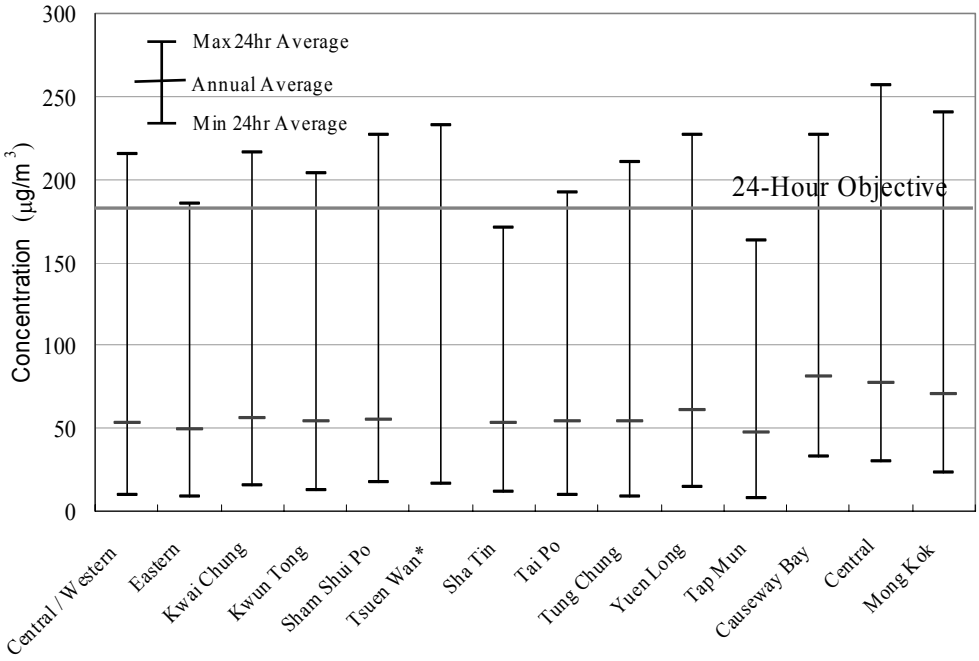
Respirable suspended particulates (RSP) refer to those suspended particulates with nominal aerodynamic diameters of 10 micrometres or less. Combustion sources, in particular diesel vehicle exhaust and emissions from power plants, are the major sources of RSP. Besides, RSP can be formed by atmospheric 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 2003. Most of these stations were also equipped with high-volume sampler to collect particulate samples for chemical analysis. In 2003, the highest 24-hr average of 257 $\mu g/m^3$ was recorded at the Central roadside station.

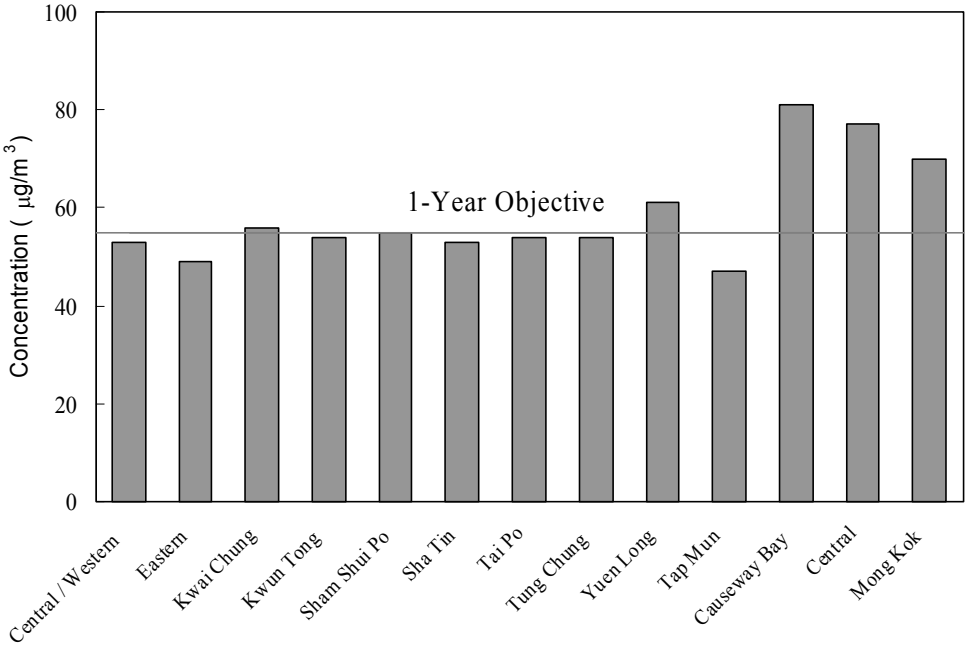
In 2003, the highest annual average (81 $\mu g/m^3$) was recorded at Causeway Bay roadside station, which exceeded the annual AQO for RSP. Other two roadside stations, viz Central and Mong Kok stations, also breached the annual AQO for RSP, with annual averages of 77 $\mu g/m^3$ and 70 $\mu g/m^3$ respectively. There were 2 general stations, namely Yuen Long and Kwai Chung, which recorded exceedance of the annual AQO, with annual averages of 61 $\mu g/m^3$ and 56 $\mu g/m^3$ respectively in the year.

Figure 7a: RSP Monitoring 2003
(24-Hour Average Statistics)



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

Figure 7b: RSP Monitoring 2003
(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 2003. The overall 3-month averages ranged from 15 ng/m^3 (third quarter) to 191 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 2003, 8 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 generally 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 pollutant levels at roadside.

Figure 8: 2003 Diurnal variations of NO_2

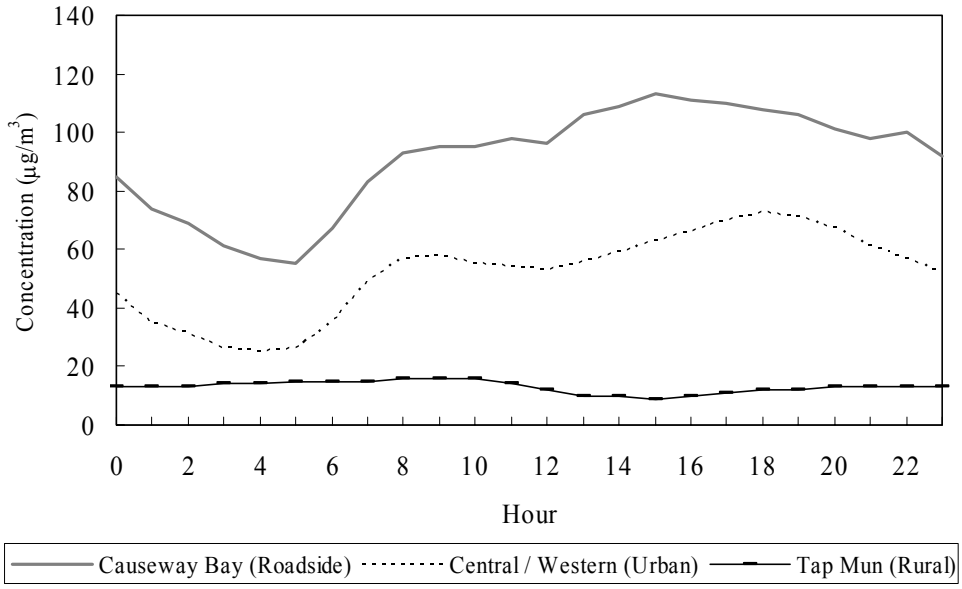
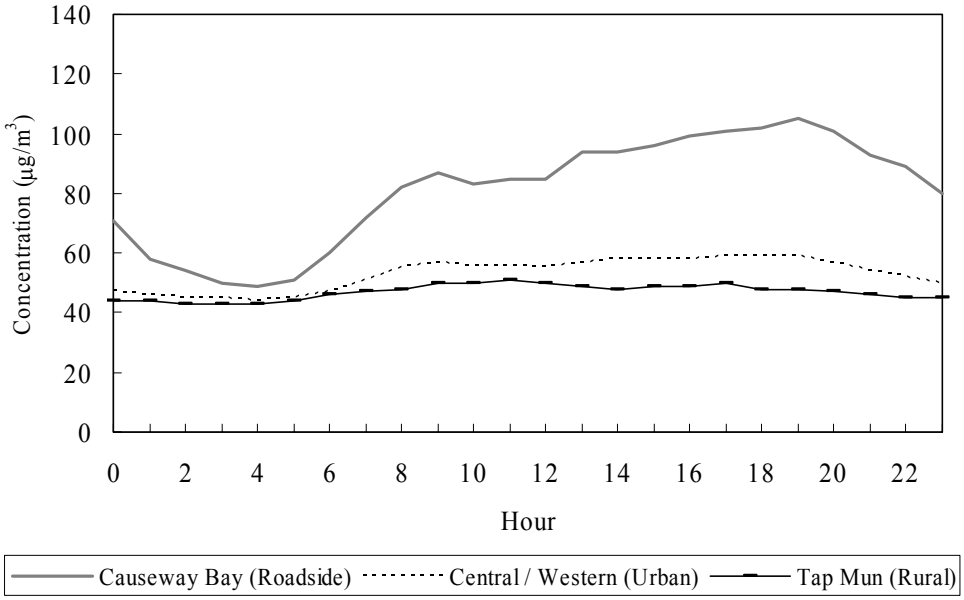
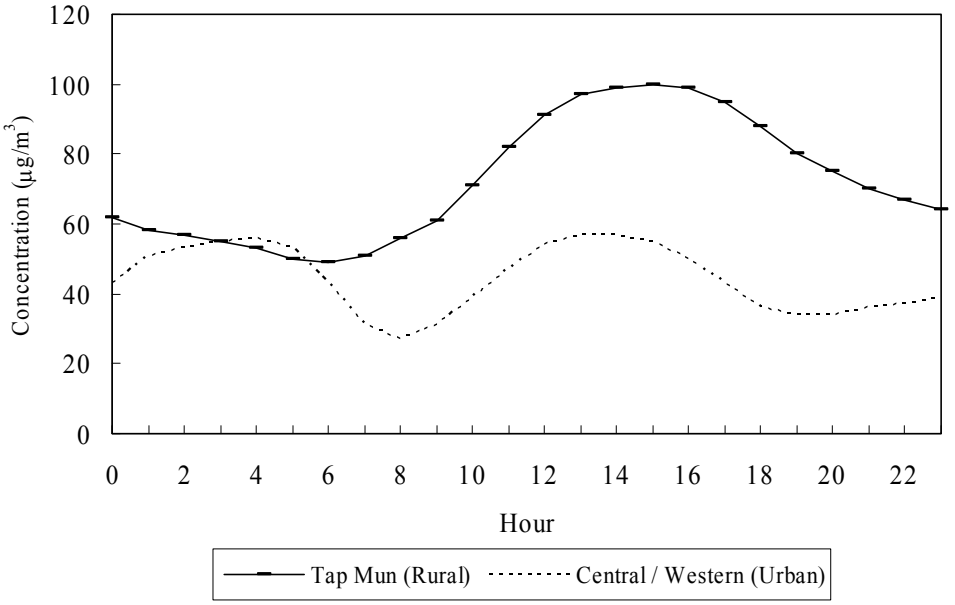


Figure 9: 2003 Diurnal variations of RSP



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 not strong enough for photochemical reactions to take place.

