AIR QUALITY
IN HONG KONG 2000

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 (2000) (AQMN)

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Summary

The overall air quality in Hong Kong in year 2000 was better than that in 1999, with noticeable reduction in most of the air pollutants measured at most stations. The percentage of monitoring stations complying with the long-term Air Quality Objectives (AQO) also increased in the year. The improving trend in air quality reflects that, apart from the weather factor which varies from year to year, air pollution control measures launched by the Government in recent years have been taking effect.

Notwithstanding the improvement, respirable suspended particulates and nitrogen dioxide still breached their long-term AQO and occasionally breached their short-term AQO, for roadside monitoring stations. Exceedance of AQO for ozone was observed in Tung Chung station. Although on a reducing trend, total suspended particulates levels remained high in a couple of stations in 2000.

It was good to see that sulphur dioxide, carbon monoxide and lead continued to remain at levels well within their respective AQO limits in 2000.

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1. Introduction

The Environmental Protection Department (EPD) operated in 2000 a network of fourteen air quality monitoring stations for measuring major air pollutants. It contains 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 area type classification of monitoring stations).

The network also collects samples at the Tsuen Wan and Central/Western monitoring stations to measure the ambient levels of potentially important Toxic Air Pollutants in Hong Kong, in addition to monitoring the major air pollutants.

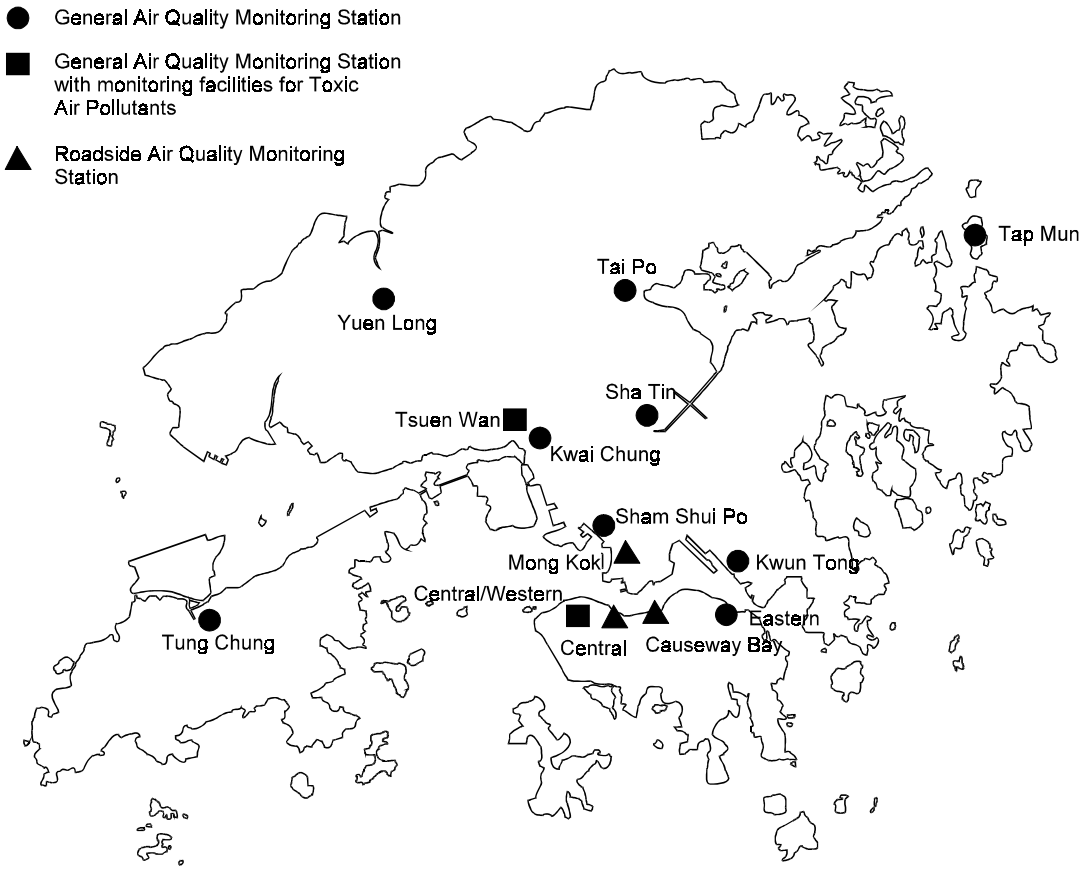


FIGURE 1 LOCATION OF EPD's AIR QUALITY MONITORING STATIONS (2000)

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 2000 are at Appendix A.

2. Air Quality Objectives and their Compliance Status

Established in 1987, the Hong Kong Air Quality Objectives (HKAQO) for 7 major air pollutants were set at levels to protect the public health. Over the years, the compliance status of the AQO has been used as the indicator of the air quality in different districts in Hong Kong.

Table 1: Hong Kong Air Quality Objectives

Concentration in micrograms per cubic metre [1]

Pollutant	Averaging Time				
	1 hr[2]	**8 hrs[3]**	**24 hrs[3]**	**3 mths[4]**	**1 yr[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 means 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 2: Percentage Time in compliance with Short-Term Air Quality Objectives in 2000†

Station		Ozone	Nitrogen Dioxide		Total Suspended Particulates	Respirable Suspended Particulates
		1-hour	**1-hour**	**24-hour**	**24-hour**	**24-hour**
General Station	Central/Western	100	99.96	99.72	100	99.17
	Eastern	100	100	99.70	--	100
	Kwai Chung	100	100	99.72	100	99.45
	Kwun Tong	100	100	99.62	100	99.72
	Sham Shui Po	100	100	99.72	100	99.73
	Tsuen Wan	100	100	99.72	100	100
	Sha Tin	99.98	100	100	100	100
	Tai Po	100	100	99.69	100	100
	Tung Chung	99.92	100	100	100	100
	Yuen Long	100	100	100	98.33	100
	Tap Mun	99.99	100	100	--	100
Roadside Station	Causeway Bay	--	99.99	97.77	--	99.44
	Central	--	99.90	97.16	--	99.72
	Mong Kok *	--	100	98.87	97.44	99.43

Notes: "--" *Not measured*
"*" *The Mong Kok station has only three representative quarters of air quality data.*
"†" *For those stations with sufficient data, sulphur dioxide, carbon monoxide and lead all complied with their relevant short-term AQO.*

Compliance with the short-term AQO

Table 2 shows the percentage in compliance with the short-term AQO (i.e. 1-hr, 8-hr or 24-hr). For NO_2, the compliance percentages for 24-hr AQO were better than 97% at all stations, and for 1-hr AQO were better than 99.9% with 11 stations at 100% compliance. Regarding RSP, the compliance percentages for 24-hr AQO were over 99% for all measured stations. The same compliance level was observed in 1-hr AQO for O_3**.** For TSP, 8 stations recorded 100% compliance rate for 24-hr AQO. The compliance percentages for the short-term AQO of SO_2, CO and lead not shown in Table 2 all achieved 100% at measured stations.

Compliance with the long-term AQO

Table 3 shows that all general stations were in compliance with the long-term (annual) AQO for RSP and NO_2 except Yuen Long station which RSP level just breached the annual AQO. However, non-compliance of annual AQO for NO_2 and RSP were still observed at the 3 roadside stations in 2000. Regarding TSP, 6 out of 10 stations complied with annual AQO in 2000, compared with 3 out of 9 stations in 1999.

Overall in 2000, the compliance rate with long-term AQO for all pollutants was recorded at 8 stations, compared with 5 stations in 1999. The improvement in the compliance rate reflects that, apart from the weather factor which changes from year to year, various air pollution control measures launched by the Government have been taking effect.

Table 3: Compliance Status of Long-Term (Annual) Air Quality Objectives in 2000†

Station		Nitrogen Dioxide	Respirable Suspended Particulates	Total Suspended Particulates
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*

"~" *Insufficient data for assessment of compliance*

"†" *For those stations with sufficient data, sulphur dioxide, carbon monoxide and lead all complied with the relevant Long-term AQO.*

"*" *The Mong Kok station has only three representative quarters of air quality data.*

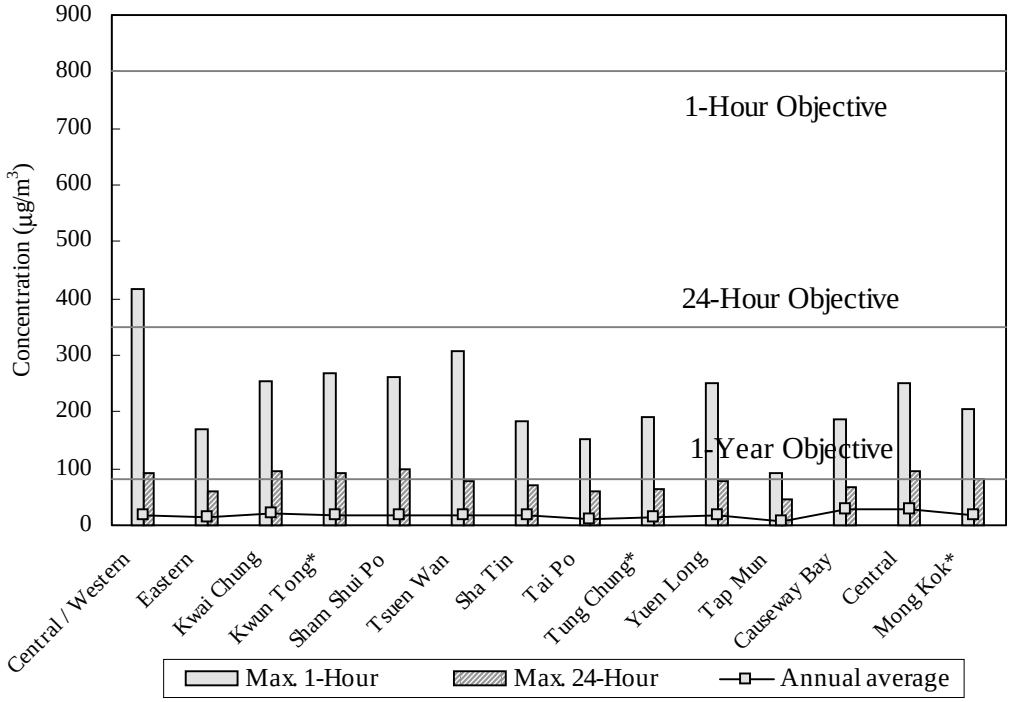
3. Gaseous Pollutants

3.1 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 in terms of roadside air quality because of their close proximity to the pedestrians.

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 2: Sulphur Dioxide Monitoring 2000



Note: The asterisked stations do not have adequate data for assessment of AQO compliance in the year.

Sulphur dioxide was continuously measured at all 14 stations in the monitoring network during 2000. Due to past control efforts, the ambient concentrations of SO_2 still maintained at very low levels in 2000. All of the 14 stations complied with AQO for SO_2 during the year. The highest 1-hour average (416 $\mu g/m^3$) and the highest 24-hour average (100 $\mu g/m^3$) were measured at the urban stations in Central/Western and Sham Shui Po respectively, while the highest annual average (28 $\mu g/m^3$) was recorded at both the roadside stations at Central and Causeway Bay. All of the readings were well below their respective AQO limits.

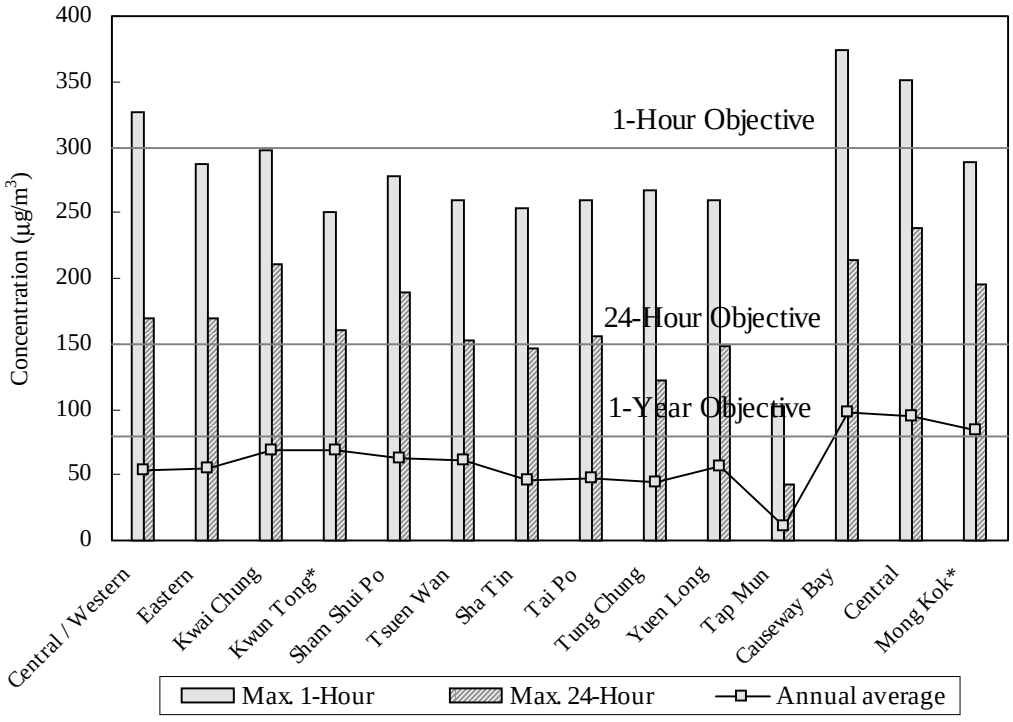
3.2 Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2) is formed from oxidation of nitric oxide (NO) emitted from fuel combustion. Power station and motor vehicles (diesel vehicles in particular) are the two major sources of NO_2 in Hong Kong. NO_2 emissions from motor vehicles are of great concern due to their direct influence on the roadside air quality. Long-term exposures 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 2000. In 2000, there were total 9 counts and 3 counts of 1-hr AQO exceedance for roadside stations and general stations respectively, with the highest 1-hour average (374 $\mu g/m^3$) recorded at Causeway Bay. There were 21 counts and 7 counts of 24-hr AQO exceedance for roadside stations and general stations respectively, with the highest 24-hr average (238 $\mu g/m^3$) recorded at Central roadside station.

The overall annual average of all stations was 61 $\mu g/m^3$, which was 6.2% lower than the 1999 value of 65 $\mu g/m^3$. Same as last year, all general stations complied with the annual AQO for NO_2 while non-compliance was still observed at the 3 roadside stations in 2000. The highest annual average (98 $\mu g/m^3$) was measured at Causeway Bay roadside station.

