AIR QUALITY
IN HONG KONG 2001

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 (2001) (AQMN)

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Summary

This report summarises the 2001 air quality monitoring results measured by the Environmental Protection Department's monitoring network.

In Hong Kong, high levels of respirable suspended particulates and nitrogen oxides at roadside are the major air pollution issues. As a result of the vehicle emission control programme implemented by the Government, the concentrations of these pollutants at roadside have been dropping gradually over the past few years.

Over the past decade, concentrations of ozone have been on a slow rising trend which generally indicates a deterioration in regional air quality.

As in previous years, concentrations of sulphur dioxide, carbon monoxide and lead remained at levels well below their respective Air Quality Objectives limits in 2001.

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1. Introduction

The Environmental Protection Department (EPD) operated in 2001 a network of fourteen air quality monitoring stations for measuring major air pollutants. It consists of 11 stations for monitoring general air quality and 3 stations for roadside air quality across the territory (please refer to Table B1 in Appendix B for area type classification of monitoring stations).

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

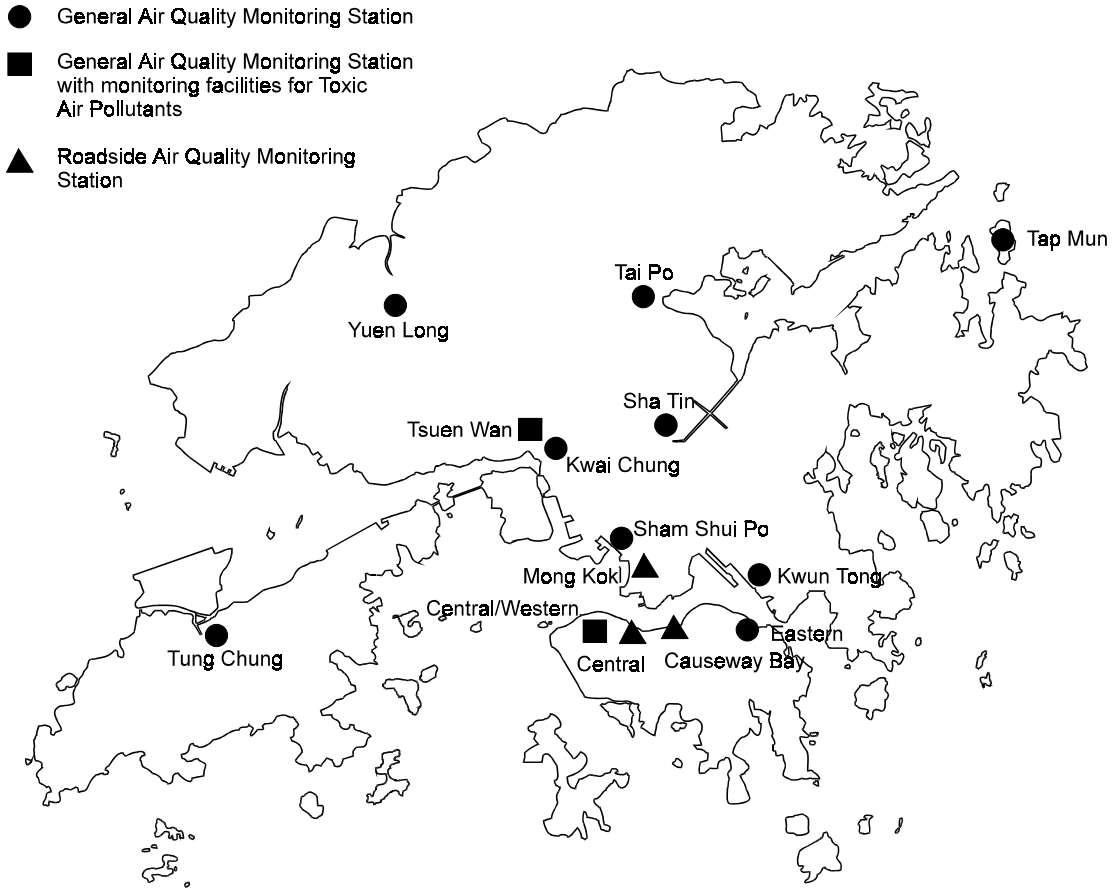


Figure 1: Location of EPD's Air Quality Monitoring Stations (2001)

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 2001 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 public health. Over the years, the compliance status of the AQO has been used as the indicator of 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 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 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 2001†

Station		Ozone	Nitrogen Dioxide		Total Suspended Particulates	Respirable Suspended Particulates
		1-hour	1-hour	24-hour	24-hour	24-hour
General Station	Central/Western	99.99	100	100	100	100
	Eastern	100	100	100	--	100
	Kwai Chung	100	99.99	99.17	100	100
	Kwun Tong	100	100	99.72	100	100
	Sham Shui Po	100	100	100	100	100
	Tsuen Wan	99.99	100	100	100	100
	Sha Tin	99.98	100	100	100	100
	Tai Po	99.98	100	100	100	100
	Tung Chung	99.75	100	100	100	100
	Yuen Long	100	100	100	100	100
	Tap Mun	99.92	100	100	--	100
Roadside Station	Causeway Bay	--	100	95.62	--	99.72
	Central	--	99.92	96.40	--	100
	Mong Kok	--	100	98.61	100	100