Figure 10: 2003 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 prevailing wind 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 2003

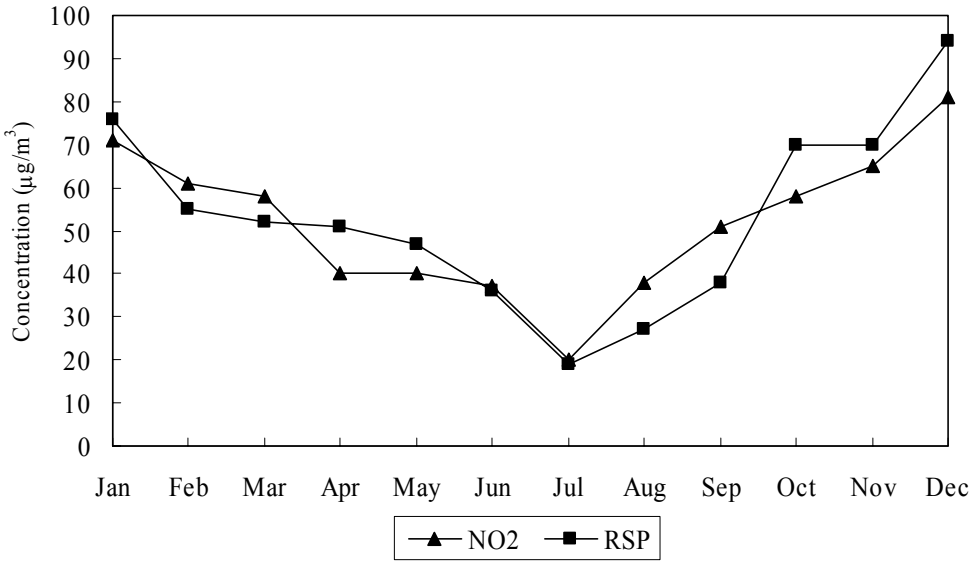
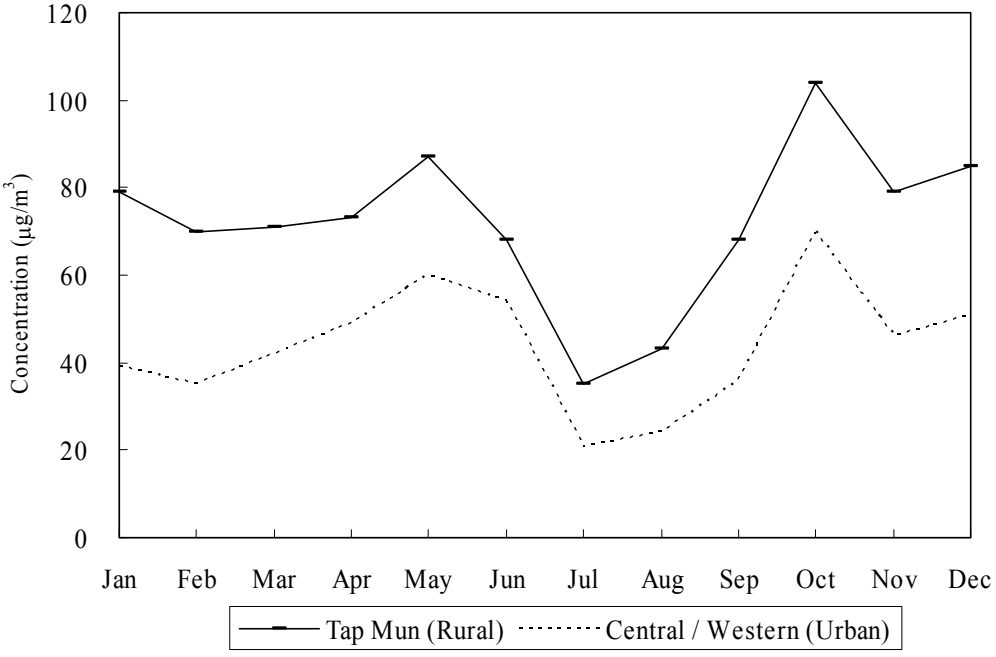


Figure 12: Monthly variations of O_3 in 2003



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)

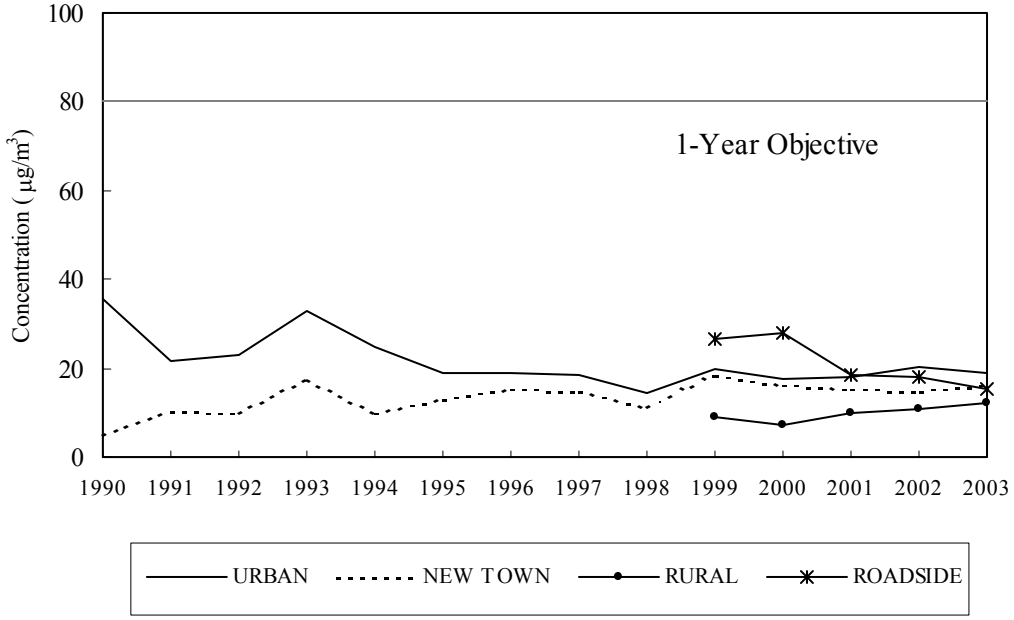
Since the implementation of the Air Pollution Control (Fuel Restriction) Regulations in 1990 for cutting sulphur content of industrial fuels and the Air Pollution Control (Motor Vehicle Fuel) Regulations in 1995 for controlling motor vehicle fuel quality, SO_2 concentrations in Hong Kong have reduced 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 2003 (16 $\mu g/m^3$) dropped by 43% compared with the 2000 value (28 $\mu g/m^3$).

[1] The current Mong Kok roadside station was commissioned in 2001. The station is not included in the trend analysis due to its relatively short history of measurement as compared with other stations. 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.

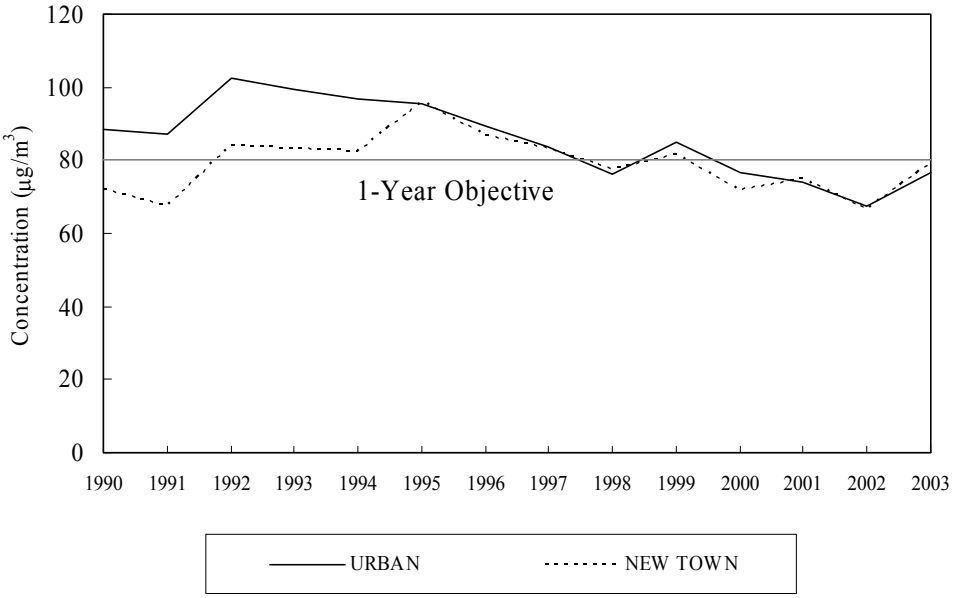
Figure 13: SO_2 long term trend



5.3.2 Total Suspended Particulates (TSP)

TSP levels in urban and new town areas have shown declining trends since 1995.