Figure 3: Nitrogen Dioxide Monitoring 2000

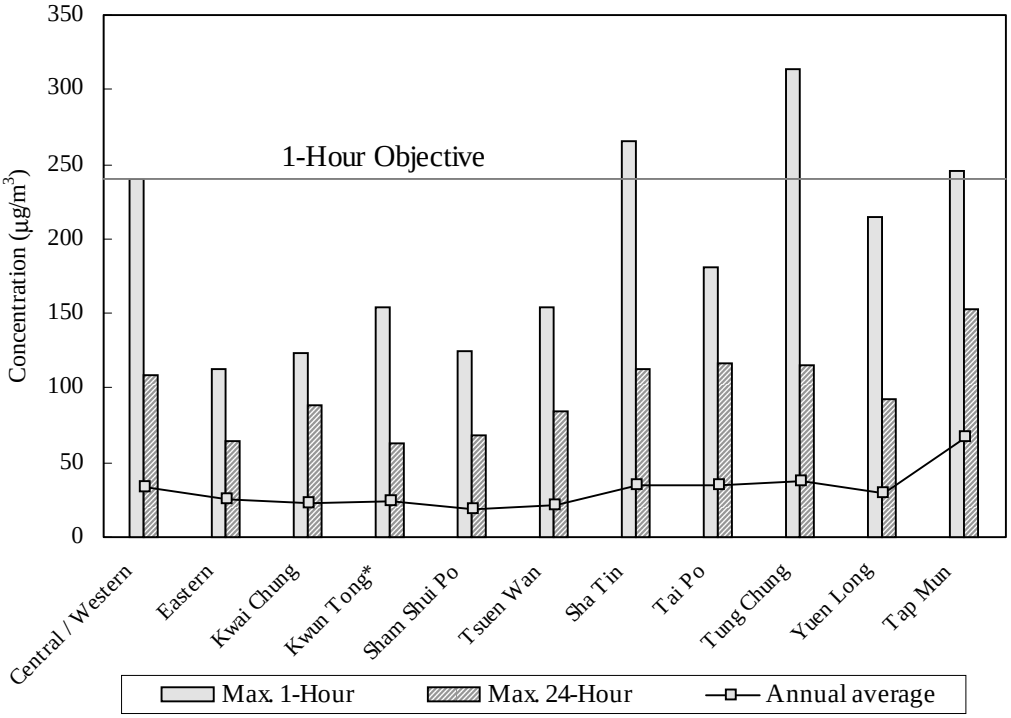


3.3 Ozone (O_3)

Ozone (O_3), a major constituent of photochemical smog, is formed by a series of complicated photochemical reactions of oxygen, nitrogen oxides and reactive 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 11 general monitoring stations during 2000. Tung Chung Station recorded 7 counts of exceedance of 1-hr AQO limit and was the only station breaching the AQO for ozone. The highest 1-hr average (314 $\mu g/m^3$) was also recorded at Tung Chung station in 2000. Sha Tin station and Tap Mun station recorded 2 counts and 1 count of exceedance of 1-hr AQO limit, with the highest values of 265 $\mu g/m^3$ and 246 $\mu g/m^3$ respectively during the year.

Figure 4: Ozone Monitoring 2000

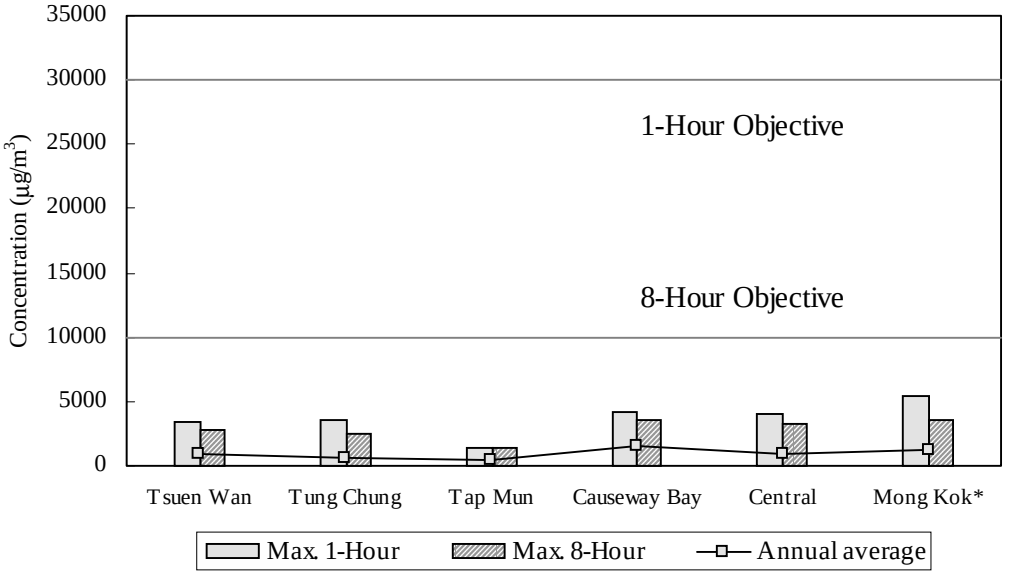


3.4 Carbon Monoxide (CO)

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 monitored at 6 stations including 3 roadside stations and 3 general stations during 2000. Similar to previous years, both the ambient and roadside CO concentrations continued to maintain at very low levels in 2000. 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 both measured at the Mong Kok roadside station, of about one sixth and one third of the respective AQO limits.

Figure 5: Carbon Monoxide Monitoring 2000

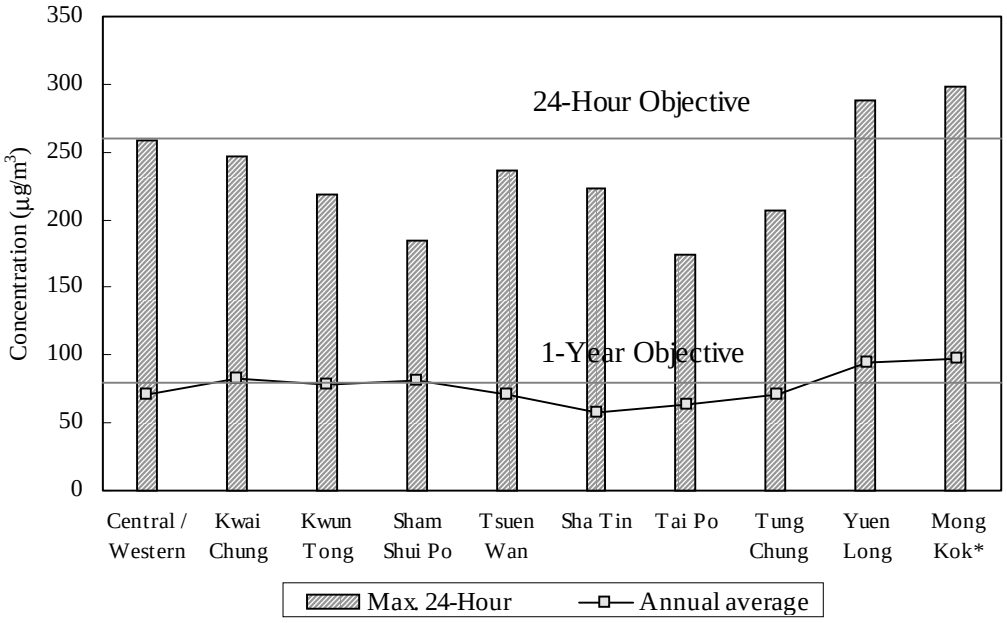


4. Suspended Particulates

4.1 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 4.2 below). On the other hand, suspended particulates that are larger than 10 micrometres in diameter are mainly related to soiling and dust nuisance.

Figure 6: TSP Monitoring 2000



TSP measurement was conducted by using High-volume sampling at 9 general and 1 roadside stations during 2000. The highest 24-hr average (299 $\mu g/m^3$) was measured at Mong Kok roadside station, whilst second highest (288 $\mu g/m^3$) was recorded at Yuen Long station. Both of these stations recorded one exceedance of the 24-hr AQO limit for TSP.

In 2000, the overall annual average for all stations was 77 $\mu g/m^3$, which was 10.5% lower than the 1999 value of 86 $\mu g/m^3$. The highest annual average (97 $\mu g/m^3$) was again measured at Mong Kok roadside station. Exceedance of annual AQO were also observed at Yuen Long (95 $\mu g/m^3$), Kwai Chung (82 $\mu g/m^3$) and Sham Shui Po (81 $\mu g/m^3$) stations.

4.2 Respirable Suspended Particulates (RSP)

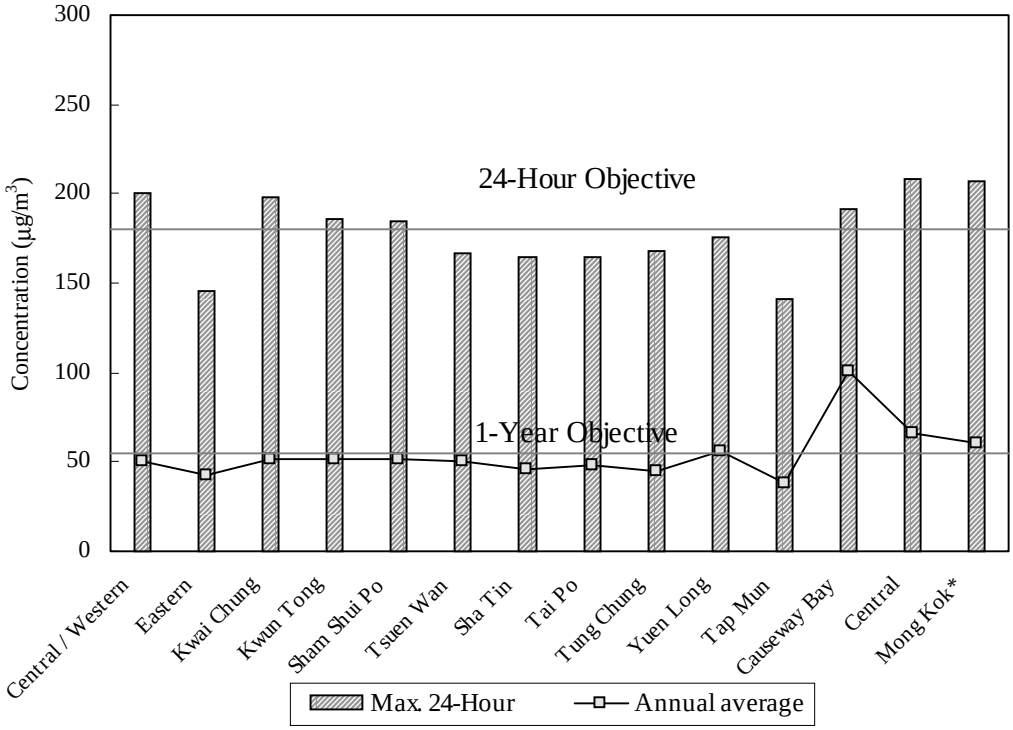
Respirable suspended particulates (RSP) refer to those suspended particulates with nominal aerodynamic diameters of 10 micrometres or less. Combustion sources, in particular diesel vehicle exhaust, are the major sources of RSP. Besides, RSP can be formed by atmospheric oxidation of sulphur dioxide and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

RSP at high level 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 will also have a major impact on visibility.

RSP was measured at all 14 stations in the monitoring network in 2000. Most of these stations were also equipped with high-volume sampler to collect particulate samples for chemical analysis. In 2000, the highest 24-hr average (208 μg/m^3) was recorded at Central roadside station. The second highest 24-hr average (207 μg/m^3) was measured at Mong Kok roadside station. There were 5 counts and 7 counts of exceedance of 24-hr AQO limit for roadside and general stations respectively in the year. Causeway Bay, Mong Kok, Central/Western and Kwai Chung stations recorded violation of its 24-hr AQO.

In 2000, the overall annual average for all stations was 54 μg/m^3, which was 8.5% lower than the 1999 value of 59 μg/m^3. The highest annual average (101 μg/m^3) was recorded at Causeway Bay roadside station. Other two roadside stations, Central and Mong Kok also breached annual AQO for RSP, with annual average of 66 μg/m^3 and 60 μg/m^3 respectively. Yuen Long station was the only general station which violated the annual AQO for RSP, with an annual average of 56 μg/m^3 which just exceeded the AQO limit.

Figure 7: RSP Monitoring 2000



4.3 Lead (Pb)

Lead is the only one AQO pollutant that is also a toxic air pollutant. To lessen the threat of airborne lead, the sale and supply of leaded petrol, which is a known major source of lead, was banned in Hong Kong from 1 April 1999. The ambient lead concentration continued to linger at a very low level during 2000. The overall 3-month averages ranged from 30 ng/m^3 (second quarter) to 91 ng/m^3 (fourth quarter) and were well within the relevant AQO limit of 1,500 ng/m^3.

5. Toxic Air Pollutants

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 2000, 10 of them are considered more important in terms of their health impacts and their annual averages are summarised in Table C10. Detailed description of the monitoring operation is given in Appendix B.4. The monitoring data collected so far indicate that the level of toxic air pollutants in Hong Kong is comparable to those observed in other major cities.

6. Variation of Air Pollution Levels over Time

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

6.1 Over a Day

The concentrations of most air pollutants follow closely 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. The pollutant levels measured at the roadside station are generally higher than those measured at the urban station, which is followed in turn by the rural station.

Figure 8: 2000 Diurnal variations of NO_2

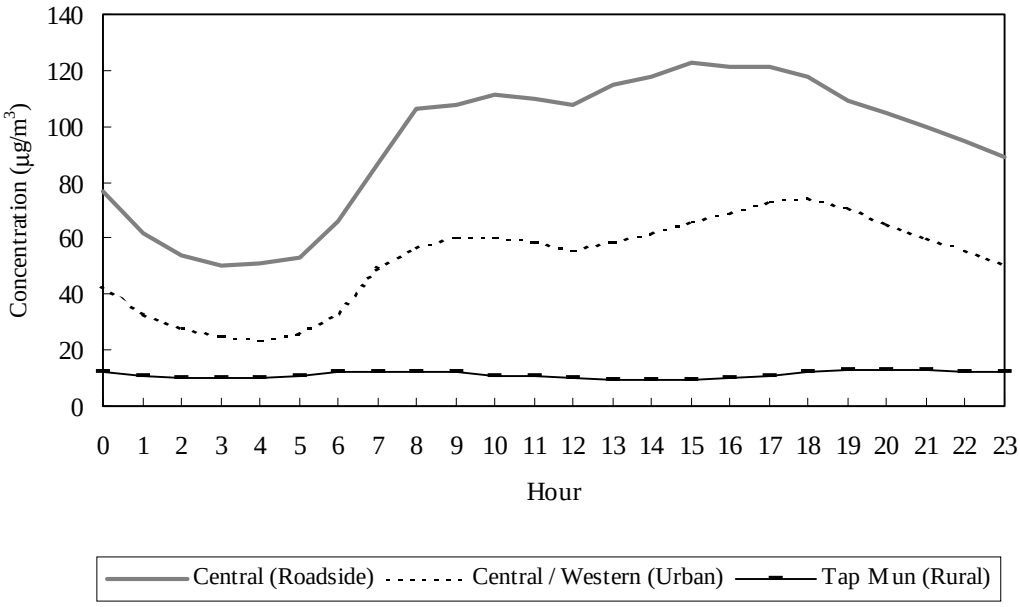
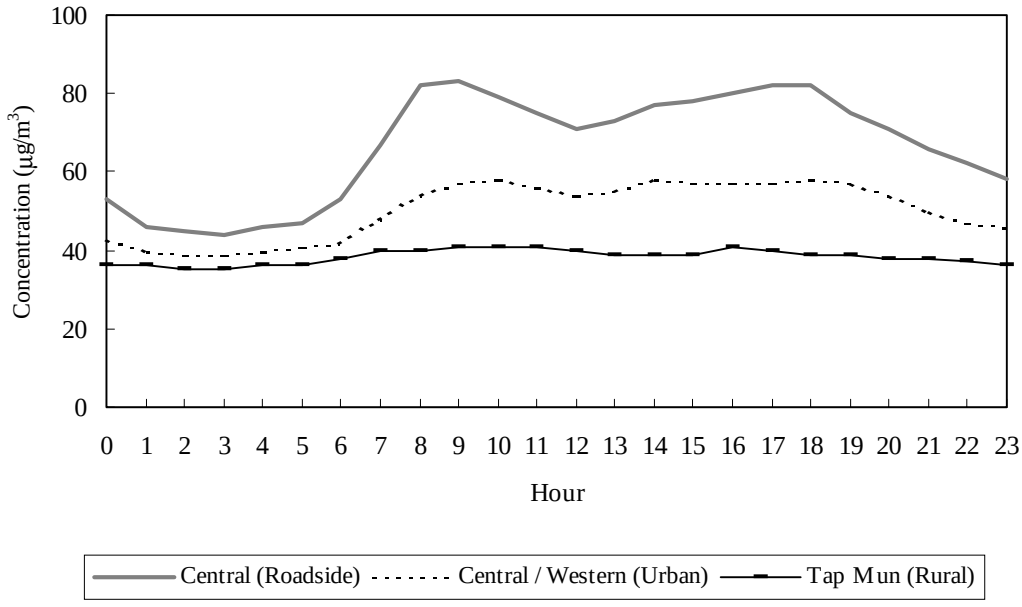
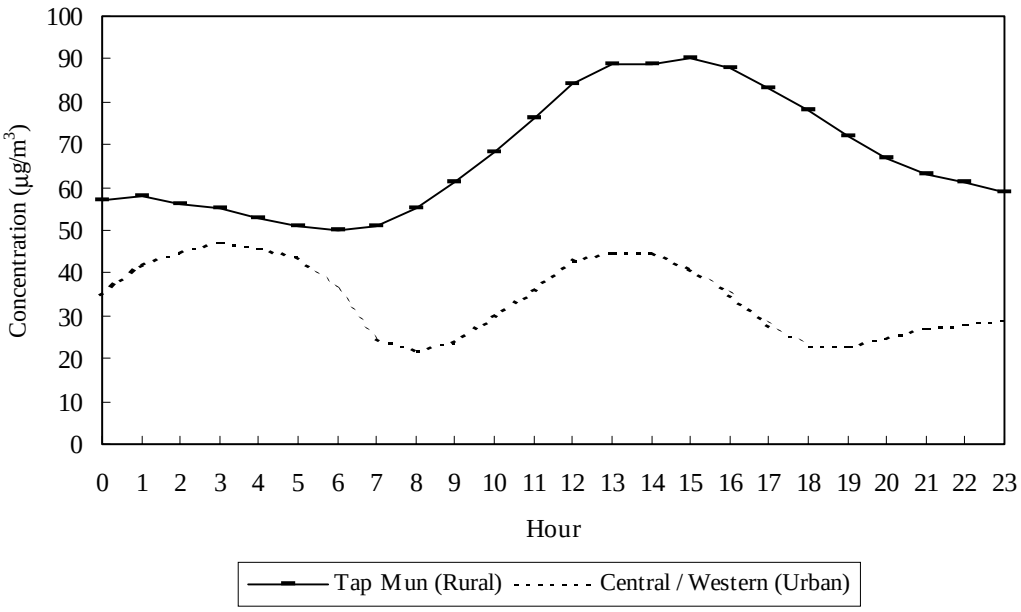


Figure 9: 2000 Diurnal variations of RSP



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: 2000 Diurnal variations of O_3

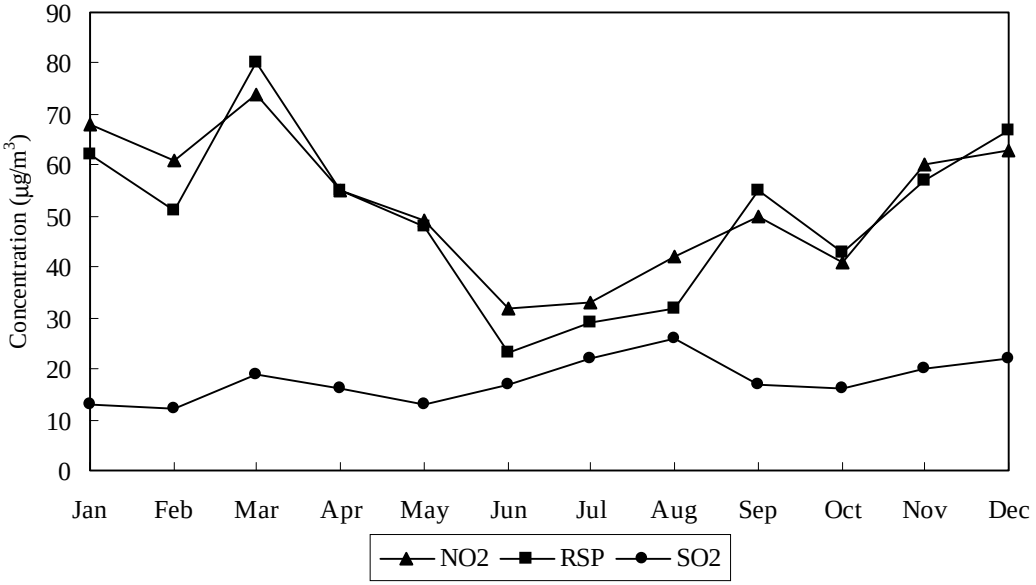


6.2 Over a Year

The concentrations of NO_2 and RSP are substantially lower in the summer period due to a number of reasons. The higher temperature in the summer induces a larger mixing height and helps to disperse the air pollutants. The rains in the summer help to washout pollutants. The south-westerly prevailing wind in the summer also helps to replenish the region with cleaner ocean air.

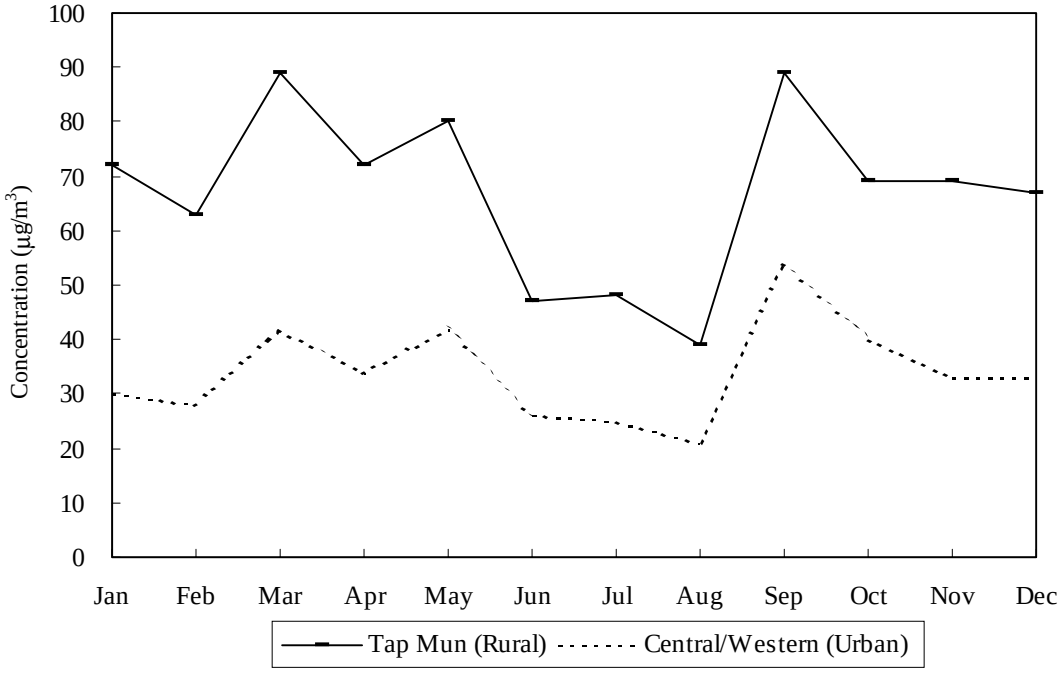
SO_2 does not show similar pattern with NO_2 and RSP. Its concentrations in summer period are higher, which is mainly due to more SO_2 emissions from power plants as a result of higher electricity demand for air conditioning operation during the period.

Figure 11: Monthly variations of NO_2, RSP and SO_2 at Central/Western in 2000



The formation of ozone is dependent on a number of factors including the availability of the precursor pollutants such as NO_2. The average ozone levels are low from June to August when the NO_2 level are also low in the similar period. The ozone levels in urban areas are generally lower than that in Tap Mun mainly due to the scavenging effect of nitric oxide emitted from motor vehicles in the urban areas.

Figure 12: Monthly variations of O_3 in 2000



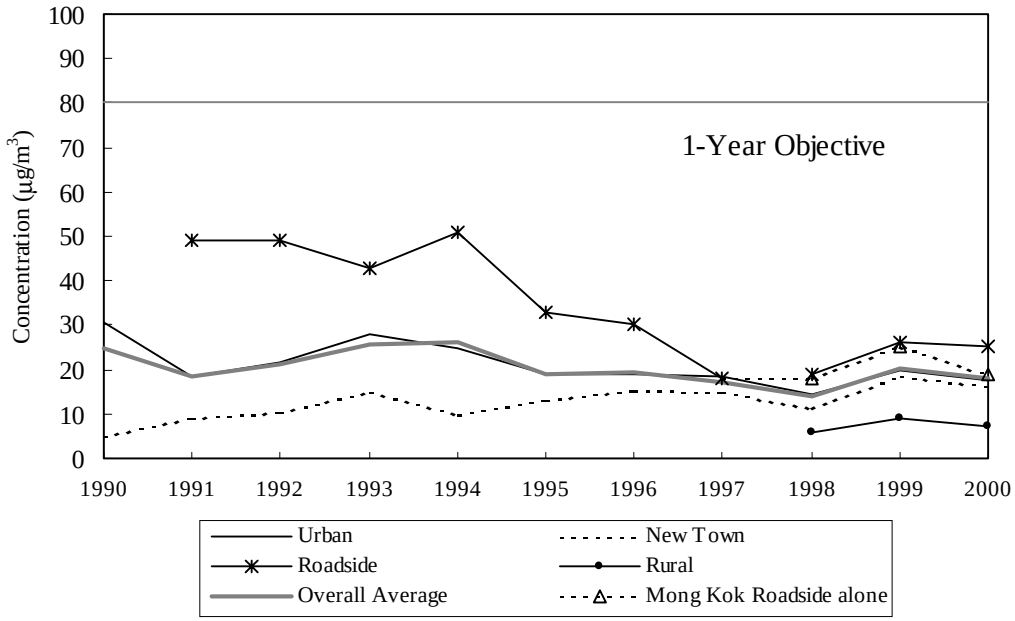
6.3 Long Term Trends[1]

6.3.1 Sulphur Dioxide (SO_2)

The SO_2 concentration in ambient air has been maintaining at a reasonably low level since the implementation of the Air Pollution Control (Fuel Restriction) Regulations for stationary sources in 1990. Subsequent introduction of low sulphur diesel fuel under the Air Pollution Control (Motor Vehicle Fuel) Regulation and stringent diesel vehicle emission standards under the Air Pollution Control (Vehicle Design Standards) (Emission) Regulations in 1995 had further reduced the roadside SO_2 level in the following 3 years. Besides, improvement was also seen in 1998 after the tightening of the sulphur content of automobile diesel from 0.2% to 0.05% from April 1997.

In general, the overall SO_2 level in Hong Kong was well below the annual AQO limit of 80 $\mu g/m^3$ and showed a steady downward trend in the last decade, even though slight increases were observed in 1994 and 1999. The overall annual average in 2000 (18 $\mu g/m^3$) was about 28% and 10% lower than the 1990 (25 $\mu g/m^3$) and 1999 (20 $\mu g/m^3$) values respectively. On average, the roadside SO_2 level was higher than the urban and new town levels due to the vehicle emissions and street canyon effect. By further tightening the vehicle sulphur content in law and the ultra-low sulphur diesel (0.005% sulphur content) is being widely available starting from July 2000, the SO_2 pollution problem should become even less significant in the future.

Figure 13: SO_2 long term trend



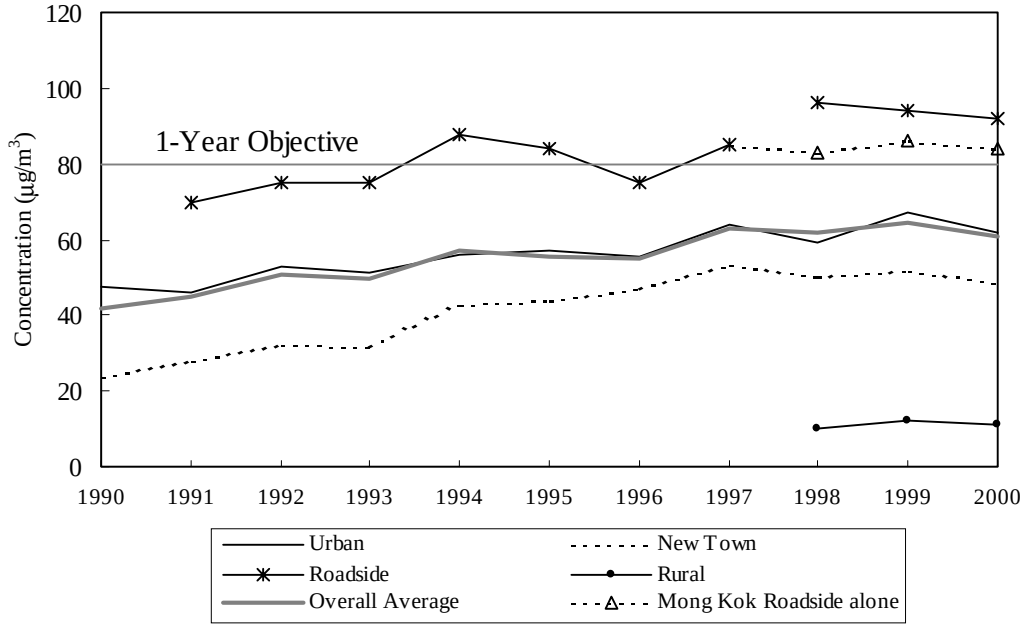
[1] *The roadside trends from 1991 to 1997 in Fig. 13, 14, 16 and 17 were plotted using data from the Mong Kok station only. After the addition of the Causeway Bay and Central stations to the monitoring network in 1998, the averages of all three roadside stations were then used. For the sake of comparison, the levels of Mong Kok station in 1998, 1999 and 2000 are also indicated with triangular markers in the figures.*

6.3.2 Nitrogen Dioxide (NO_2)

The overall annual average of NO_2 in 2000 (61 μg/m^3) reduced by 6.2% compared with the 1999 value (65 μg/m^3). Both the overall annual average and the annual average of NO_2 for general stations (52 μg/m^3) in the year were in compliance with annual AQO limit (80 μg/m^3). However, the overall roadside NO_2 level (92 μg/m^3) continued to breach the annual AQO limit by 15% in 2000.