Figure 14: TSP long term trend

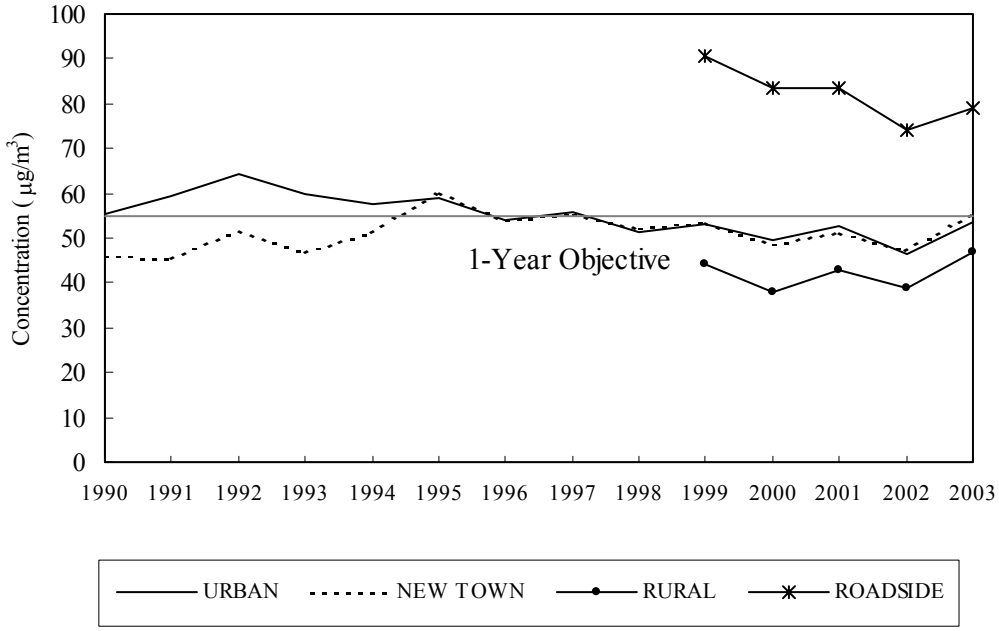


5.3.3 Respirable Suspended Particulates (RSP)

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 2003 reduced by 13% compared with 1999.

The annual average of RSP for urban stations decreased from 1992 to 2000 but the trend has levelled off in subsequent years.

Figure 15: RSP long term trend



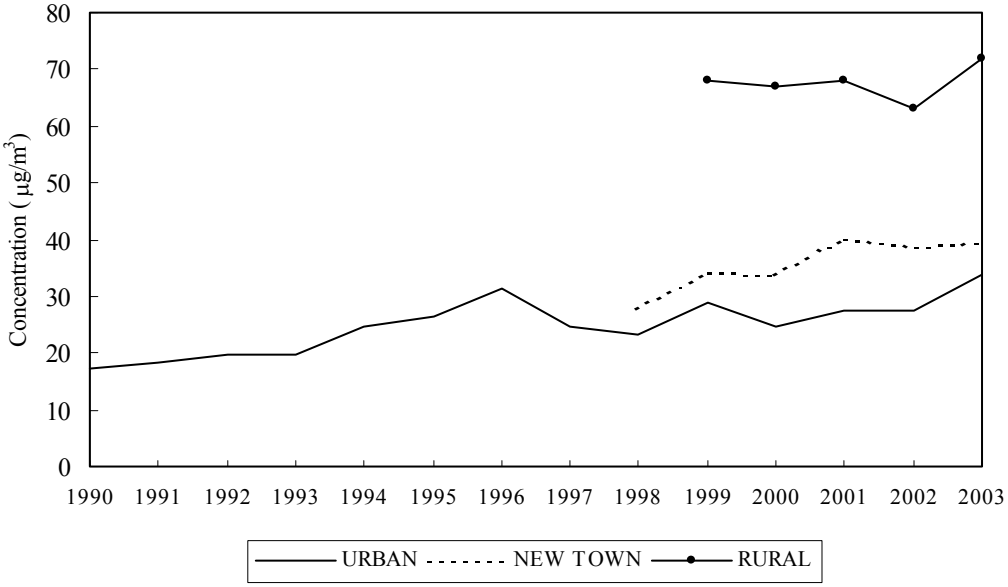
5.3.4 Ozone (O_3)

As nitric oxide emissions from motor vehicles can react with and remove ozone in the air, areas with heavy traffic flow normally have lower ozone levels than areas with low traffic flow. Hence, 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 rising trend. The annual average of ozone for urban stations in 2003 (34 $\mu g/m^3$) was 70% higher than the 1993 value (20 $\mu g/m^3$).

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 have formulated a regional air quality management plan to improve air quality in the Pearl River Delta region.

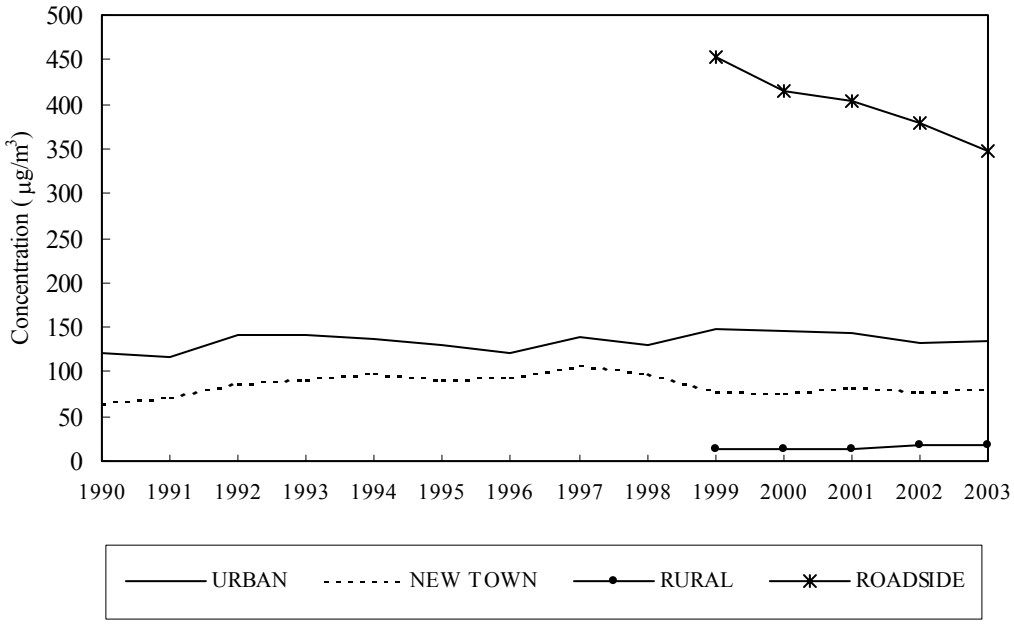
Figure 16: O_3 long term trend



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

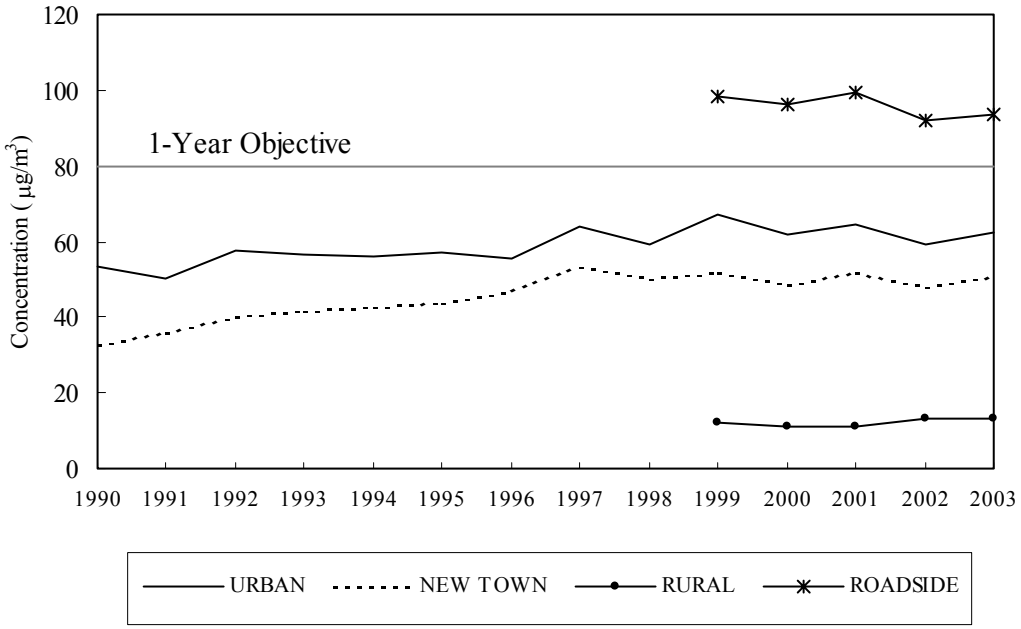
The annual average of NO_x in urban areas has remained quite constant over the past decade. The annual average of NO_x at roadside in 2003 reduced by 23% compared with 1999, which reflects a reduction in emission levels as a result of vehicle emission control measures implemented in recent years.

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.