Over the past decade, the NO_2 levels for both general stations and roadside stations exhibited a general increasing trend, which was mainly attributed to the rapid vehicle growth during the period. Such increasing trend for NO_2 levels started to level off from 1998 as a result of vehicle emission control measures implemented in recent years.

Figure 14: NO_2 long term trend

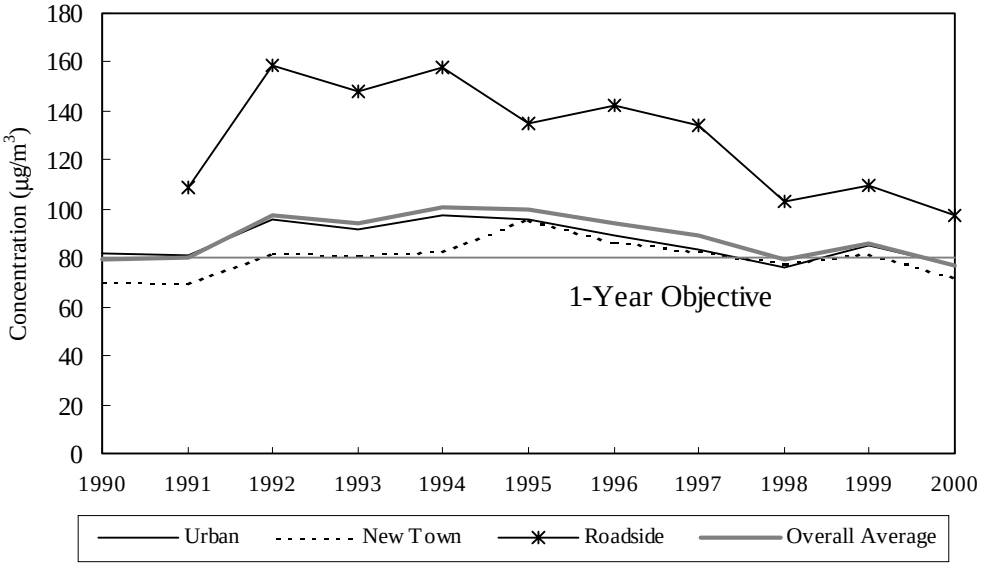


6.3.3 Total Suspended Particulates (TSP)

The overall annual average of TSP level in 2000 (77 μg/m^3) reduced by 10.5% compared with 1999 value (86 μg/m^3). In 2000, the overall annual average and the annual average of TSP for general stations (75 μg/m^3) were in compliance with the annual AQO limit (80 μg/m^3). However, the roadside TSP recorded at the sole Mong Kok station was 97 μg/m^3, which still exceeded the annual AQO limit by 21% in the year.

While the TSP levels in Hong Kong have been maintaining at relatively high levels across the past 10 years, it showed a declining trend since 1992.

Figure 15: TSP long term trend

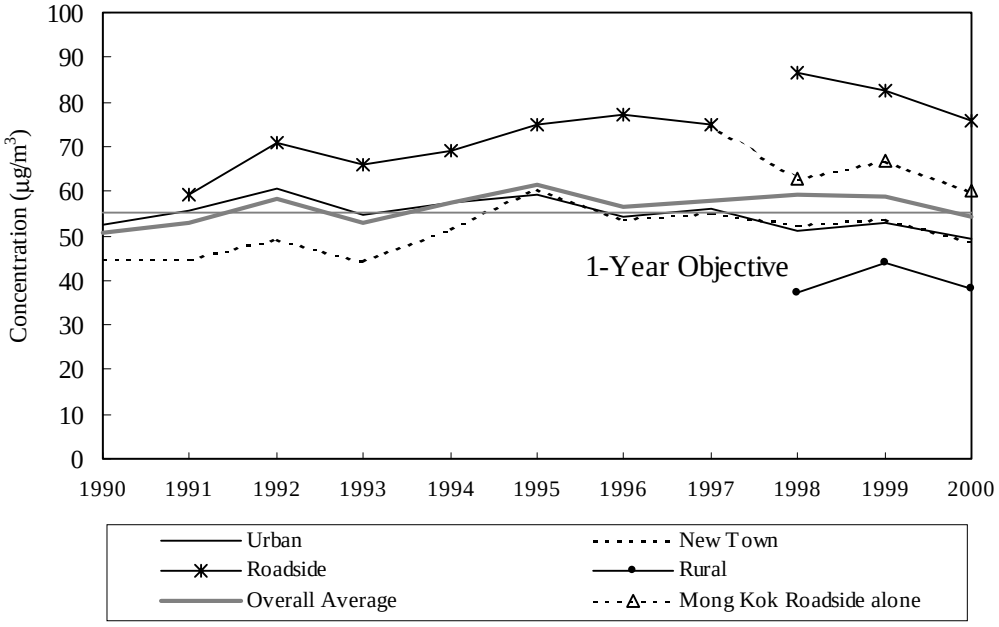


6.3.4 Respirable Suspended Particulates (RSP)

The overall average of RSP in 2000 (54 μg/m^3) reduced by 8.5% as compared with the 1999 value (59 μg/m^3). The annual average of RSP for general stations (48 μg/m^3) was in compliance with the annual AQO limit (55 μg/m^3), whilst the overall average barely met the AQO limit in the year. The annual average of roadside RSP in 2000 (76 μg/m^3) still exceeded the annual AQO limit by 38%.

Similar to TSP, RSP concentrations have been maintaining at relatively high levels particularly at roadside for the past 10 years. The problem was also attributed to the high concentration of vehicles especially diesel vehicles at urban roadside. It can be seen that starting from 1999, the overall average and the annual average of roadside RSP showed a decreasing trend as a result of the implementation of vehicle emission control measures.

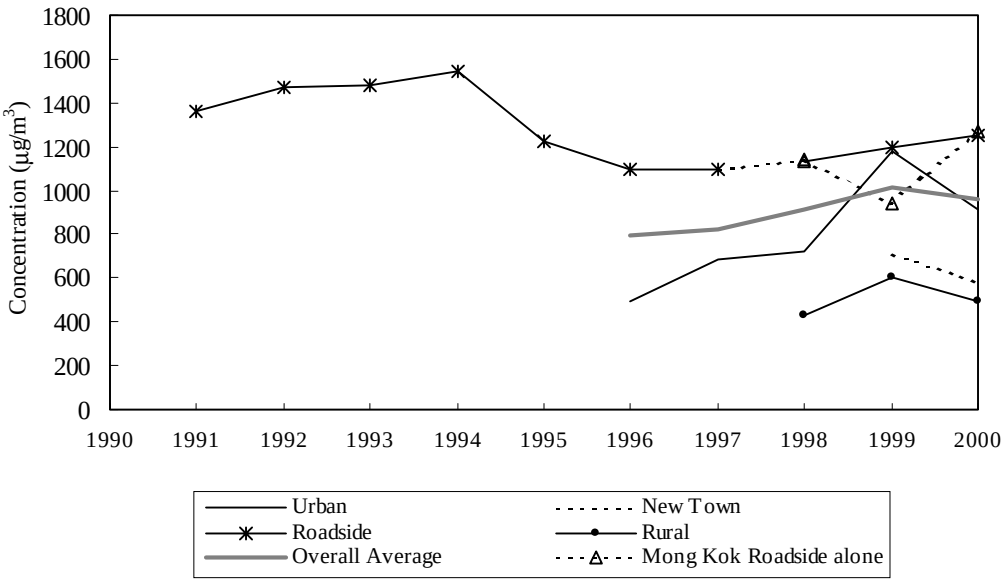
Figure 16: RSP long term trend



6.3.5 Carbon Monoxide (CO)

The CO levels in 2000 had shown reduction from general stations and overall average, except an increase of 4.8% from roadside average as compared to the values in 1999. Although a slight rising trend was observed in roadside level starting from1996, the CO concentrations still remained in very low levels in Hong Kong. As a more stringent emission standard and in-used emission control would be implemented for motor vehicles in Hong Kong, the CO level is expected to be continuously well within the relevant AQOs in the future.

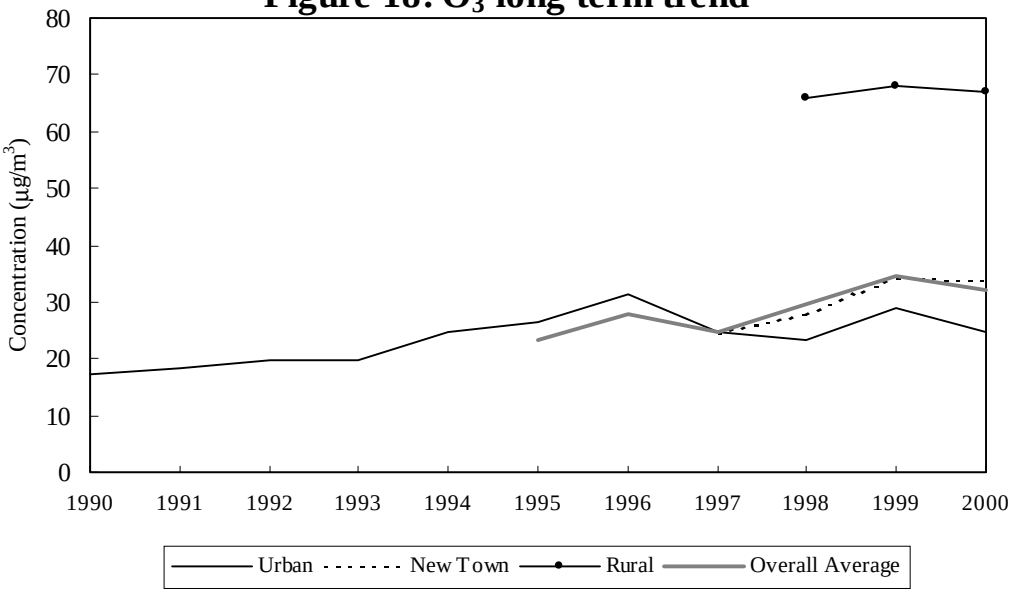
Figure 17: CO long term trend



6.3.6 Ozone (O_3)

The overall annual average of O_3 level in 2000 (32 μg/m^3) showed reduction of 5.9% as compared with the 1999 value (34 μg/m^3). The Tap Mun rural station steadily recorded more than twice of the ozone levels measured in urban and new town since 1998. The relatively lower O_3 level in urban and new town areas was attributed to the scavenging of ozone by the large amount of nitric oxide emitted from motor vehicles in these areas.

Figure 18: O_3 long term trend

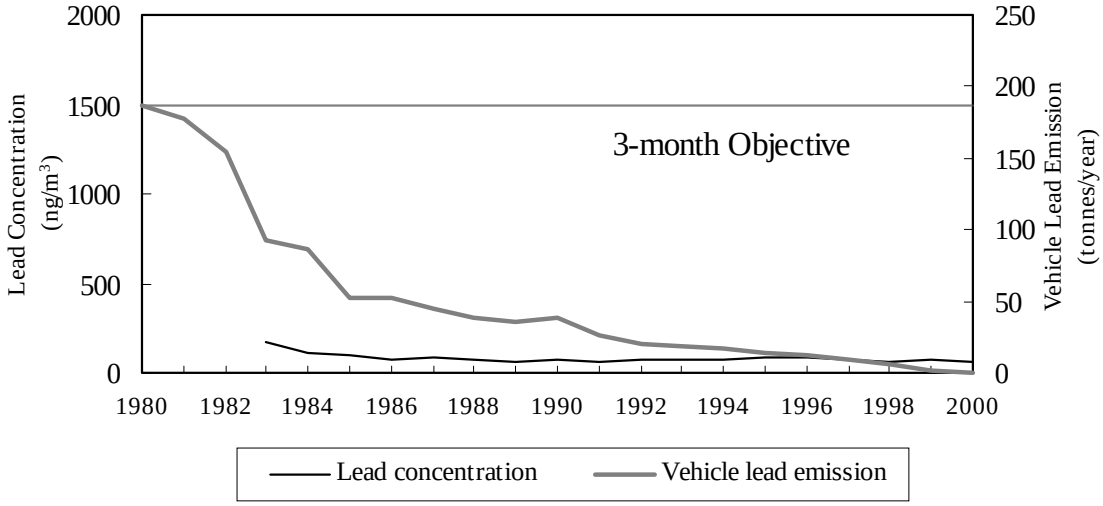


Over the past 10 years, ozone levels in the territory showed a slow rising trend. The rather steep rise in the overall ozone average in the past few years (28% from 1997 to 2000) could be mainly attributed to the effects of the 4 additional stations in ozone monitoring. The addition of the rural Tap Mun station in 1998 was particularly important since the ozone levels recorded there were in general much higher than those measured in the urban and new town areas.

6.3.7 Lead (Pb)

The lead content of petrol has reduced by almost 90% since the oil companies took voluntary action in reducing the use of lead in the eighties. Past monitoring results showed that the lead concentration was already at a rather low level when unleaded petrol was introduced to Hong Kong in April 1992. The ambient lead concentration has been maintaining at a very low level since the early eighties. As the sale and supply of leaded petrol was banned on 1 April 1999, the lead pollution problem would not be an issue in Hong Kong.

Figure 19 : Vehicle lead emission and lead concentration



Appendix A

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

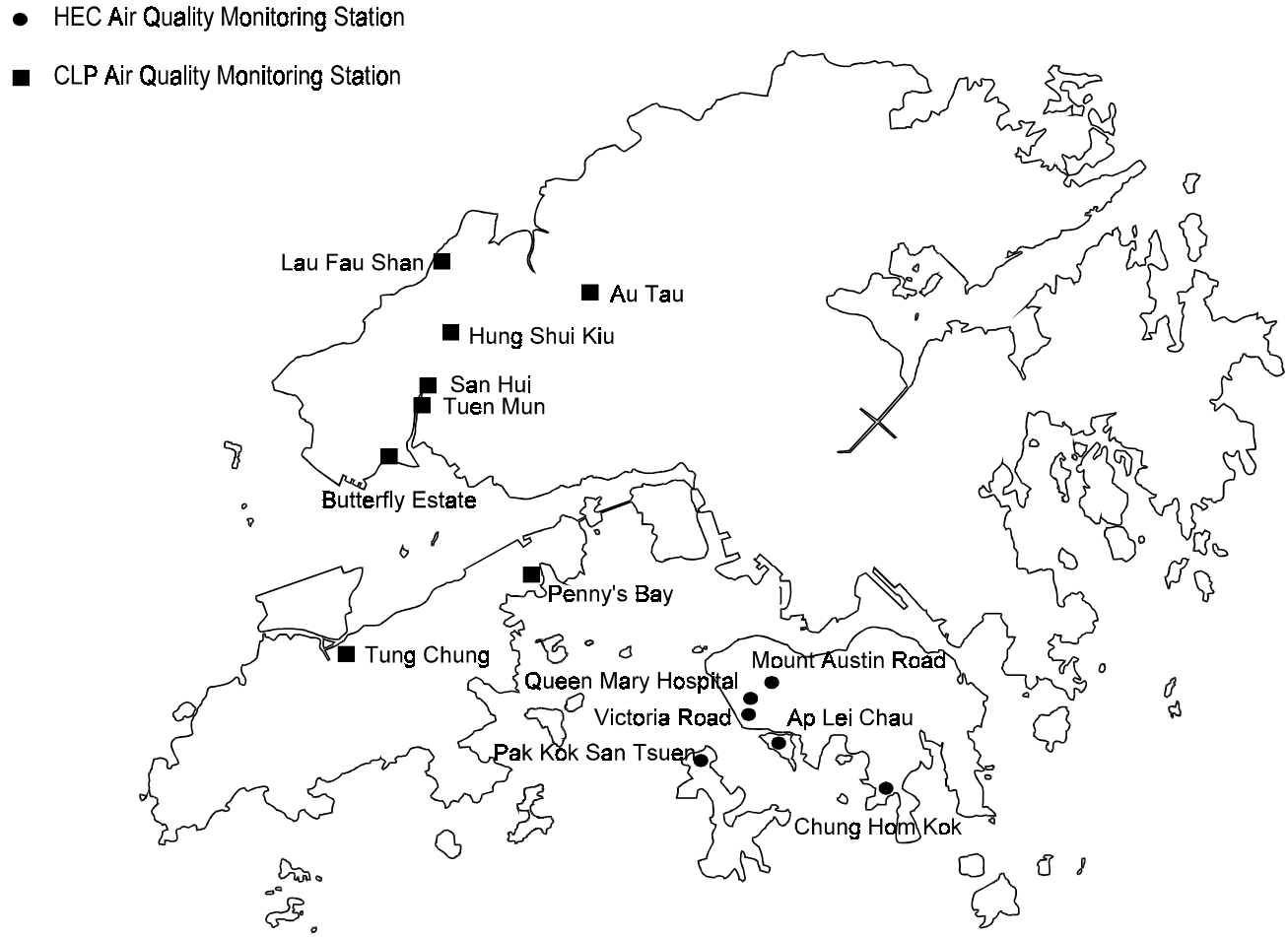


Figure A1 LOCATION OF HEC & CLP AIR QUALITY MONITORING STATIONS FOR SULPHUR DIOXIDE AND NITROGEN DIOXIDE

A.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 [4]	10	7 - 10
Chung Hom Kok	4	2 - 6
Victoria Road	12	5 - 19
Queen Mary Hospital	17	8 - 24
Ap Lei Chau	8	3 - 11
Pak Kok San Tsuen	8	1 - 14
Nitrogen Dioxide (NO_2) [3]		
Mount Austin Road [4]	25	18 - 37
Chung Hom Kok	16	10 - 23
Victoria Road	38	20 - 58
Queen Mary Hospital	33	17 - 48
Ap Lei Chau	27	13 - 44
Pak Kok San Tsuen	25	9 - 40

A.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	22	11 - 36
Tuen Mun	15	8 - 28
Hung Shui Kiu	10	4 - 26
Au Tau	30	24 - 35
Butterfly Estate	9	3 - 23
Penny's Bay [5]	9	6 - 14
Lau Fau Shan	9	1 - 14
Tung Chung [6]	--	--
Nitrogen Dioxide (NO_2) [3]		
Tuen Mun	53	31 - 78
Butterfly Estate	48	27 - 77
Penny's Bay [5]	48	34 - 59
Lau Fau Shan	34	14 - 55
Tung Chung [6]	--	--

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] There was no exceedance of AQO level for NO_2.
[4] Monitoring resumed in Aug 2000.
[5] Monitoring discontinued in May 2000.
[6] Station re-location is in progress.

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 (from October 2000). The parameters measured for all wet and dry samples include: Si, Al, Ca, Fe, Mg, V, Mn, Cu and Ba in the residue; and 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 2000, 394 audit checks were carried out on the stations' analysers and samplers. As shown in Figure B1 and based on the 95% probability limits, the accuracy of the network was within the specified control limits.

The precision, a measure of the repeatability, of the measurements is checked in accordance with EPD's quality manuals. In 2000, 1395 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 -9.0% and 13.2%, which was again within target limits.

In addition to the above operations, 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 were collected by ENSR International, Inc., Hong Kong and were sent to the Government Laboratory for analysis.

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	17.5m (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 with fairly rapid development	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	2m	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 (Mong Kok Rd. Pumping Station)	4E Mong Kok Road, Mong Kok	Urban Roadside : Mixed residential/commercial area surrounded by some moderately tall buildings	7m	2m (1 floor)	Apr 91

Note: P.D. = Principal datum

Table B2. Summary of the Parameters Monitored in the Network (2000)

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 Monitor Laboratories 8850
NO, NO_2, NO_x	Chemiluminescence	API 200A Monitor Laboratories 8840
O_3	UV absorption	TECO 49, API 400
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
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-9 / 23	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, 2000

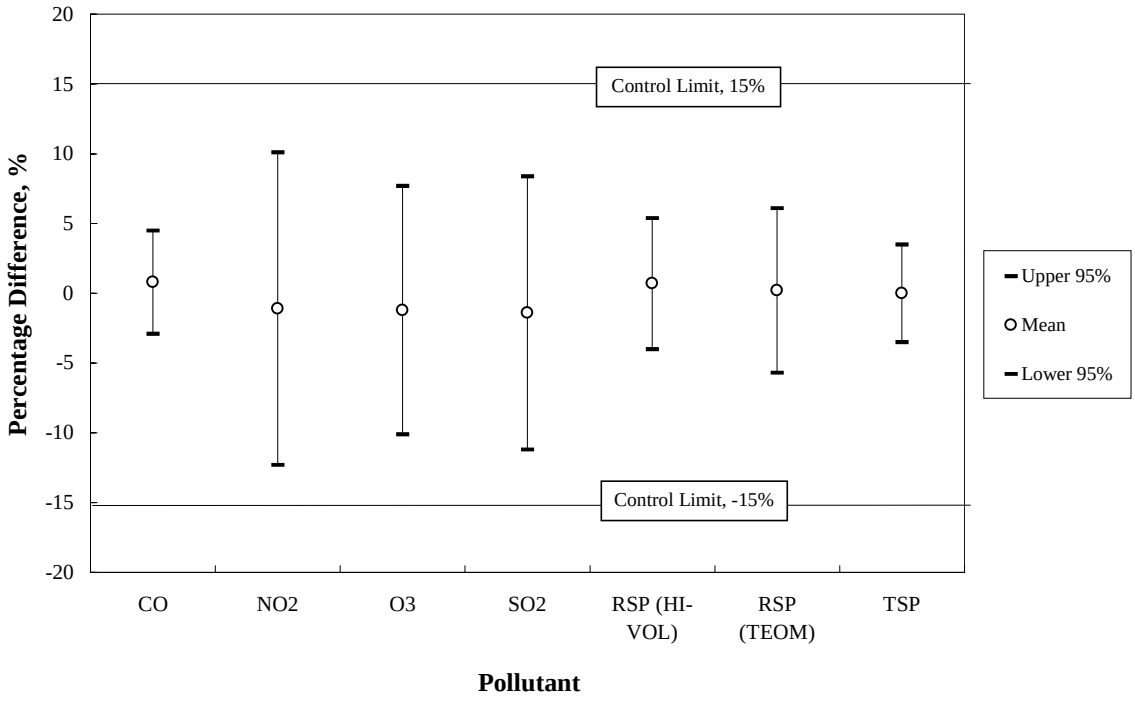
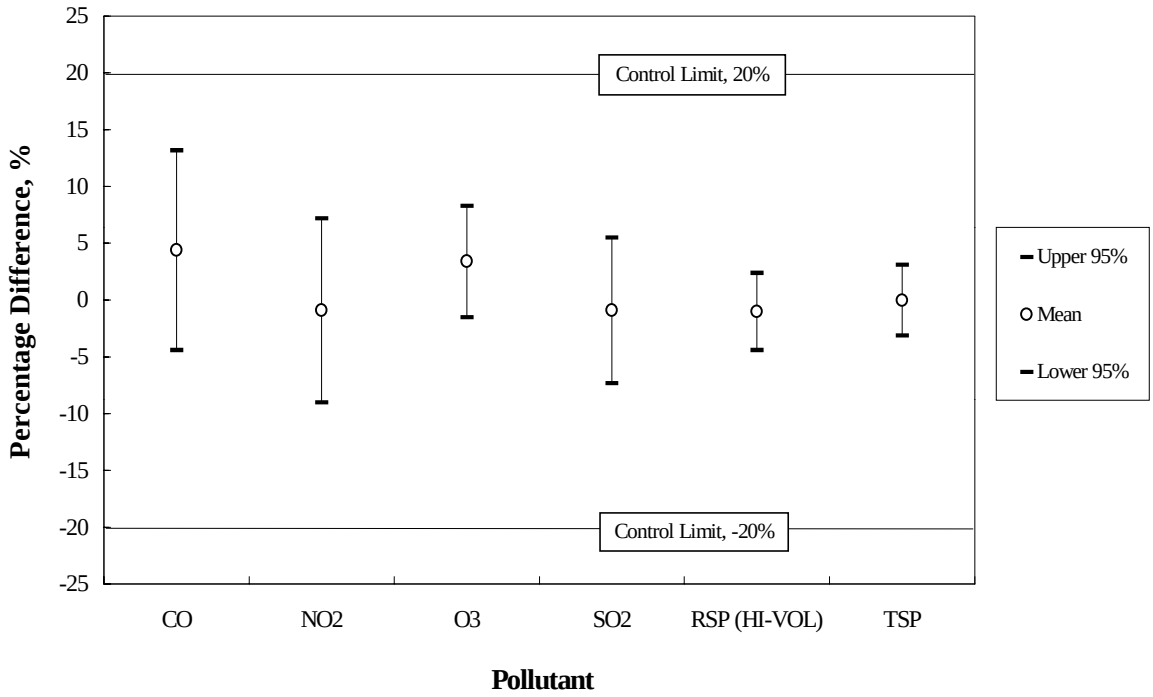


Figure B2: Precision of Air Quality Monitoring Network, 2000



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 2000

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	416	286	255	245
Eastern	169	147	133	130
Kwai Chung	253	222	221	219
Kwun Tong	268	236	230	227
Sham Shui Po	261	210	193	192
Tsuen Wan	307	244	233	224
Sha Tin	185	181	170	168
Tai Po	153	145	134	134
Tung Chung	189	170	157	138
Yuen Long	251	251	247	232
Tap Mun	93	83	75	71
Causeway Bay	186	173	148	135
Central	249	226	223	220
Mong Kok	203	183	179	164

Pollutant: Nitrogen Oxides

Station	1st High	2nd High	3rd High	4th High
Central / Western	951	949	946	879
Kwai Chung	1518	1234	1192	1132
Kwun Tong	1345	916	837	773
Sham Shui Po	1458	1316	1252	1106
Tsuen Wan	1420	1269	1220	1202
Sha Tin	760	647	636	629
Tung Chung	549	420	400	378
Tap Mun	183	145	144	110
Causeway Bay	1716	1678	1650	1645
Central	2166	1816	1617	1502
Mong Kok	1481	1452	1305	1219

Pollutant: Nitric Oxide

Station	1st High	2nd High	3rd High	4th High
Central / Western	481	453	415	414
Kwai Chung	855	682	656	598
Kwun Tong	745	467	433	420
Sham Shui Po	785	729	683	614
Tsuen Wan	821	719	696	690
Sha Tin	374	348	342	340
Tung Chung	232	210	191	183
Tap Mun	55	53	42	41
Causeway Bay	959	955	953	941
Central	1208	1012	891	842
Mong Kok	834	822	736	686

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	326	320	316	298
Eastern	287	274	270	264
Kwai Chung	298	295	292	289
Kwun Tong	251	246	236	228
Sham Shui Po	278	269	257	252
Tsuen Wan	260	250	234	230
Sha Tin	254	254	217	215
Tai Po	259	243	235	227
Tung Chung	267	260	230	210
Yuen Long	260	224	221	215
Tap Mun	103	91	89	87
Causeway Bay	374	295	290	280
Central	351	334	329	322
Mong Kok	289	281	269	263

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

Station	1st High	2nd High	3rd High	4th High
Tsuen Wan	3450	3110	2990	2990
Tung Chung	3550	3440	3040	2980
Tap Mun	1400	1390	1390	1370
Causeway Bay	4140	4140	4030	3910
Central	4030	3910	3560	3340
Mong Kok	5400	3790	3680	3680

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	240	217	195	190
Eastern	113	110	105	94
Kwai Chung	124	123	122	121
Kwun Tong	154	145	131	122
Sham Shui Po	125	124	123	118
Tsuen Wan	154	147	142	137
Sha Tin	265	262	197	168
Tai Po	181	166	164	164
Tung Chung	314	299	268	265
Yuen Long	215	211	179	178
Tap Mun	246	233	219	215

Pollutant: Respirable Suspended Particulates

Station	1st High	2nd High	3rd High	4th High
Central / Western	349	323	302	299
Eastern	218	216	200	197
Kwai Chung	327	319	308	292
Kwun Tong	265	261	249	248
Sham Shui Po	250	248	235	231
Tsuen Wan	254	229	224	222
Sha Tin	227	223	210	207
Tai Po	237	224	221	214
Tung Chung	271	267	264	255
Yuen Long	281	266	263	261
Tap Mun	202	198	191	185
Causeway Bay	329	312	282	279
Central	324	303	300	280
Mong Kok	310	263	248	242

TABLE C2: THE HIGHEST 2 DAILY POLLUTANT CONCENTRATIONS MEASURED IN 2000

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

Station	1st High	2nd High
Central / Western	92	74
Eastern	61	42
Kwai Chung	97	81
Kwun Tong	92	83
Sham Shui Po	100	84
Tsuen Wan	76	73
Sha Tin	72	71
Tai Po	59	53
Tung Chung	64	61
Yuen Long	79	68
Tap Mun	45	25
Causeway Bay	68	62
Central	97	83
Mong Kok	81	64

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

Station	1st High	2nd High
Central / Western	170	120
Eastern	169	118
Kwai Chung	211	146
Kwun Tong	161	117
Sham Shui Po	190	146
Tsuen Wan	152	141
Sha Tin	146	109
Tai Po	156	100
Tung Chung	122	113
Yuen Long	148	121
Tap Mun	43	42
Causeway Bay	213	185
Central	238	174
Mong Kok	196	168