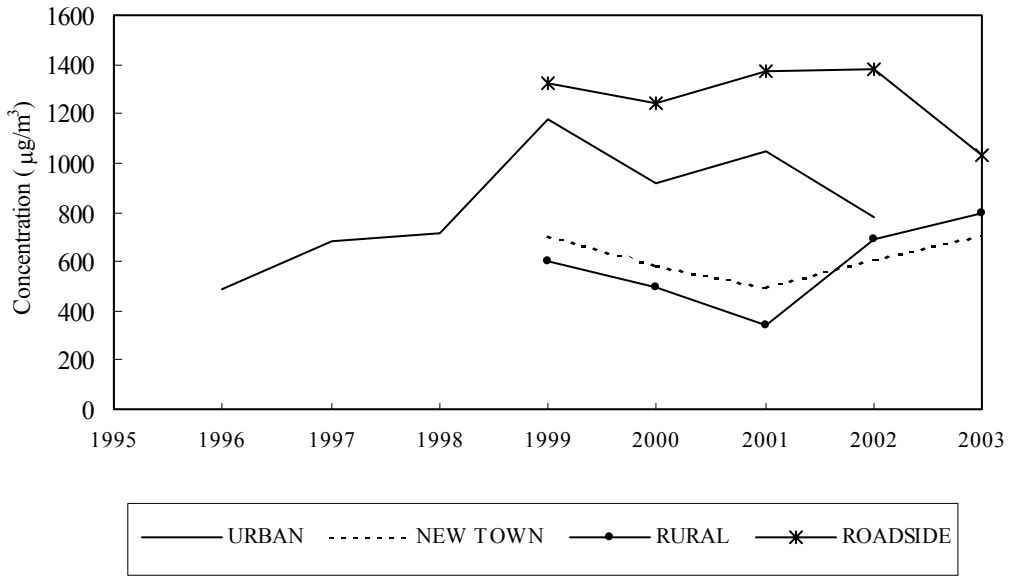
Figure 18: NO_2 long term trend



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 CO levels were well within the relevant AQOs.

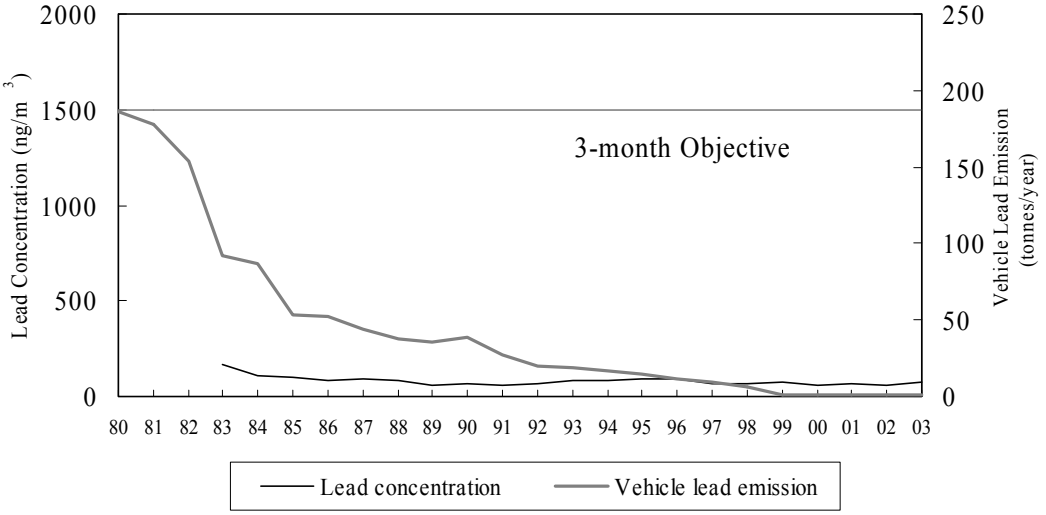
Figure 19: CO long term trend



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 while high pressure dominates over South China region.

Appendix A

Air Quality Objectives and their Compliance Status

Established in 1987, the Hong Kong Air Quality Objectives (AQO) for seven major air pollutants was 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 2003

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	100	99.95	99.45	100	99.45	100	100	--	--
	Eastern	100	100	100	--	99.72	100	100	--	--
	Kwai Chung	100	99.93	98.90	98.33	99.73	100	100	--	--
	Kwun Tong	100	99.98	98.35	100	99.71	100	100	--	--
	Sham Shui Po	100	99.96	99.39	100	99.40	100	100	--	--
	Tsuen Wan	100	99.90	98.79	100	98.82	100	100	100	100
	Sha Tin	99.98	100	99.72	100	100	100	100	--	--
	Tai Po	99.98	100	100	98.36	99.72	100	100	--	--
	Tung Chung	99.69	100	99.16	100	99.15	100	100	100	100
	Yuen Long	100	100	100	96.77	99.17	100	100	--	--
	Tap Mun	99.85	100	100	--	100	100	100	100	100
Roadside Station	Causeway Bay	--	99.95	98.04	--	99.41	100	100	100	100
	Central	--	99.89	94.75	--	99.31	100	100	100	100
	Mong Kok	--	99.95	97.25	100	99.45	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-hr and 24-hr AQO) recorded at each of the monitoring stations in 2003. For NO_2, the compliance percentages of 24-hr AQO were between 94% and 100% at all stations with four stations achieving 100% compliance; its 1-hr AQO compliance rates were above 99% at all stations with 6 stations achieving 100% compliance. Regarding RSP, the compliance percentages for 24-hr AQO achieved at least 99% for 13 out of 14 stations. The compliance levels for 1-hr AQO for O_3 were over 99% at all monitoring stations. For TSP, the compliance percentage of its 24-hr AQO were between 96% and 100% at all stations, with 7 stations reached 100% compliance. The compliance rates for the short-term AQO for both SO_2 and CO 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 2003. The annual AQO for NO_2 and RSP were complied at 10 out of 13 stations and 8 out of 13 stations respectively. For TSP, 7 out of 9 stations complied with annual AQO. For those stations with sufficient data, sulphur dioxide and lead all complied with the long-term AQO.

Overall in 2003, the compliance rate with long-term AQO for all pollutants was recorded at 8 out of 13[@] stations, compared with 5 out of 13* stations in 1999.

Notes: [@] *Tsuen Wan station did not have sufficient data for the assessment of annual AQO compliance in 2003. 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 2003

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*
"~" *Number of data collected is below the minimum required*

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

- Environmental Protection Interactive Centre (EPIC) was established for public to download air quality monitoring data since March 2003
(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 2003, 386 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 -10.2% and 10.4%, 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 2003, 1661 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 -8.1% and 8.2%, 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 : 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	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/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 : Busy 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 (2003)

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 43A Environnement S.A. AF21M
NO, NO_2, NO_x	Chemiluminescence	API 200A Monitor Laboratories 8840
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 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 925 / 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 920 / Bicarbonate Impregnated Filter	Every 12 days	24 hours

Figure B1: Accuracy of Air Quality Monitoring Network, 2003

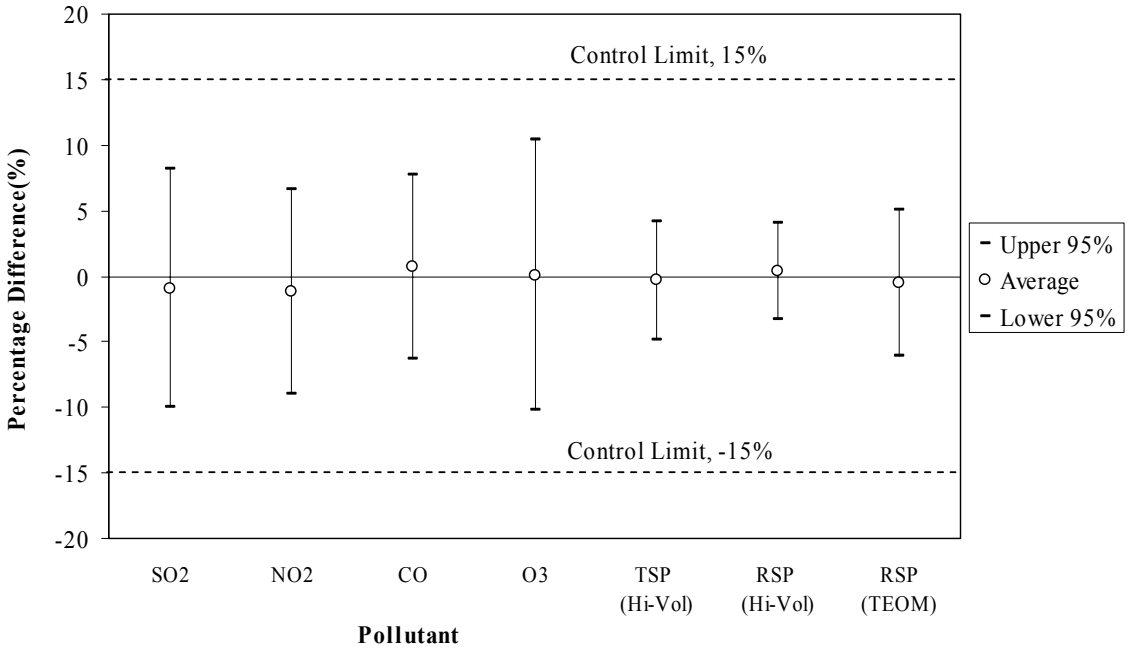
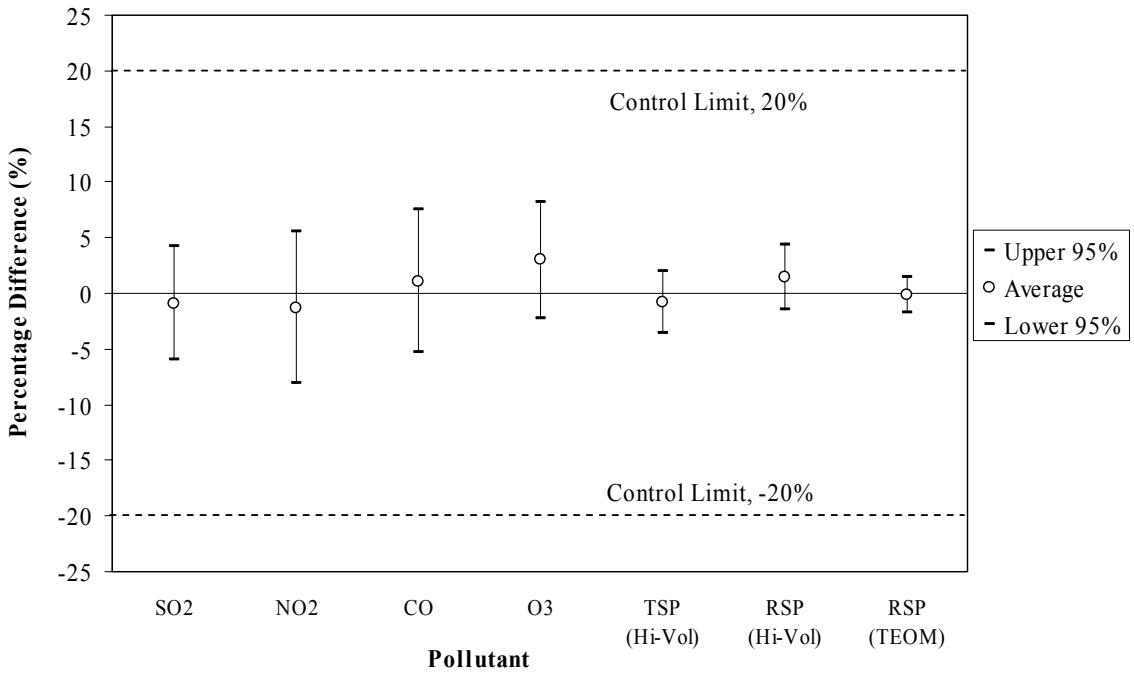