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

Station	1st High	2nd High
Central / Western	200	183
Eastern	145	142
Kwai Chung	198	181
Kwun Tong	186	170
Sham Shui Po	185	176
Tsuen Wan	167	165
Sha Tin	164	162
Tai Po	165	158
Tung Chung	168	162
Yuen Long	176	169
Tap Mun	141	133
Causeway Bay	191	190
Central	208	180
Mong Kok	207	186

Pollutant: Nitrogen Oxides

Station	1st High	2nd High
Central / Western	388	330
Kwai Chung	468	461
Kwun Tong	426	331
Sham Shui Po	515	412
Tsuen Wan	501	386
Sha Tin	293	264
Tung Chung	225	189
Tap Mun	59	53
Causeway Bay	1028	949
Central	799	736
Mong Kok	632	518

Pollutant: Nitric Oxide

Station	1st High	2nd High
Central / Western	188	159
Kwai Chung	237	211
Kwun Tong	175	149
Sham Shui Po	269	175
Tsuen Wan	261	202
Sha Tin	140	135
Tung Chung	99	73
Tap Mun	15	14
Causeway Bay	553	523
Central	384	376
Mong Kok	335	244

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

Station	1st High	2nd High
Central / Western	258	145
Kwai Chung	246	135
Kwun Tong	218	142
Sham Shui Po	184	175
Tsuen Wan	237	139
Sha Tin	223	118
Tai Po	174	129
Tung Chung	207	162
Yuen Long	288	194
Mong Kok	299	175

Pollutant: Ozone

Station	1st High	2nd High
Central / Western	108	103
Eastern	65	63
Kwai Chung	88	79
Kwun Tong	63	63
Sham Shui Po	69	69
Tsuen Wan	85	83
Sha Tin	113	96
Tai Po	116	113
Tung Chung	115	99
Yuen Long	92	88
Tap Mun	153	146

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

Station	1st High	2nd High
Tsuen Wan	2733	2716
Tung Chung	2535	2493
Tap Mun	1367	1354
Causeway Bay	3525	3453
Central	3321	3308
Mong Kok	3549	3549

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: 2000 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	13	12	19	16	13	17	22	26	17	16	20	22	18
Eastern	14	12	14	13	10	12	14	17	11	10	12	12	13
Kwai Chung	20	15	25	23	25	35	27	33	14	10	13	18	21
Kwun Tong	17	14 *	*	20 *	7	18	29	34	12	12	15	16	18 *
Sham Shui Po	14	12	21	19	18	22	21	30	17	10	12	16	18
Tsuen Wan	20	16	21	19	14	19	20	30	15	10	16	21	18
Sha Tin	13	14	22	14	19	24	31	24	12	11	14	15	18
Tai Po	14	11	13 *	10	10	12	13	13	11	6	18	10	12
Tung Chung	18	12	18	9	14 *	*	*	7 *	14	11	18	26	15 *
Yuen Long	26	18	20	13	11	15	20	23	16	17	26	27	19
Tap Mun	7	4	6	8	5	8	9	10	7	6	8	8	7
Causeway Bay	33	26	26	25	24	28	27	30	28	28	26	31	28
Central	32	31	32	31	22	29	29	36	22	19	27	27	28
Mong Kok	16	19	26	18	21	25	17	18	14	*	*	*	19 *

Pollutant: Nitrogen Oxides

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	121	112	132	104	69	57	57	101	70	59	97	108	91
Kwai Chung	201	182	212	205	150	197	185	252	164	139	170	186	187
Kwun Tong	229	183 *	*	196 *	163	153	157	185	168	151	179	190	175 *
Sham Shui Po	184	148	201	158	124	117	123	144	116	111	136	157	144
Tsuen Wan	189	160	184	167	111	109	108	144	112	97	122	139	137
Sha Tin	107	73	97	83	55	60	67	116	73	67	103	119	85
Tung Chung	100	90	97	58	43	30	35	57	55	56	92	104	68
Tap Mun	12	9	13	12	9	15	17	19	11	11	14	13	13
Causeway Bay	547	593	545	415	347	362	380	432	386	452	559	625	470
Central	427	401	414	385	318	355	342	398	317	282	327	342	359
Mong Kok	289	260	293	256	223	194	210	242	233	*	*	*	244 *

Pollutant: Nitric Oxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	35	34	38	32	12	16	15	38	13	11	24	29	25
Kwai Chung	83	74	80	88	56	93	83	121	61	54	65	73	78
Kwun Tong	90	64 *	*	82 *	60	64	68	83	62	59	70	75	70 *
Sham Shui Po	72	55	73	60	35	48	50	61	34	36	42	53	52
Tsuen Wan	66	61	73	70	37	44	43	63	33	32	37	45	50
Sha Tin	35	19	28	27	13	19	23	48	20	20	33	40	27
Tung Chung	25	25	25	17	7	9	8	18	8	11	18	22	16
Tap Mun	1	1	1	2	2	3	3	3	2	3	2	1	2
Causeway Bay	284	317	276	213	170	198	206	239	192	237	299	330	247
Central	203	194	191	184	144	187	179	214	141	130	149	151	172
Mong Kok	126	111	120	113	92	94	99	115	92	*	*	*	107 *

Pollutant: Nitrogen Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	68	61	74	55	49	32	33	42	50	41	60	63	53
Eastern	69	60	75	62	56	34	35	39	55	50	62	64	55
Kwai Chung	75	70	91	70	65	58	57	69	72	57	71	74	69
Kwun Tong	93	86 *	*	71 *	73	56	55	59	74	61	74	77	69 *
Sham Shui Po	73	62	87	65	69	42	45	50	62	56	72	77	63
Tsuen Wan	89	67	74	60	55	42	42	48	63	50	66	72	61
Sha Tin	55	44	55	44	38	34	38	44	44	39	55	60	46
Tai Po	62	56	66 *	45	42	34	35	41	54	31	53	49	47
Tung Chung	62	52	61	32	31	24	22	30	42	40	66	70	45
Yuen Long	71	61	77	54	50	37	42	50	56	49	70	74	57
Tap Mun	11	8	12	11	8	11	14	15	10	8	11	13	11
Causeway Bay	115	111	127	96	93	66	70	73	98	95	106	123	98
Central	119	104	116	92	93	69	67	67	100	82	99	111	94
Mong Kok	101	94	114	87	87	54	61	68	95	*	*	*	84 *

Pollutant: Carbon Monoxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tsuen Wan	1160	770	850	620	850	770	670	1020	950	900	1160	1260	915
Tung Chung	720	840	750	510	420	310	360	470	530	440	750	900	582
Tap Mun	710	600	600	440	400	290	380	360	520	390	590	650	493
Causeway Bay	1960	1810	1660	1650	1640	1190	1020	1100	1170	1250	1610	1960	1504
Central	1320	980	860	760	520	580	970	1330	1190	1140	1120	1040	984
Mong Kok	1800	1270	1650	1220	1260	720	960	1440	1180	*	*	*	1270 *

Pollutant: Ozone

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	30	28	42	34	42	26	25	21	54	40	33	33	34
Eastern	26	25	34	35	31	14	18	18	37	24	24	27	26
Kwai Chung	24	22	29	22	32	14	10	8	39	29	25	22	23
Kwun Tong	26	26 *	*	25 *	31	18	17	13	35	27	27	24	24 *
Sham Shui Po	17	16	23	19	26	12	10	9	35	23	22	19	19
Tsuen Wan	23	20	28	21	30	15	14	11	38	25	24	21	22
Sha Tin	37	35	49	39	47	24	22	16	51	39	34	31	35
Tai Po	15	20	49 *	46	49	21	25	18	56	49	45	41	35
Tung Chung	33	31	50	32	46	35	31	23	57	42	34	33	37
Yuen Long	8	13	26	25	42	34	28	25	40	34	32	35	29
Tap Mun	72	63	89	72	80	47	48	39	89	69	69	67	67

Notes:

1. All units are in micrograms per cubic metre.

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

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

4. Shaded annual averages are above their respective AQO.

TABLE C4: 2000 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	103	83	124	53	87	34	44	39	66	71	78	76	71
Kwai Chung	108	82	132	62	89	57	57	61	79	81	75	104	82
Kwun Tong	109	71	125	85	77	57	53	51	78	58	77	97	79
Sham Shui Po	115	68	113	90	76	53	56	60	77	62	92	97	81
Tsuen Wan	97	64	129	82	58	51	44	46	75	60	63	87	71
Sha Tin	76	52	100	65	39	26	43	51	62	52	72	67	58
Tai Po	89	83	83	48	50	35	54	37	72	51	75	82	63
Tung Chung	105	76	104	47	68	27	35	33	74	76	96	119	71
Yuen Long	142	96	148	55	79	47	55	54	85	97	118	154	95
Mong Kok	130	102	158	72	118	61	71	64	*	*	*	*	97 *

Pollutant: Respirable Suspended Particulates (Annual AQO = 55)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	62	51	80	55	48	23	29	32	55	43	57	67	50
Eastern	59	44	63	45	43	21	26	23	46	37	44	51	42
Kwai Chung	63	51	77	53	48	36	39	41	55	43	50	58	51
Kwun Tong	62	51	79	56	50	31	38	36	56	46	54	63	52
Sham Shui Po	65	50	78	57	50	32	37	37	54	43	55	61	52
Tsuen Wan	64	50	74	51	46	29	35	36	53	42	53	63	50
Sha Tin	58	44	69	47	43	26	30	33	49	40	51	58	46
Tai Po	60	47	67	47	38 *	30	37	35	52	38	53	58	48
Tung Chung	65	48	69	39	38	19	25	25	49	37	59	68	45
Yuen Long	74	56	80	48	47	30	38	38	59	50	67	77	56
Tap Mun	50	38	60	39	37	19	25	21	41	34	43	51	38
Causeway Bay	100	83	112	109	117	81	93	85	116	105	101	101	101
Central	76	60	94	73	64	48	52	58	72	58	66	71	66
Mong Kok	76	60	89	65	59	40	48	44	61	*	*	*	60 *

Notes:

1. All units are in micrograms per cubic metre.

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

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

4. Shaded annual averages are above their respective AQO.

TABLE C5: 2000 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	8413	96.0	4	7	11	20	38	56	85	105	12	18	416	92
Eastern	8021	91.6	5	7	10	14	20	29	48	67	10	13	169	61
Kwai Chung	8650	98.7	3	6	13	25	53	74	103	124	14	21	253	97
Kwun Tong	6764	77.2	5	8	13	19	36	55	83	104	13	18	268	92
Sham Shui Po	8569	97.8	4	7	11	17	40	64	92	113	12	18	261	100
Tsuen Wan	8611	98.3	5	7	11	21	41	57	80	98	13	18	307	76
Sha Tin	8642	98.7	5	8	14	21	35	45	69	89	14	18	185	72
Tai Po	7693	87.8	3	5	9	14	22	33	52	68	9	12	153	59
Tung Chung	6205	70.8	3	5	10	19	33	48	70	82	10	15	189	64
Yuen Long	8121	92.7	4	8	14	25	37	50	78	103	14	19	251	79
Tap Mun	8258	94.3	2	3	5	9	15	20	27	34	5	7	93	45
Causeway Bay	8546	97.6	15	19	24	31	43	57	74	89	25	28	186	68
Central	8410	96.0	9	13	20	33	58	77	102	121	22	28	249	97
Mong Kok	6292	71.8	6	10	15	23	35	48	71	88	15	19	203	81

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	8450	96.5	19	37	68	111	182	250	363	490	63	91	951	388
Kwai Chung	8610	98.3	37	95	155	245	367	457	573	660	139	187	1518	468
Kwun Tong	6786	77.5	42	108	171	230	294	344	423	478	141	175	1345	426
Sham Shui Po	8579	97.9	37	83	129	176	242	311	441	559	115	144	1458	515
Tsuen Wan	8570	97.8	31	74	116	168	251	333	457	543	104	137	1420	501
Sha Tin	8651	98.8	20	32	58	105	184	263	363	428	59	85	760	293
Tung Chung	8373	95.6	10	24	51	99	148	183	224	257	46	68	549	225
Tap Mun	8254	94.2	4	5	8	15	28	39	55	66	9	13	183	59
Causeway Bay	8511	97.2	187	288	420	610	814	957	1111	1231	404	470	1716	1028
Central	8335	95.1	100	194	329	471	650	779	918	1036	291	359	2166	799
Mong Kok	6332	72.3	89	147	229	314	402	471	581	681	210	244	1481	632

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	8450	96.5	0	1	9	26	65	104	168	237	13	25	481	188
Kwai Chung	8610	98.3	6	26	56	106	173	227	292	350	48	78	855	237
Kwun Tong	6786	77.5	6	34	64	97	134	163	206	245	48	70	745	175
Sham Shui Po	8579	97.9	5	20	40	64	100	138	220	288	32	52	785	269
Tsuen Wan	8570	97.8	3	15	36	65	109	156	232	280	31	50	821	261
Sha Tin	8651	98.8	2	4	10	31	71	120	177	221	11	27	374	140
Tung Chung	8373	95.6	1	3	7	21	46	64	87	106	8	16	232	99
Tap Mun	8255	94.2	0	1	1	2	3	5	10	17	2	2	55	15
Causeway Bay	8511	97.2	80	134	214	332	456	538	627	709	201	247	959	553
Central	8335	95.1	29	77	149	236	344	419	508	571	121	172	1208	384
Mong Kok	6332	72.3	27	55	96	141	191	235	303	369	83	107	834	335

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	8450	96.5	16	27	49	71	93	109	135	150	43	53	326	170
Eastern	8022	91.6	21	33	53	73	89	100	114	129	47	55	287	169
Kwai Chung	8610	98.3	28	46	65	87	111	134	166	190	60	69	298	211
Kwun Tong	6786	77.5	30	45	67	89	109	124	141	154	62	69	251	161
Sham Shui Po	8579	97.9	25	38	61	83	103	117	138	159	55	63	278	190
Tsuen Wan	8570	97.8	24	37	56	77	101	122	147	170	52	61	260	152
Sha Tin	8651	98.8	17	26	40	59	82	99	121	137	39	46	254	146
Tai Po	7693	87.8	18	28	42	60	81	96	114	129	40	47	259	156
Tung Chung	8373	95.6	8	20	39	63	87	105	126	142	33	45	267	122
Yuen Long	8124	92.7	24	35	52	74	96	113	136	153	50	57	260	148
Tap Mun	8255	94.2	3	5	7	13	24	32	42	49	8	11	103	43
Causeway Bay	8511	97.2	56	72	96	119	140	154	177	191	92	98	374	213
Central	8335	95.1	44	62	90	120	146	164	192	214	84	94	351	238
Mong Kok	6332	72.3	40	55	82	109	129	143	163	182	76	84	289	196

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	8612	98.3	460	690	920	1150	1380	1490	1730	1960	869	915	3450	2733
Tung Chung	8376	95.6	230	340	490	710	1010	1190	1560	1950	504	582	3550	2535
Tap Mun	8261	94.3	230	340	460	570	800	920	1030	1150	443	493	1400	1367
Causeway Bay	8549	97.6	920	1150	1490	1840	2180	2410	2760	2990	1416	1504	4140	3525
Central	8430	96.2	350	580	920	1270	1610	1840	2070	2300	883	984	4030	3321
Mong Kok	6251	71.4	580	920	1270	1610	2070	2300	2640	2990	1139	1270	5400	3549