Figure B2: Precision of Air Quality Monitoring Network, 2003



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

Appendix C

Tables of Air Quality Data

Table No.	Table Title
C1.	The highest 4 hourly pollutant concentrations measured in 2003
C2.	The highest 2 daily pollutant concentrations measured in 2003
C3.	2003 Monthly and annual averages of gaseous pollutants
C4.	2003 Monthly and annual averages of particulate pollutants
C5.	2003 Hourly Statistics of major air pollutants
C6.	2003 Total wet and dry deposition
C7.	2003 Diurnal variations of air pollutant
C8.	2003 Ambient levels of toxic air pollutants

TABLE C1: THE HIGHEST 4 HOURLY POLLUTANT CONCENTRATIONS MEASURED IN 2003

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	446	329	309	295
Eastern	237	194	184	182
Kwai Chung	343	277	249	241
Kwun Tong	193	187	184	179
Sham Shui Po	295	289	280	263
Tsuen Wan	309	301	244	223
Sha Tin	197	192	185	175
Tai Po	192	181	174	168
Tung Chung	291	271	246	243
Yuen Long	336	248	241	223
Tap Mun	203	202	174	169
Causeway Bay	209	198	190	185
Central	219	215	193	174
Mong Kok	356	326	304	299

Pollutant: Nitrogen Oxides

Station	1st High	2nd High	3rd High	4th High
Central / Western	1148	1032	794	793
Kwai Chung	1501	1331	1125	1093
Kwun Tong	1014	908	907	882
Sham Shui Po	1295	995	958	928
Tsuen Wan	754	712	657	627
Sha Tin	780	733	717	695
Tung Chung	493	485	412	384
Tap Mun	220	210	199	196
Causeway Bay	1475	1325	1283	1276
Central	1980	1662	1647	1577
Mong Kok	1405	1283	1253	1212

Pollutant: Nitric Oxide

Station	1st High	2nd High	3rd High	4th High
Central / Western	636	569	434	426
Kwai Chung	835	737	634	625
Kwun Tong	531	455	445	445
Sham Shui Po	743	563	536	519
Tsuen Wan	372	370	319	307
Sha Tin	419	377	368	353
Tung Chung	186	150	150	145
Tap Mun	96	94	75	63
Causeway Bay	792	715	703	700
Central	1082	979	960	896
Mong Kok	800	691	663	653

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	321	315	308	302
Eastern	284	257	253	253
Kwai Chung	331	331	325	320
Kwun Tong	303	301	299	293
Sham Shui Po	324	322	306	292
Tsuen Wan	352	341	339	315
Sha Tin	279	274	273	264
Tai Po	247	243	229	228
Tung Chung	298	289	278	277
Yuen Long	267	265	263	253
Tap Mun	170	169	152	141
Causeway Bay	334	318	316	309
Central	348	326	316	312
Mong Kok	334	328	324	310

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

Station	1st High	2nd High	3rd High	4th High
Tsuen Wan	3110	2760	2530	2530
Tung Chung	4680	4470	4380	4130
Tap Mun	3510	3280	2930	2900
Causeway Bay	4140	4140	3910	3680
Central	4260	4030	4030	3790
Mong Kok	4710	4710	4370	4260

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	232	220	217	217
Eastern	177	173	168	155
Kwai Chung	188	184	155	147
Kwun Tong	203	201	176	149
Sham Shui Po	199	181	176	174
Tsuen Wan	192	190	190	179
Sha Tin	279	246	230	213
Tai Po	250	242	225	205
Tung Chung	303	276	273	270
Yuen Long	218	213	210	207
Tap Mun	310	307	296	293

Pollutant: Respirable Suspended Particulates

Station	1st High	2nd High	3rd High	4th High
Central / Western	356	352	332	321
Eastern	289	288	285	283
Kwai Chung	346	326	324	309
Kwun Tong	339	337	327	316
Sham Shui Po	348	345	344	343
Tsuen Wan	381	374	366	347
Sha Tin	338	325	308	266
Tai Po	320	317	315	305
Tung Chung	458	384	351	350
Yuen Long	377	371	360	355
Tap Mun	336	322	295	289
Causeway Bay	352	336	335	331
Central	344	332	326	324
Mong Kok	394	376	372	364

TABLE C2: THE HIGHEST 2 DAILY POLLUTANT CONCENTRATIONS MEASURED IN 2003

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

Station	1st High	2nd High
Central / Western	122	111
Eastern	90	80
Kwai Chung	117	100
Kwun Tong	88	81
Sham Shui Po	145	127
Tsuen Wan	135	85
Sha Tin	81	57
Tai Po	74	69
Tung Chung	116	102
Yuen Long	85	73
Tap Mun	65	63
Causeway Bay	72	67
Central	66	64
Mong Kok	164	100

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

Station	1st High	2nd High
Central / Western	183	180
Eastern	150	138
Kwai Chung	210	181
Kwun Tong	184	167
Sham Shui Po	193	160
Tsuen Wan	194	166
Sha Tin	158	129
Tai Po	131	131
Tung Chung	166	156
Yuen Long	144	135
Tap Mun	60	54
Causeway Bay	200	178
Central	224	205
Mong Kok	214	193

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

Station	1st High	2nd High
Central / Western	215	186
Eastern	185	157
Kwai Chung	216	159
Kwun Tong	204	178
Sham Shui Po	227	182
Tsuen Wan	232	184
Sha Tin	171	150
Tai Po	192	172
Tung Chung	210	198
Yuen Long	227	207
Tap Mun	163	157
Causeway Bay	227	207
Central	257	183
Mong Kok	240	197

Pollutant: Nitrogen Oxides

Station	1st High	2nd High
Central / Western	410	379
Kwai Chung	595	479
Kwun Tong	425	391
Sham Shui Po	426	409
Tsuen Wan	379	296
Sha Tin	392	332
Tung Chung	255	219
Tap Mun	73	68
Causeway Bay	842	769
Central	887	758
Mong Kok	673	630

Pollutant: Nitric Oxide

Station	1st High	2nd High
Central / Western	196	164
Kwai Chung	252	211
Kwun Tong	177	169
Sham Shui Po	196	182
Tsuen Wan	121	113
Sha Tin	153	151
Tung Chung	66	64
Tap Mun	24	13
Causeway Bay	439	393
Central	434	391
Mong Kok	327	296

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

Station	1st High	2nd High
Central / Western	160	148
Kwai Chung	279	231
Kwun Tong	160	140
Sham Shui Po	179	171
Tsuen Wan	213	196
Sha Tin	168	162
Tai Po	263	213
Tung Chung	225	166
Yuen Long	389	324
Mong Kok	252	208

Pollutant: Ozone

Station	1st High	2nd High
Central / Western	134	125
Eastern	107	105
Kwai Chung	104	88
Kwun Tong	99	95
Sham Shui Po	81	79
Tsuen Wan	87	74
Sha Tin	134	117
Tai Po	109	107
Tung Chung	127	124
Yuen Long	120	90
Tap Mun	167	165

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

Station	1st High	2nd High
Tsuen Wan	2373	2301
Tung Chung	3821	3775
Tap Mun	2886	2845
Causeway Bay	3580	3508
Central	3583	3539
Mong Kok	4155	4054

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: 2003 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	20	17	12	19	14	18	15	20	20	15	19	23	18
Eastern	15	12	10	12	9	13	14	14	11	8	13	18	13
Kwai Chung	27	22	17	31	25	37	33	32	19	21	25	34	27
Kwun Tong	28	19	9	13	10	14	18	15	14	11	16	23	16
Sham Shui Po	26	20	13	25	19	22	22	25	19	16	22	16 *	21
Tsuen Wan	26	18 *						23 *	21	21	27	33	NA
Sha Tin	16	12	12	16	10	17	17	18	14	14	16	19	15
Tai Po	16	10	8	12	10	16	16	14	13	13	15	20	14
Tung Chung	27	17	13	14	13	11	5	8	15	18	31	37	17
Yuen Long	20	14	13	13	11	16	16	20	19	19	23	27	18
Tap Mun	14	8	8	9	8	10	10	10	15	16	19	22	12
Causeway Bay	24	18	15	20	12	15	21	18	16	15	17	23	18
Central	23	15	13	11	7	11	13	9	6	9	12	23	13
Mong Kok	22	21	14	20	19	23	16	19	21	22	28	29	21