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	8351	95.3	6	13	28	50	72	85	98	110	24	34	240	108
Eastern	8007	91.4	7	14	23	36	49	58	70	77	20	26	113	65
Kwai Chung	8607	98.3	2	5	15	36	57	69	83	92	15	23	124	88
Kwun Tong	6577	75.1	7	11	19	31	50	61	77	87	19	24	154	63
Sham Shui Po	8481	96.8	2	4	13	28	47	61	76	86	12	19	125	69
Tsuen Wan	8479	96.8	3	6	15	32	53	66	83	95	14	22	154	85
Sha Tin	8555	97.7	5	9	27	57	80	91	104	112	22	35	265	113
Tai Po	7623	87.0	3	13	26	54	79	91	108	122	21	35	181	116
Tung Chung	8270	94.4	3	11	29	55	82	98	127	149	24	37	314	115
Yuen Long	8078	92.2	3	13	24	39	60	74	90	104	20	29	215	92
Tap Mun	8210	93.7	22	39	65	94	113	127	142	153	55	67	246	153

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	8575	97.9	17	26	42	65	91	112	142	175	41	50	349	200
Eastern	8386	95.7	15	22	36	55	75	89	111	128	35	42	218	145
Kwai Chung	8673	99.0	22	32	45	64	86	102	134	160	44	51	327	198
Kwun Tong	8464	96.6	22	31	46	65	88	106	135	161	45	52	265	186
Sham Shui Po	8674	99.0	22	31	45	66	88	106	134	160	45	52	250	185
Tsuen Wan	8678	99.1	22	30	43	63	86	104	137	161	43	50	254	167
Sha Tin	8590	98.1	18	26	39	59	82	98	121	145	39	46	227	164
Tai Po	7721	88.1	21	28	40	60	82	98	127	150	41	48	237	165
Tung Chung	8472	96.7	13	20	36	60	88	112	145	162	35	45	271	168
Yuen Long	8367	95.5	23	31	47	72	98	120	149	177	47	56	281	176
Tap Mun	8328	95.1	13	20	32	50	69	86	111	127	31	38	202	141
Causeway Bay	8436	96.3	48	69	98	129	156	172	193	207	91	101	329	191
Central	8372	95.6	30	43	61	82	108	129	158	180	58	66	324	208
Mong Kok	6336	72.3	27	38	53	75	101	123	152	180	53	60	310	207

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

TABLE C6(a): 2000 AIRBORNE SPECIES CONCENTRATIONS AS DERIVED FROM TOTAL SUSPENDED PARTICULATES

Station	TSP	As	Be	Cd	Ni	Pb	Cr	Al	Mn	Fe	Ca	Mg	V	Zn	Ba	Cu	Hg	Se	Na+	K+	Cl-	Br-	SO4=	BAP	NH4+	NO3-
Central / Western	71	3.0	0.06	1.56	4.6	51	2.5	440	22	777	1842	540	8.6	145	16	100	0.22	1.6	3432	561	3671	9	9290	0.12	1578	4499
Kwai Chung	82	3.4	0.06	1.92	10.5	62	4.7	484	28	1084	2354	393	17.6	196	38	149	0.22	1.6	1827	583	1554	7	9675	0.19	1732	4092
Kwun Tong	79	3.2	0.06	1.74	3.8	52	3.5	505	32	1118	2093	452	6.1	158	37	92	0.22	1.6	2424	525	2389	8	9036	0.14	1516	3957
Sham Shui Po	81	2.8	0.06	1.71	6.0	55	3.3	542	28	983	2456	480	10.3	144	30	72	0.22	1.6	2701	585	2670	9	9685	0.16	1681	4804
Tsuen Wan	71	3.8	0.07	2.20	5.0	64	3.0	446	25	871	1689	365	10.1	147	25	97	0.22	1.7	1788	584	1404	8	8849	0.22	1763	3830
Sha Tin	58	3.4	0.06	2.05	3.4	55	2.0	352	21	832	1164	319	7.5	124	26	75	0.21	1.8	1674	542	1113	7	8890	0.14	1657	2710
Tai Po	63	3.6	0.06	2.42	3.7	63	2.7	345	21	848	1192	286	6.1	161	29	93	0.22	1.8	1467	582	1082	7	9080	0.23	2084	3369
Tung Chung	71	4.0	0.07	3.00	4.5	67	2.4	478	26	866	1885	344	7.0	166	18	624	0.22	1.7	1633	592	1137	7	8952	0.21	1627	3889
Yuen Long	95	4.9	0.08	3.28	6.0	80	4.0	637	42	1319	2449	373	8.8	424	29	191	0.22	1.9	1514	728	1383	7	9575	0.35	1992	5152
Mong Kok	97	2.4	0.07	1.23	7.8	46	4.8	583	32	1233	2699	546	11.5	165	34	75	0.23	1.2	2682	514	3084	8	9115	0.27	1606	5201
Average	76	3.5	0.06	2.14	5.4	60	3.2	477	28	984	1955	405	9.3	183	28	160	0.22	1.7	2094	582	1906	8	9218	0.21	1728	4110

Note:

1. All concentration units are in nanograms per cubic metre except TSP which is in micrograms per cubic metre.

2. All values presented are annual arithmetic means.

3. All particulate samples were collected using high-volume samplers.

TABLE C6(b): 2000 AIRBORNE SPECIES CONCENTRATIONS AS DERIVED FROM TOTAL SUSPENDED PARTICULATES (EXPRESSED AS PERCENTAGE BY WEIGHT)

Station		As	Be	Cd	Ni	Pb	Cr	Al	Mn	Fe	Ca	Mg	V	Zn	Ba	Cu	Hg	Se	Na+	K+	Cl-	Br-	SO4=	BAP	NH4+	NO3-
Central / Western		0.00	0.00	0.00	0.01	0.07	0.00	0.62	0.03	1.10	2.60	0.76	0.01	0.20	0.02	0.14	0.00	0.00	4.84	0.79	5.17	0.01	13.09	0.00	2.22	6.34
Kwai Chung		0.00	0.00	0.00	0.01	0.08	0.01	0.59	0.03	1.32	2.87	0.48	0.02	0.24	0.05	0.18	0.00	0.00	2.23	0.71	1.90	0.01	11.82	0.00	2.11	5.00
Kwun Tong		0.00	0.00	0.00	0.00	0.07	0.00	0.64	0.04	1.42	2.66	0.58	0.01	0.20	0.05	0.12	0.00	0.00	3.09	0.67	3.04	0.01	11.50	0.00	1.93	5.04
Sham Shui Po		0.00	0.00	0.00	0.01	0.07	0.00	0.67	0.03	1.21	3.01	0.59	0.01	0.18	0.04	0.09	0.00	0.00	3.32	0.72	3.28	0.01	11.89	0.00	2.06	5.90
Tsuen Wan		0.01	0.00	0.00	0.01	0.09	0.00	0.63	0.04	1.23	2.38	0.51	0.01	0.21	0.03	0.14	0.00	0.00	2.52	0.82	1.98	0.01	12.46	0.00	2.48	5.39
Sha Tin		0.01	0.00	0.00	0.01	0.09	0.00	0.60	0.04	1.43	2.00	0.55	0.01	0.21	0.05	0.13	0.00	0.00	2.87	0.93	1.91	0.01	15.24	0.00	2.84	4.64
Tai Po		0.01	0.00	0.00	0.01	0.10	0.00	0.55	0.03	1.34	1.89	0.45	0.01	0.25	0.05	0.15	0.00	0.00	2.32	0.92	1.71	0.01	14.38	0.00	3.30	5.33
Tung Chung		0.01	0.00	0.00	0.01	0.09	0.00	0.67	0.04	1.22	2.65	0.48	0.01	0.23	0.03	0.88	0.00	0.00	2.30	0.83	1.60	0.01	12.59	0.00	2.29	5.47
Yuen Long		0.01	0.00	0.00	0.01	0.08	0.00	0.67	0.04	1.40	2.59	0.39	0.01	0.45	0.03	0.20	0.00	0.00	1.60	0.77	1.46	0.01	10.13	0.00	2.11	5.45
Mong Kok		0.00	0.00	0.00	0.01	0.05	0.01	0.60	0.03	1.28	2.79	0.56	0.01	0.17	0.04	0.08	0.00	0.00	2.78	0.53	3.19	0.01	9.44	0.00	1.66	5.38
Average		0.00	0.00	0.00	0.01	0.08	0.00	0.62	0.04	1.29	2.54	0.54	0.01	0.23	0.04	0.21	0.00	0.00	2.79	0.77	2.52	0.01	12.25	0.00	2.30	5.39

TABLE C7(a): 2000 AIRBORNE SPECIES CONCENTRATIONS AS DERIVED FROM RESPIRABLE SUSPENDED PARTICULATES

Station	RSP	As	Be	Cd	Ni	Pb	Cr	Al	Mn	Fe	Ca	Mg	V	Zn	Ba	Cu	Hg	Se	Na+	K+	Cl-	Br-	SO4=	C	THC	BAP	NH4+	NO3-
Central / Western	49	2.7	0.06	1.35	3.2	48	1.0	210	14	411	686	291	7.9	124	11	34	0.23	1.5	1822	510	1401	7	8513	23008	1657	0.15	1962	3104
Kwai Chung	58	3.2	0.06	1.69	6.7	58	1.8	224	16	551	802	252	16.4	157	23	38	0.23	1.6	1262	548	807	7	9118	32600	1983	0.23	2313	3045
Kwun Tong	51	2.8	0.06	1.58	2.5	48	1.6	238	17	544	726	274	5.7	123	19	35	0.23	1.5	1539	477	1069	7	8446	27582	1592	0.16	2001	2793
Sham Shui Po	55	2.5	0.06	1.47	4.6	51	1.4	252	15	495	847	292	9.6	111	16	28	0.23	1.5	1726	521	1295	8	8948	28750	1782	0.19	2116	3578
Tsuen Wan	51	3.4	0.06	2.10	3.7	60	1.4	223	15	468	671	233	9.1	123	15	28	0.23	1.5	1193	555	677	8	8502	27275	1758	0.30	2123	2887
Sha Tin	41	2.9	0.06	1.81	2.7	50	1.2	197	13	507	504	209	7.2	105	18	22	0.23	1.5	1125	498	525	7	8215	21558	1212	0.16	1832	1906
Tai Po	48	3.2	0.06	2.19	2.8	60	1.4	185	14	525	491	191	6.1	142	21	55	0.23	1.7	1057	559	572	7	9081	25381	1501	0.28	2439	2618
Tung Chung	53	3.7	0.06	2.38	3.8	69	1.4	255	17	481	803	223	7.7	155	13	57	0.24	1.8	1122	618	527	7	8823	18923	1331	0.25	2286	3157
Yuen Long	62	4.4	0.06	2.56	4.7	74	2.0	289	28	655	924	227	8.7	424	17	44	0.23	1.8	1068	689	827	7	8969	30589	2022	0.47	2583	4441
Mong Kok	61	1.9	0.06	0.98	4.9	38	1.8	259	16	559	874	313	10.2	112	18	37	0.24	1.1	1674	435	1563	7	8003	32725	2635	0.25	1983	3899
Average	53	3.1	0.06	1.84	3.9	56	1.5	232	17	519	728	248	8.8	160	17	38	0.23	1.6	1347	545	903	7	8686	26629	1716	0.25	2172	3119

Note: *1. All concentration units are in nanograms per cubic metre except RSP which is in micrograms per cubic metre.*

2. All values presented are annual arithmetic means.

3. All particulate samples were collected using high-volume samplers.

TABLE C7(b): 2000 AIRBORNE SPECIES CONCENTRATIONS AS DERIVED FROM RESPIRABLE SUSPENDED PARTICULATES (EXPRESSED AS PERCENTAGE BY WEIGHT)

Station		As	Be	Cd	Ni	Pb	Cr	Al	Mn	Fe	Ca	Mg	V	Zn	Ba	Cu	Hg	Se	Na+	K+	Cl-	Br-	SO4=	C	THC	BAP	NH4+	NO3-
Central / Western		0.01	0.00	0.00	0.01	0.10	0.00	0.43	0.03	0.85	1.41	0.60	0.02	0.26	0.02	0.07	0.00	0.00	3.75	1.05	2.89	0.01	17.54	47.40	3.41	0.00	4.04	6.39
Kwai Chung		0.01	0.00	0.00	0.01	0.10	0.00	0.38	0.03	0.95	1.38	0.43	0.03	0.27	0.04	0.07	0.00	0.00	2.17	0.94	1.39	0.01	15.66	56.00	3.41	0.00	3.97	5.23
Kwun Tong		0.01	0.00	0.00	0.00	0.09	0.00	0.46	0.03	1.06	1.41	0.53	0.01	0.24	0.04	0.07	0.00	0.00	2.99	0.93	2.08	0.01	16.42	53.63	3.10	0.00	3.89	5.43
Sham Shui Po		0.00	0.00	0.00	0.01	0.09	0.00	0.46	0.03	0.90	1.54	0.53	0.02	0.20	0.03	0.05	0.00	0.00	3.14	0.95	2.36	0.01	16.29	52.34	3.24	0.00	3.85	6.51
Tsuen Wan		0.01	0.00	0.00	0.01	0.12	0.00	0.43	0.03	0.91	1.31	0.45	0.02	0.24	0.03	0.06	0.00	0.00	2.32	1.08	1.32	0.02	16.55	53.11	3.42	0.00	4.13	5.62
Sha Tin		0.01	0.00	0.00	0.01	0.12	0.00	0.48	0.03	1.23	1.22	0.51	0.02	0.25	0.04	0.05	0.00	0.00	2.73	1.21	1.27	0.02	19.91	52.26	2.94	0.00	4.44	4.62
Tai Po		0.01	0.00	0.00	0.01	0.13	0.00	0.39	0.03	1.11	1.03	0.40	0.01	0.30	0.04	0.12	0.00	0.00	2.22	1.18	1.20	0.01	19.11	53.41	3.16	0.00	5.13	5.51
Tung Chung		0.01	0.00	0.00	0.01	0.13	0.00	0.48	0.03	0.90	1.51	0.42	0.01	0.29	0.02	0.11	0.00	0.00	2.11	1.16	0.99	0.01	16.57	35.53	2.50	0.00	4.29	5.93
Yuen Long		0.01	0.00	0.00	0.01	0.12	0.00	0.47	0.05	1.05	1.49	0.37	0.01	0.68	0.03	0.07	0.00	0.00	1.72	1.11	1.33	0.01	14.44	49.25	3.26	0.00	4.16	7.15
Mong Kok		0.00	0.00	0.00	0.01	0.06	0.00	0.43	0.03	0.92	1.44	0.52	0.02	0.18	0.03	0.06	0.00	0.00	2.76	0.72	2.57	0.01	13.18	53.91	4.34	0.00	3.27	6.42
Average		0.01	0.00	0.00	0.01	0.11	0.00	0.44	0.03	0.99	1.37	0.48	0.02	0.29	0.03	0.07	0.00	0.00	2.59	1.03	1.74	0.01	16.57	50.68	3.28	0.00	4.12	5.88