Pollutant: Nitrogen Oxides

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	122	137	99	74	63	63	49	72	78	73	90	121	87
Kwai Chung	206	180	144	160	140	199	164	187	140	156	157	217	171
Kwun Tong	210	180	152	149	118	142	118	126	122	120	133	161	144
Sham Shui Po	183	173	143	139	113	109	88	122	122	119	139	155 *	132
Tsuen Wan	169	107 *						127 *	114	106	122	156	NA
Sha Tin	144	90	81	69	59	97	72	103	67	96	92	168	95
Tung Chung	106	81	69	44	38	40	28	52	49	68	84	116	65
Tap Mun	20	16	13	13	9	15	16	18	18	16	21	26	17
Causeway Bay	450	436	360	337	335	322	333	327	308	298	278	406	349
Central	380	386	331	316	273	328	317	330	300	368	376	419	344
Mong Kok	398	356	343	329	319	333	300	328	345	340	352	399	345

Pollutant: Nitric Oxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	34	49	26	22	15	17	19	23	18	9	16	26	23
Kwai Chung	75	73	54	64	52	81	76	82	52	51	54	77	66
Kwun Tong	71	66	52	52	40	54	52	50	42	32	41	49	50
Sham Shui Po	62	65	48	50	34	37	37	45	39	25	37	37 *	43
Tsuen Wan	54	29 *						51 *	35	22	33	43	NA
Sha Tin	52	32	23	20	16	31	28	39	18	27	27	61	31
Tung Chung	22	20	16	9	5	6	10	16	8	8	15	21	13
Tap Mun	1	2	2	2	1	3	4	4	2	2	3	3	2
Causeway Bay	217	220	173	164	159	158	182	173	151	126	123	186	169
Central	174	188	154	148	125	157	168	168	141	162	173	189	162
Mong Kok	180	168	159	155	148	160	157	168	167	146	159	176	162

Pollutant: Nitrogen Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	71	61	58	40	40	37	20	38	51	58	65	81	52
Eastern	74	60	58	53	54	51	31	43	54	63	66	79	57
Kwai Chung	91	68	61	62	61	75	48	63	61	78	74	99	70
Kwun Tong	102	79	73	69	57	60	39	49	57	70	70	87	68
Sham Shui Po	89	73	70	62	61	53	32	53	62	80	82	98 *	66
Tsuen Wan	86	64 *						49 *	60	73	72	91	NA
Sha Tin	65	41	45	38	34	49	29	43	40	54	51	75	47
Tai Po	66	43	42	40	41	54	37	47	49	66	61	84	52
Tung Chung	72	50	44	31	30	30	13	27	37	55	61	85	45
Yuen Long	84	59	59	50	50	49	31	49	56	72	70	89	60
Tap Mun	18	13	10	10	7	11	10	12	14	13	17	22	13
Causeway Bay	118	100	96	87	91	81	55	63	78	105	90	122	91
Central	114	98	97	90	82	88	60	73	85	120	111	130	96
Mong Kok	123	100	100	92	93	88	60	72	89	116	108	131	98

Pollutant: Carbon Monoxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tsuen Wan	810	620 *						330 *	320	340	780	1040	NA
Tung Chung	1200	1060	810	580	440	420	100	320	530	840	1030	1140	706
Tap Mun	1150	760	1130	560	950	560	610	470	580	720	990	1020	793
Causeway Bay	1490	1560	740	880	950	570	440	650	790	910	1120	1150	935
Central	1610	880	510	730	1370	1070	890	980	1040	1350	1360	1730	1129
Mong Kok	1670	1580	1670	1340	1460	1510	1110	1240	1460	1710	1750	2030	1544

Pollutant: Ozone

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	39	35	42	49	60	54	21	24	36	70	46	51	44
Eastern	42	32	43	36	56	44	26	27	36	56	43	56	42
Kwai Chung	27	25	29	30	35	19	7	8	24	46	32	33	26
Kwun Tong	33	29	32	32	40	28	13	16	28	53	39	45	32
Sham Shui Po	23	19	22	27	28	25	11	14	24	45	30	31 *	25
Tsuen Wan	30	27 *						15 *	28	50	35	32	NA
Sha Tin	40	42	43	46	51	24	14	15	40	55	44	39	38
Tai Po	54	51	48	53	56	41	35	31	42	58	48	40	46
Tung Chung	42	38	42	52	57	49	27	29	40	64	41	38	43
Yuen Long	27	24	22	31	41	33	18	23	32	52	35	30	31
Tap Mun	79	70	71	73	87	68	35	43	68	104	79	85	72

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: 2003 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	121	97	78	60	66	55	27	35	58	98	96	115	75
Kwai Chung	102	70	62	71	75	66	46	45	41	87	117	163	79
Kwun Tong		85	74	79	63	61	35	43	58	95	100	123	73
Sham Shui Po	131	105	88	74	79	64	34	45	64	109	98		80
Tsuen Wan	120	102 *						36 *	51	90	112	124	NA
Sha Tin	118	76	89	62	72	51	35 *	49 *	53	90	79	115	78
Tai Po	109	52	58	69	53	35	34	42	48	75	83	169	71
Tung Chung	102	59	52	60	60	42	31	44	42	90	104	156	70
Yuen Long	162	66	87	74	69	46	36	47	63	106	122	243	98
Mong Kok	155	127	133	118	106	89	65	70	93	141	123	173	116

Pollutant: Respirable Suspended Particulates (Annual AQO = 55)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	76	55	52	51	47	36	19	27	38	70	70	94	53
Eastern	69	49	47	48	45	33	19	25	37	65	64	87	49
Kwai Chung	80	56	50	54	53	48	28	35	41	69	67	92	56
Kwun Tong	78	57	51	53	48	40	25	32	40	69	69	90	54
Sham Shui Po	83	60	55	58	54	45	26	34	44	72	74	88 *	55
Tsuen Wan	81	55 *						33 *	41	71	71	96	NA
Sha Tin	74	50	47	49	47	42	26	33	39	67	66	96	53
Tai Po	81	52	50	51	47	40	24	33	38	69	67	94	54
Tung Chung	82	47	45	41	45	35	17	29	40	76	78	106	54
Yuen Long	94	56	53	51	51	43	24	33	45	80	83	118	61
Tap Mun	69	44	43	42	42	32	18	24	38	63	64	87	47
Causeway Bay	79	74	81	73	79	73	53	67	77	100	97	117	81
Central	93	69	69	73	62	63	50	58 *	75 *	107 *	98	112	77
Mong Kok	90	69	63	65	65	55	36	47	60	89	87	107	70

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: 2003 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	8649	98.7	4	6	10	18	38	60	95	129	11	18	446	122
Eastern	8315	94.9	3	5	8	13	24	41	74	97	8	13	237	90
Kwai Chung	8676	99.0	6	9	17	35	64	86	110	128	18	27	343	117
Kwun Tong	8615	98.3	4	6	9	19	31	48	77	97	11	16	193	88
Sham Shui Po	7921	90.4	5	8	12	20	48	77	117	145	13	21	295	145
Tsuen Wan	4068	46.4	9	11	17	29	49	68	104	127	19	NA	309	135
Sha Tin	8589	98.0	5	7	10	17	30	42	67	83	11	15	197	81
Tai Po	8248	94.2	3	5	8	15	27	43	75	97	9	14	192	74
Tung Chung	8479	96.8	2	4	9	21	43	62	89	116	10	17	291	116
Yuen Long	8371	95.6	3	5	11	22	37	53	86	115	11	18	336	85
Tap Mun	8455	96.5	4	5	8	15	27	36	45	55	9	12	203	65
Causeway Bay	8502	97.1	8	10	13	19	34	46	70	91	15	18	209	72
Central	8597	98.1	2	4	8	15	25	38	58	80	8	13	219	66
Mong Kok	8127	92.8	8	11	16	23	39	57	88	110	17	21	356	164

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	8592	98.1	20	37	66	105	162	222	370	494	61	87	1148	410
Kwai Chung	8670	99.0	45	91	145	223	320	393	495	584	134	171	1501	595
Kwun Tong	8555	97.7	41	81	127	185	254	314	399	510	116	144	1014	425
Sham Shui Po	7897	90.1	39	78	121	163	214	272	402	510	108	132	1295	426
Tsuen Wan	3984	45.5	38	76	119	167	233	289	378	448	108	NA	754	379
Sha Tin	8552	97.6	20	32	62	120	218	291	381	446	63	95	780	392
Tung Chung	8435	96.3	12	24	49	91	141	171	211	238	44	65	493	255
Tap Mun	8470	96.7	4	6	10	20	38	51	68	82	12	17	220	73
Causeway Bay	8444	96.4	135	218	323	447	584	689	838	945	301	349	1475	842
Central	8487	96.9	118	195	311	453	613	712	842	965	287	344	1980	887
Mong Kok	8549	97.6	147	258	348	429	507	565	656	743	313	345	1405	673

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	8592	98.1	2	3	10	24	52	81	164	241	11	23	636	196
Kwai Chung	8670	99.0	8	23	49	92	142	181	240	293	40	66	835	252
Kwun Tong	8555	97.7	6	19	38	67	105	134	181	228	32	50	531	177
Sham Shui Po	7897	90.1	4	17	34	54	83	113	186	248	28	43	743	196
Tsuen Wan	3984	45.5	3	12	28	51	81	112	154	190	22	NA	372	121
Sha Tin	8552	97.6	2	4	11	39	88	129	179	214	13	31	419	153
Tung Chung	8435	96.3	1	2	5	15	37	53	73	86	7	13	186	66
Tap Mun	8470	96.7	0	1	2	2	4	8	13	18	2	2	96	24
Causeway Bay	8444	96.4	51	92	150	226	309	368	451	517	136	169	792	439
Central	8487	96.9	39	78	138	223	316	377	452	518	122	162	1082	434
Mong Kok	8549	97.6	55	108	160	208	256	289	347	404	139	162	800	327

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	8592	98.1	14	25	47	70	95	115	144	166	40	52	321	183
Eastern	8316	94.9	24	36	55	74	92	106	125	143	50	57	284	150
Kwai Chung	8670	99.0	30	45	62	86	120	146	177	198	61	70	331	210
Kwun Tong	8555	97.7	28	42	62	86	112	130	160	192	59	68	303	184
Sham Shui Po	7897	90.1	26	39	61	86	109	125	147	162	57	66	324	193
Tsuen Wan	3984	45.5	30	46	68	96	126	144	168	188	65	NA	352	194
Sha Tin	8552	97.6	15	24	39	60	91	113	137	155	37	47	279	158
Tai Po	8248	94.2	24	32	45	65	92	113	137	152	45	52	247	131
Tung Chung	8435	96.3	8	19	37	62	93	114	137	154	31	45	298	166
Yuen Long	8371	95.6	25	36	53	76	103	124	147	161	51	60	267	144
Tap Mun	8470	96.7	2	4	8	17	31	40	53	64	8	13	170	60
Causeway Bay	8444	96.4	46	62	86	115	140	156	178	201	82	91	334	200
Central	8487	96.9	46	64	91	121	151	171	193	213	87	96	348	224
Mong Kok	8549	97.6	53	67	93	124	149	165	184	200	90	98	334	214

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	4064	46.4	230	350	580	920	1150	1380	1610	1840	539	NA	3110	2373
Tung Chung	8477	96.8	160	360	630	1000	1310	1520	1780	1930	552	706	4680	3821
Tap Mun	8487	96.9	390	510	710	1030	1320	1480	1610	1690	713	793	3510	2886
Causeway Bay	8439	96.3	350	580	920	1270	1610	1730	2070	2300	819	935	4140	3580
Central	8524	97.3	460	690	1030	1490	1960	2180	2530	2760	979	1129	4260	3583
Mong Kok	8470	96.7	920	1150	1490	1840	2180	2300	2640	2880	1448	1544	4710	4155

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	8570	97.8	9	17	34	65	94	111	129	141	31	44	232	134
Eastern	8289	94.6	17	25	37	55	74	84	99	108	36	42	177	107
Kwai Chung	8640	98.6	2	5	17	40	64	80	98	112	14	26	188	104
Kwun Tong	8559	97.7	6	11	25	48	71	85	100	110	23	32	203	99
Sham Shui Po	7925	90.5	4	7	16	34	59	74	95	108	16	25	199	81
Tsuen Wan	4041	46.1	7	12	26	47	71	84	103	122	24	NA	192	87
Sha Tin	8337	95.2	3	6	24	64	94	109	126	137	19	38	279	134
Tai Po	8248	94.2	16	22	37	64	92	106	122	133	38	46	250	109
Tung Chung	8437	96.3	5	16	34	61	93	113	140	177	28	43	303	127
Yuen Long	8371	95.6	6	11	21	42	69	87	113	134	21	31	218	120
Tap Mun	8434	96.3	19	38	65	102	132	152	174	188	55	72	310	167

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	8657	98.8	16	26	46	71	98	118	137	155	43	53	356	215
Eastern	8593	98.1	16	25	43	66	91	107	126	143	40	49	289	185
Kwai Chung	8678	99.1	23	33	49	72	99	119	141	157	48	56	346	216
Kwun Tong	8450	96.5	21	31	48	71	97	116	134	148	46	54	339	204
Sham Shui Po	8011	91.4	22	32	48	72	96	114	133	147	47	55	348	227
Tsuen Wan	4074	46.5	26	41	63	89	119	138	170	207	59	NA	381	232
Sha Tin	8234	94.0	20	30	46	69	96	114	135	151	45	53	338	171
Tai Po	8492	96.9	19	29	45	71	98	117	141	167	44	54	320	192
Tung Chung	8425	96.2	15	23	43	72	107	134	161	192	41	54	458	210
Yuen Long	8557	97.7	20	30	51	79	116	140	172	193	49	61	377	227
Tap Mun	8476	96.8	15	22	40	64	88	107	127	144	38	47	336	163
Causeway Bay	7999	91.3	37	55	77	101	127	144	168	187	72	81	352	227
Central	7033	80.3	36	49	71	97	126	145	170	193	69	77	344	257
Mong Kok	8588	98.0	30	44	64	88	116	134	155	167	61	70	394	240

Note:

1. All concentration units are in micrograms per cubic metre.

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

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

TABLE C6: 2003 TOTAL WET AND DRY DEPOSITION

(a) WET DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong	Yuen Long
	WET DEPOSITION (TON/HA)	21136	20156	16536
	WEIGHTED MEAN pH (based on volume-weighted mean hydrogen ion concentrations ($[H^+]$)	4.58	4.63	4.58
	WEIGHTED MEAN pH (based on volume-weighted mean pH)	4.94	5.08	4.92
	NO. OF SAMPLES	89	82	81
Filtrate (Kg/Ha)	**NH_4^+**	6.34	5.60	5.50
	NO_3^-	19.57	18.94	17.86
	$SO_4^=$	39.09	33.08	28.13
	Cl^-	50.58	36.69	17.25
	F^-	0.61	0.52	0.57
	Na^+	27.21	20.47	9.91
	K^+	5.30	5.08	4.13
	Formate	4.53	4.33	3.65
	Acetate	4.26	4.13	3.32
	Ca^{++}	4.28	4.06	3.23
	Mg^{++}	3.17	2.20	1.17

(b) DRY DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong	Yuen Long
	NO. OF SAMPLES	26	25	26
Filtrate (Kg/Ha)	**NH_4^+**	0.43	0.79	0.26
	NO_3^-	11.45	12.19	8.73
	$SO_4^=$	13.97	14.09	12.61
	Cl^-	19.62	17.56	7.21
	F^-	0.155	0.157	0.248
	Na^+	11.53	9.79	4.14
	K^+	1.00	1.06	0.69
	Formate	0.20	0.22	0.20
	Acetate	0.20	0.19	0.20
	Ca^{++}	8.60	9.74	8.92
	Mg^{++}	1.49	1.33	0.70

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

TABLE C7: 2003 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	14	13	13	15	13	13	14	16	19	19	20	20	19	21	22	23	24	22	20	19	19	17	17	15
Eastern	10	10	10	10	9	9	10	12	13	13	16	15	15	14	14	15	14	14	13	13	14	14	12	11
Kwai Chung	21	21	21	21	20	18	18	22	26	30	31	32	31	34	34	35	36	36	34	31	28	24	23	22
Kwun Tong	13	12	12	13	12	12	12	15	17	19	20	19	18	17	18	19	18	18	17	16	15	15	15	14
Sham Shui Po	15	15	15	17	17	17	18	19	21	22	23	23	23	24	25	24	24	26	27	25	22	21	20	18
Tsuen Wan	18	18	18	17	17	17	18	19	24	27	27	27	29	32	34	35	36	35	32	29	25	23	21	19
Sha Tin	11	10	10	11	10	10	11	12	14	17	18	17	17	18	18	20	21	21	20	18	16	15	14	12
Tai Po	11	11	10	10	10	10	11	13	16	16	15	15	14	15	15	15	16	17	17	16	16	14	13	12
Tung Chung	13	12	12	14	13	12	12	14	16	20	22	23	25	25	25	24	23	21	19	17	16	15	14	14
Yuen Long	12	12	12	11	12	12	13	16	20	23	23	24	23	21	22	26	27	25	20	17	15	14	14	13
Tap Mun	10	10	10	12	11	12	12	14	16	18	18	17	15	13	12	11	11	11	10	10	10	10	10	10
Causeway Bay	15	14	14	14	13	13	15	18	23	25	24	22	19	21	22	22	21	20	18	17	17	15	16	16
Central	9	9	8	11	9	8	9	10	15	15	14	15	15	15	16	16	16	15	14	15	13	12	12	11
Mong Kok	18	16	16	17	16	17	18	20	22	23	25	24	23	25	25	26	27	26	26	25	23	21	20	20

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	75	55	49	41	39	41	55	91	120	119	104	93	87	87	90	94	97	103	113	118	112	103	98	88
Kwai Chung	139	94	77	69	65	77	140	208	248	239	198	179	168	177	185	198	212	223	243	224	197	184	180	172
Kwun Tong	124	78	64	53	52	65	129	189	210	200	177	160	145	142	154	159	175	190	199	185	155	146	148	143
Sham Shui Po	119	79	68	60	60	69	116	164	181	171	153	141	133	137	137	145	152	163	174	167	154	145	144	137
Tsuen Wan	113	68	53	46	43	50	102	156	195	186	153	143	136	144	149	152	161	185	192	176	152	147	146	137
Sha Tin	109	83	72	62	58	62	94	133	134	103	81	69	60	61	67	77	85	97	120	130	130	127	129	124
Tung Chung	71	51	39	37	37	44	64	76	79	78	73	71	68	66	62	60	61	69	77	76	75	71	72	73
Tap Mun	16	16	16	17	17	18	19	20	23	24	23	20	16	14	13	12	13	13	14	15	15	15	15	15
Causeway Bay	314	236	207	175	156	151	245	381	443	446	406	385	355	395	393	410	412	418	435	432	417	400	418	374
Central	262	198	167	140	140	143	224	374	510	481	425	408	385	379	391	404	407	433	447	443	421	383	368	337
Mong Kok	334	207	190	165	157	156	305	418	444	424	369	333	330	355	385	395	430	452	454	404	367	384	415	420