TABLE C8: 2000 TOTAL WET AND DRY DEPOSITION

(a) WET DEPOSITION

	Monitoring Station	Kwun Tong	Central / Western	Yuen Long[@]
	WET DEPOSITION (Ton/Ha)	26357	25062	2758
	WEIGHTED MEAN pH (based on volume-weighted mean hydrogen ion concentrations ($[H^+]$)	4.66	4.67	4.51
	WEIGHTED MEAN pH (based on volume-weighted mean pH)	4.86	4.80	4.88
	NO. OF SAMPLES	54	49	13
Filtrate (Kg/Ha)	**NH_4^+**	8.47	7.43	1.60
	NO_3^-	19.31	16.08	4.99
	$SO_4^=$	37.56	37.38	6.22
	Cl^-	27.07	29.05	1.32
	F^-	0.00	0.00	0.00
	Na^+	14.41	15.46	0.82
	K^+	6.77	6.48	0.71
	Formate	5.28	5.01	0.74
	Acetate	5.27	5.01	0.55
	Ca^{++}	3.11	3.29	0.87
	Mg^{++}	1.31	1.51	0.09
Residue (Kg/Ha)	**WEIGHT**	37.76	34.31	4.52
	Si	5.96	5.46	1.34
	Al	2.30	2.01	0.45
	Ca	0.52	0.50	0.05
	Fe	1.12	1.01	0.18
	Mg	0.54	0.50	0.05
	V	0.21	0.20	0.02
	Mn	0.21	0.20	0.02
	Cu	0.21	0.20	0.02
	Ba	0.52	0.50	0.05

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

[@] Yuen Long station started to operate from October 2000

(b) DRY DEPOSITION

	Monitoring Station	Kwun Tong	Central / Western	Yuen Long[@]
	NO. OF SAMPLES	61	58	6
Filtrate (Kg/Ha)	**NH_4^+**	0.92	0.86	0.10
	NO_3^-	10.29	8.01	1.13
	$SO_4^=$	16.83	13.74	2.61
	Cl^-	14.58	16.42	0.95
	Na^+	8.61	9.81	0.58
	K^+	1.13	0.89	0.16
	Formate	0.48	0.45	0.05
	Acetate	0.48	0.45	0.05
	Ca^{++}	11.66	7.46	1.92
	Mg^{++}	1.09	1.07	0.11
Residue (Kg/Ha)	**WEIGHT**	226.33	91.75	53.39
	Si	44.41	18.20	10.58
	Al	13.00	5.44	3.21
	Ca	6.65	2.10	1.07
	Fe	7.43	2.94	1.58
	Mg	0.73	0.38	0.20
	V	0.02	0.02	0.00
	Mn	0.18	0.06	0.04
	Cu	0.04	0.03	0.01
	Ba	0.14	0.06	0.03

TABLE C9: 2000 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	13	12	11	12	11	12	12	15	20	20	20	22	20	21	21	23	22	23	22	22	22	19	17	15
Eastern	9	9	8	8	8	9	10	13	16	16	15	15	14	15	14	14	15	15	15	13	13	14	12	10
Kwai Chung	16	14	13	13	11	11	12	17	23	26	27	26	25	27	28	29	29	30	29	26	23	21	19	17
Kwun Tong	15	13	12	12	11	12	13	17	20	21	22	20	19	21	22	24	24	22	21	20	17	17	17	17
Sham Shui Po	12	10	11	12	11	12	14	17	19	21	20	21	21	20	21	22	24	23	21	20	20	18	16	13
Tsuen Wan	12	11	9	10	10	10	12	15	21	23	24	24	23	25	25	26	26	25	24	21	19	17	15	14
Sha Tin	14	14	14	14	13	13	14	16	19	20	20	20	19	20	20	21	22	21	21	19	19	18	18	16
Tai Po	9	9	8	8	8	9	11	14	14	14	13	13	13	12	12	13	13	14	15	15	14	13	12	11
Tung Chung	11	11	11	14	10	10	9	10	14	17	18	19	20	20	21	21	20	19	17	17	15	14	13	12
Yuen Long	14	13	12	11	12	13	15	20	25	25	24	24	24	26	26	26	26	24	22	20	18	17	16	15
Tap Mun	6	6	6	6	6	8	7	8	9	9	9	9	8	7	7	7	7	7	7	7	7	6	6	6
Causeway Bay	25	22	22	21	21	20	23	29	34	34	32	32	31	32	32	31	31	31	29	28	28	27	28	26
Central	19	16	14	15	13	14	15	25	39	40	37	36	32	35	37	39	39	40	37	32	30	27	24	21
Mong Kok	14	12	12	13	12	12	13	17	23	28	29	28	26	26	26	25	24	22	19	18	17	17	16	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	75	52	42	36	35	37	52	91	120	128	119	110	96	95	97	102	112	121	131	125	115	104	97	92
Kwai Chung	128	76	62	57	55	73	159	240	269	265	230	210	198	202	217	226	242	264	293	259	200	190	185	178
Kwun Tong	138	72	52	45	45	69	163	256	272	251	217	189	179	178	187	201	227	246	257	227	188	180	187	178
Sham Shui Po	119	72	60	55	53	68	121	172	201	194	177	164	155	155	157	167	178	189	197	183	163	155	149	142
Tsuen Wan	102	56	42	38	39	51	111	162	201	192	170	160	145	152	159	162	177	190	198	182	159	150	148	140
Sha Tin	87	61	49	42	40	49	86	120	124	100	84	72	64	63	65	71	84	96	110	117	117	121	119	106
Tung Chung	61	48	42	37	35	39	53	69	83	88	84	82	73	72	75	71	73	81	86	86	81	76	73	68
Tap Mun	13	13	12	12	12	13	14	15	16	15	14	14	12	11	10	11	11	12	13	13	14	14	13	13
Causeway Bay	399	308	282	253	226	202	354	572	630	619	547	534	503	541	531	539	555	563	560	552	533	511	520	453
Central	236	153	124	115	120	125	212	382	552	530	491	439	405	427	443	476	485	508	507	438	407	386	362	322
Mong Kok	203	135	116	102	100	114	188	288	333	333	312	285	261	262	279	279	298	318	337	291	251	261	264	252

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	12	9	7	7	7	11	27	41	44	38	33	25	23	23	24	27	31	36	35	32	29	26	26
Kwai Chung	49	25	19	18	17	25	69	112	127	122	100	87	79	79	85	88	97	110	128	112	81	78	76	74
Kwun Tong	52	21	12	10	10	20	67	120	128	115	94	76	69	67	70	76	90	101	108	93	74	71	75	72
Sham Shui Po	41	21	16	14	14	20	44	71	87	82	71	61	55	53	52	56	61	67	72	66	57	55	53	50
Tsuen Wan	33	13	8	7	8	12	40	69	90	84	70	62	52	53	54	55	62	69	75	68	58	55	55	52
Sha Tin	30	19	14	11	10	13	30	47	49	35	26	21	17	15	15	16	21	25	33	38	40	44	44	39
Tung Chung	15	10	8	7	6	7	14	21	26	27	24	22	17	15	15	14	13	16	18	19	19	19	19	18
Tap Mun	2	2	1	2	2	2	2	3	3	3	3	3	2	2	2	2	2	1	1	1	1	1	1	2
Causeway Bay	199	145	131	117	104	93	185	317	350	341	294	284	262	284	277	282	292	298	298	295	284	273	278	235
Central	102	58	44	40	43	45	94	192	291	275	248	214	193	203	211	230	237	252	253	214	196	185	173	151
Mong Kok	84	49	40	34	34	41	82	138	162	161	145	128	112	112	119	117	129	142	154	129	108	114	117	111

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	43	33	28	25	24	26	33	49	57	60	60	59	56	59	62	66	69	73	75	71	65	60	56	51
Eastern	48	39	31	28	29	33	47	58	63	62	59	59	56	58	62	65	72	75	75	69	63	60	56	54
Kwai Chung	54	39	34	31	30	36	54	70	76	79	78	78	79	82	89	92	95	97	98	89	77	72	69	65
Kwun Tong	60	42	34	31	31	40	62	75	77	77	76	75	76	78	81	86	92	94	94	86	77	74	73	69
Sham Shui Po	55	39	34	31	31	35	52	62	67	68	68	69	70	73	76	80	84	86	86	82	74	70	67	64
Tsuen Wan	51	36	30	27	27	33	49	58	63	64	63	65	66	71	76	79	82	84	85	78	71	67	65	61
Sha Tin	43	34	30	28	27	31	43	50	52	49	46	42	40	41	43	48	55	59	62	61	58	55	53	49
Tai Po	45	37	31	28	28	33	45	54	51	47	41	39	39	40	42	45	53	62	69	67	61	57	55	52
Tung Chung	39	34	31	28	27	29	34	38	44	48	48	49	48	50	52	52	54	59	60	58	54	49	45	42
Yuen Long	49	43	37	32	31	36	44	55	61	61	60	58	55	59	63	69	76	81	84	78	70	65	60	55
Tap Mun	12	11	10	10	10	11	12	12	12	12	11	11	10	9	9	9	10	11	12	13	13	13	12	12
Causeway Bay	100	91	86	78	71	65	76	92	100	102	101	104	106	111	112	113	114	112	108	106	104	99	99	98
Central	77	62	54	50	51	53	66	87	106	108	111	110	108	115	118	123	121	121	118	109	105	100	95	89
Mong Kok	77	63	58	53	52	54	67	81	88	91	93	93	92	95	101	102	105	105	104	97	90	89	88	85

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	860	810	770	750	750	770	820	900	970	960	940	920	920	930	950	970	980	1000	1050	1040	1010	990	970	930
Tung Chung	540	530	530	530	510	530	540	560	590	600	590	600	600	620	630	610	610	610	630	640	610	610	590	570
Tap Mun	480	470	460	470	480	490	510	530	530	520	520	520	510	500	490	480	490	490	480	480	480	490	480	480
Causeway Bay	1390	1260	1220	1180	1150	1110	1200	1330	1490	1540	1580	1590	1630	1630	1630	1650	1680	1760	1790	1790	1720	1680	1610	1480
Central	820	760	730	720	730	750	820	950	1100	1130	1090	1060	1060	1060	1100	1120	1140	1180	1230	1160	1060	1000	970	900
Mong Kok	1150	1030	970	910	920	950	1050	1180	1330	1370	1340	1300	1260	1290	1380	1390	1450	1530	1670	1530	1370	1410	1390	1290

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	35	42	45	47	46	44	36	25	22	24	30	36	43	45	45	41	35	28	23	23	25	27	28	29
Eastern	25	30	33	34	33	31	22	18	18	21	24	29	32	32	33	31	27	23	21	21	22	22	23	23
Kwai Chung	24	34	36	37	37	32	20	14	14	17	21	26	29	29	27	25	21	17	14	14	17	17	17	18
Kwun Tong	22	34	39	41	40	31	18	14	15	18	22	27	31	32	31	27	22	17	14	15	17	18	17	18
Sham Shui Po	18	30	33	34	34	29	16	11	11	14	19	23	26	27	25	22	17	12	9	9	11	11	11	12
Tsuen Wan	20	31	34	36	35	29	15	12	14	17	23	28	31	32	31	28	23	17	12	13	14	14	13	14
Sha Tin	33	37	38	39	38	32	23	20	23	30	37	45	51	54	54	50	42	36	30	28	28	28	28	28
Tai Po	30	33	35	36	34	30	23	21	26	33	41	48	53	57	56	53	46	36	28	27	27	28	27	27
Tung Chung	30	34	36	36	36	33	28	26	25	28	35	42	53	60	63	62	55	43	33	28	28	28	29	30
Yuen Long	25	27	30	31	32	28	24	20	20	25	31	38	46	48	46	42	35	25	19	18	20	21	22	23
Tap Mun	57	58	56	55	53	51	50	51	55	61	68	76	84	89	89	90	88	83	78	72	67	63	61	59

Pollutant: Respirable Suspended Particulates (Continuous Monitoring)

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	43	40	39	39	40	41	42	48	54	57	58	56	54	55	58	57	57	57	58	57	54	50	47	46
Eastern	35	34	34	34	35	35	38	42	46	51	50	48	47	46	48	47	46	46	46	44	42	40	38	37
Kwai Chung	42	39	37	37	38	40	45	52	57	58	58	56	54	57	59	59	61	61	62	61	55	51	47	45
Kwun Tong	43	40	40	39	39	40	47	55	61	62	61	59	54	56	59	58	59	60	60	58	52	50	49	47
Sham Shui Po	43	40	39	39	39	41	45	50	56	59	59	58	56	58	60	58	59	60	60	61	56	51	48	45
Tsuen Wan	42	39	37	37	37	38	42	48	54	56	55	56	53	57	59	58	58	57	58	58	54	50	47	45
Sha Tin	43	40	39	38	38	39	44	47	49	48	47	45	45	46	47	47	49	50	50	51	50	49	48	45
Tai Po	45	42	41	41	41	42	46	52	51	50	49	48	48	48	48	48	48	49	51	53	52	50	49	47
Tung Chung	38	37	36	36	36	36	37	40	45	49	50	51	51	55	57	55	54	52	50	48	46	44	42	40
Yuen Long	47	45	43	42	42	44	49	55	60	61	62	60	58	62	63	63	65	64	65	65	61	57	53	50
Tap Mun	36	36	35	35	36	36	38	40	40	41	41	41	40	39	39	39	41	40	39	39	38	38	37	36
Causeway Bay	88	72	67	63	63	62	73	92	105	107	104	106	103	119	118	119	123	130	131	133	124	111	103	96
Central	53	46	45	44	46	47	53	67	82	83	79	75	71	73	77	78	80	82	82	75	71	66	62	58
Mong Kok	51	47	44	43	43	45	50	60	67	70	69	68	65	68	70	68	68	70	70	71	67	63	59	56

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

TABLE C10: 2000 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	2.20	1.56
Hexavalent chromium	ng/m^3	0.25	0.22
Lead	ng/m^3	64	51
Nickel	ng/m^3	5.0	4.6
Organic Substances			
Benzene	µg/m^3	2.44	1.46
Benzo[a]pyrene	ng/m^3	0.32	0.21
1,3-Butadiene	µg/m^3	0.22	0.16
Formaldehyde	µg/m^3	4.84	4.46
Perchloroethylene	µg/m^3	0.79	2.67
Dioxins [3]	pgI-TEQ/m^3	0.061	0.051

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 2000 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.

Further Information

- **This report is also available on the Internet at**

  http://www.epd-asg.gov.hk/reportf.html

- **The latest Air Pollution Index (API) and forecast can be obtained**

  from EPD's API Hotline at (852) 2827 8541 and website at

  http://www.epd-asg.gov.hk/

- **For all enquiry on API and air quality data, please call the API**

  Enquiry Hotline at (852) 2594 6413.