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	20	14	12	10	9	9	14	27	41	40	32	26	22	21	20	21	20	22	26	31	30	28	27	23
Kwai Chung	52	30	23	20	19	24	56	92	114	107	82	69	62	62	65	71	77	84	96	88	75	70	71	68
Kwun Tong	41	21	16	13	12	17	46	77	89	83	69	58	50	47	51	52	58	65	69	64	51	48	50	48
Sham Shui Po	38	22	18	15	15	19	40	65	74	67	56	49	43	43	41	44	46	50	56	54	49	46	47	45
Tsuen Wan	29	12	8	7	6	8	28	56	79	72	53	45	39	39	38	37	40	51	56	50	41	40	41	39
Sha Tin	41	28	23	19	17	18	35	55	55	36	25	19	15	15	16	18	20	25	36	43	45	46	49	47
Tung Chung	17	9	5	5	5	8	17	23	23	21	18	16	13	11	9	8	8	9	11	12	14	13	16	17
Tap Mun	2	2	2	2	2	2	2	3	5	5	5	4	3	2	2	2	2	2	2	1	2	2	2	2
Causeway Bay	149	106	91	75	65	63	117	195	229	229	204	188	169	189	186	194	197	202	214	213	207	197	208	185
Central	119	84	67	54	54	57	100	186	265	246	210	196	180	175	180	186	189	206	217	212	202	183	175	159
Mong Kok	159	88	80	66	62	61	148	213	228	212	175	151	146	158	173	178	199	214	217	190	171	183	204	209

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	45	35	31	26	25	26	35	49	57	58	55	54	53	56	59	63	66	70	73	71	67	61	57	52
Eastern	52	43	36	32	31	35	50	62	64	63	61	59	58	59	62	66	72	74	75	73	68	66	62	59
Kwai Chung	60	48	41	38	37	40	54	67	74	76	74	73	74	82	87	90	94	95	96	90	82	76	72	67
Kwun Tong	62	45	39	34	33	39	59	71	74	74	71	70	69	70	76	80	87	92	93	87	78	73	72	69
Sham Shui Po	60	46	41	37	37	40	55	65	69	68	67	67	68	72	74	78	81	86	89	85	79	74	72	68
Tsuen Wan	68	49	41	35	34	38	59	70	75	76	73	74	77	85	92	96	101	107	107	100	90	85	83	78
Sha Tin	47	40	36	33	32	33	41	49	51	47	43	40	37	39	42	49	54	60	64	64	61	58	55	51
Tai Po	53	46	40	36	35	39	48	57	57	51	45	42	41	42	44	47	56	69	77	77	71	65	62	58
Tung Chung	45	37	31	30	29	32	38	41	43	46	45	47	48	49	48	48	49	56	60	58	54	51	48	47
Yuen Long	56	50	42	38	37	40	49	59	60	58	57	56	54	56	60	67	76	82	84	80	74	69	64	61
Tap Mun	13	13	13	14	14	15	15	15	16	16	16	14	12	10	10	9	10	11	12	12	13	13	13	13
Causeway Bay	85	74	69	61	57	55	67	83	93	95	95	98	96	106	109	113	111	110	108	106	101	98	100	92
Central	81	70	65	57	58	57	71	90	104	105	104	109	109	112	115	119	118	118	116	119	112	103	100	94
Mong Kok	90	72	69	64	62	62	79	92	96	101	100	102	106	113	120	123	125	125	122	113	105	103	104	101

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	630	550	530	510	510	510	580	660	720	690	650	610	590	620	640	640	670	700	770	770	730	720	710	670
Tung Chung	670	670	670	670	670	680	690	710	730	740	730	730	740	750	730	720	710	710	720	720	710	700	700	690
Tap Mun	780	780	780	790	790	790	810	830	830	830	820	820	810	800	790	780	780	780	770	780	780	780	780	780
Causeway Bay	980	960	920	840	760	690	670	760	910	980	1000	970	940	980	960	980	970	990	1050	1080	1080	1060	1020	920
Central	1000	880	840	790	760	770	850	940	1120	1280	1290	1230	1200	1230	1280	1300	1290	1340	1370	1320	1400	1330	1200	1120
Mong Kok	1520	1500	1460	1380	1360	1390	1440	1450	1490	1480	1470	1540	1530	1560	1630	1670	1720	1670	1670	1680	1650	1630	1630	1570

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	43	51	53	55	56	53	43	31	27	31	39	47	54	57	57	55	50	43	36	34	34	36	37	39
Eastern	40	43	46	48	48	44	35	31	32	35	40	45	51	53	51	50	46	43	40	37	38	37	38	37
Kwai Chung	24	33	37	37	38	34	23	16	15	18	26	31	35	34	34	31	27	22	18	17	19	20	21	21
Kwun Tong	30	40	44	47	46	40	25	19	19	24	30	36	42	45	42	40	34	27	22	23	26	27	26	26
Sham Shui Po	21	32	35	36	36	32	19	13	14	18	24	29	34	35	36	33	27	20	15	14	16	16	16	17
Tsuen Wan	24	38	44	47	47	41	22	16	18	25	36	43	50	52	53	51	43	31	20	18	20	20	19	20
Sha Tin	29	32	33	34	33	30	23	20	24	33	43	52	61	65	64	59	52	43	35	30	29	28	28	27
Tai Po	36	39	40	41	41	37	31	29	35	45	56	66	72	75	76	72	64	50	40	36	36	37	36	36
Tung Chung	30	36	39	39	38	34	27	26	29	35	43	51	61	71	77	78	71	55	42	36	33	33	32	31
Yuen Long	22	23	27	29	28	25	20	18	21	28	37	48	57	59	58	52	43	31	22	20	20	20	21	21
Tap Mun	62	58	57	55	53	50	49	51	56	61	71	82	91	97	99	100	99	95	88	80	75	70	67	64

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	47	46	45	45	44	45	47	51	55	57	56	56	55	57	58	58	58	59	59	59	57	54	52	50
Eastern	44	43	42	42	42	42	43	46	50	53	53	53	52	52	56	57	58	57	54	52	50	48	46	45
Kwai Chung	49	46	46	46	46	47	51	55	59	59	58	57	57	60	60	64	66	65	66	65	62	58	54	51
Kwun Tong	48	46	45	44	44	45	48	53	58	60	59	58	56	57	59	60	62	63	62	61	57	53	52	51
Sham Shui Po	49	46	46	45	45	46	49	53	55	57	58	58	57	58	60	61	63	64	66	66	62	56	54	52
Tsuen Wan	61	59	57	56	56	57	60	65	69	71	69	70	69	77	81	82	83	84	83	80	75	70	67	64
Sha Tin	49	46	45	44	43	44	47	51	56	57	56	54	52	55	59	60	63	61	60	59	57	55	53	51
Tai Po	51	49	49	47	47	47	51	56	57	57	57	56	54	54	54	53	55	55	58	59	58	56	54	52
Tung Chung	47	45	44	44	44	45	46	48	53	56	58	60	62	67	69	67	64	62	58	54	53	51	50	49
Yuen Long	53	51	50	48	49	50	54	61	64	67	66	65	64	66	67	68	69	69	68	67	64	61	59	56
Tap Mun	44	44	43	43	43	44	46	47	48	50	50	51	50	49	48	49	49	50	48	48	47	46	45	45
Causeway Bay	71	58	54	50	49	51	60	72	82	87	83	85	85	94	94	96	99	101	102	105	101	93	89	80
Central	66	63	62	60	59	58	60	67	81	87	90	86	78	84	92	88	91	94	85	86	86	83	81	77
Mong Kok	59	52	50	49	49	51	59	69	74	76	76	74	73	77	77	78	81	83	85	85	80	75	71	67

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

TABLE C8: 2003 AMBIENT LEVELS OF TOXIC AIR POLLUTANTS

Toxic Air Pollutants	Concentration Unit	Annual Averages [1]	
		Tsuen Wan [4]	Central/Western
Heavy Metals [2]			
Hexavalent chromium	ng/m^3	0.18	0.19
Lead	ng/m^3	NA	70
Organic Substances			
Benzene	$\mu g/m^3$	2.08	1.33
Benzo[a]pyrene	ng/m^3	0.45	0.26
1,3-Butadiene	$\mu g/m^3$	0.26	0.17
Formaldehyde	$\mu g/m^3$	6.92	6.10
Perchloroethylene	$\mu g/m^3$	0.74	1.33
Dioxins [3]	pgI-TEQ/m^3	0.071	0.066

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 2003 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

[4] No TAP sampling was conducted from 8 February to 28 June 2003 because of the construction works at the Tsuen Wan station during the period. The annual averages shown are calculated from all the valid results measured at Tsuen Wan in 2003.

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

Appendix D

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

Figure D1 LOCATION OF HEC & CLP AIR QUALITY MONITORING STATIONS FOR SULPHUR DIOXIDE AND NITROGEN DIOXIDE

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	16	9 - 22
Chung Hom Kok	6	2 - 14
Victoria Road	14	7 - 23
Queen Mary Hospital	13	7 - 22
Ap Lei Chau	8	2 - 18
Pak Kok San Tsuen	10	4 - 19
Nitrogen Dioxide (NO_2)		
Mount Austin Road	25	9 - 43
Chung Hom Kok	20	11 - 29
Victoria Road	29	6 - 61
Queen Mary Hospital	30	12 - 54
Ap Lei Chau	24	10 - 44
Pak Kok San Tsuen	23	7 - 44

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	33	17 - 76
Hung Shui Kiu	12	10 - 20
Tin Shui Wai [4]	---	36 - 58
Au Tau	31	19 - 55
Butterfly Estate	17	9 - 32
Nitrogen Dioxide (NO_2) [3]		
San Hui	60	27 - 98
Tin Shui Wai [4]	---	52 - 59
Butterfly Estate	47	17 - 80

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] San Hui and Butterfly Estate both recorded 2 count of exceedance of 24-hr AQO limit.

[4] Monitoring resumed in November 2003. Data not sufficient for the calculation of annual average in the year.