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

Compliance with the short-term AQO

Table 2 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 2001. For NO_2, the compliance percentages of 24-hr AQO were over 95% at all stations with 9 stations achieving 100% compliance; its 1-hr AQO compliance rates were higher than 99.9% at all stations with 12 stations achieving 100% compliance. Regarding RSP, the compliance percentages for 24-hr AQO achieved 100% for 13 out of 14 stations. The compliance levels for 1-hr AQO for O_3 were over 99% at all measuring stations. TSP achieved 100% compliance with its 24-hr AQO at all measuring stations. The compliance rates for the short-term AQO for SO_2, CO and lead not shown in Table 2 also achieved 100% at all measuring stations.

Compliance with the long-term AQO

Table 3 shows the compliance status of various stations with the long-term (annual) AQO in 2001. The annual AQO for NO_2 and RSP were complied at 10 stations and 8 stations respectively out of 13 stations. For TSP, 7 out of 9 stations complied with annual AQO.

Overall in 2001, the compliance rate with long-term AQO for all pollutants was recorded at 8 out of 13[#] stations, compared with 8 out of 14 stations in 2000 and 5 out of 13[⊕] stations in 1999. The improvement in the compliance rate since 1999 reflects that, apart from the weather factor which changes from year to year, various air pollution control measures launched by the Government have been taking effect.

Notes : [#] *Central/Western station did not have sufficient data for the assessment of annual AQO compliance in 2001. As a result, there were only 13 stations for which long-term AQO compliance could be assessed 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 for which long-term AQO compliance could be assessed in that year.*

Table 3: Compliance Status of Long-Term (Annual) Air Quality Objectives in 2001[†]

Station		Nitrogen Dioxide	Total Suspended Particulates	Respirable Suspended Particulates
		1-year	1-year	1-year
General Station	Central/Western	~	~	~
	Eastern	✓	--	✓
	Kwai Chung	✓	✓	✓
	Kwun Tong	✓	✓	×
	Sham Shui Po	✓	✓	✓
	Tsuen Wan	✓	✓	✓
	Sha Tin	✓	✓	✓
	Tai Po	✓	✓	✓
	Tung Chung	✓	✓	✓
	Yuen Long	✓	×	×
	Tap Mun	✓	--	✓
Roadside Station	Causeway Bay	×	--	×
	Central	×	--	×
	Mong Kok	×	×	×

Notes: "✓" *Complied with the AQO* "×" *Violated the AQO* "--" *Not measured*
"~" *Data are below the minimum requirement for compliance assessment*
"†" *For those stations with sufficient data, sulphur dioxide and lead all complied with the relevant Long-term AQO.*

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 2a: Sulphur Dioxide Monitoring 2001
(1-Hour Average Statistics)

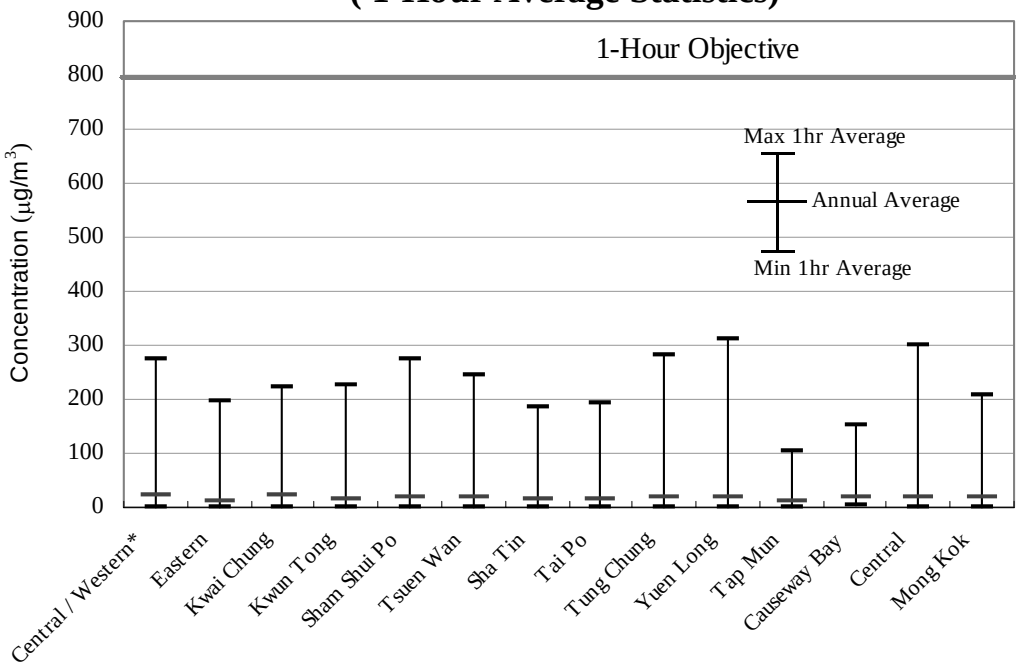


Figure 2b: Sulphur Dioxide Monitoring 2001
(24-Hour Average Statistics)

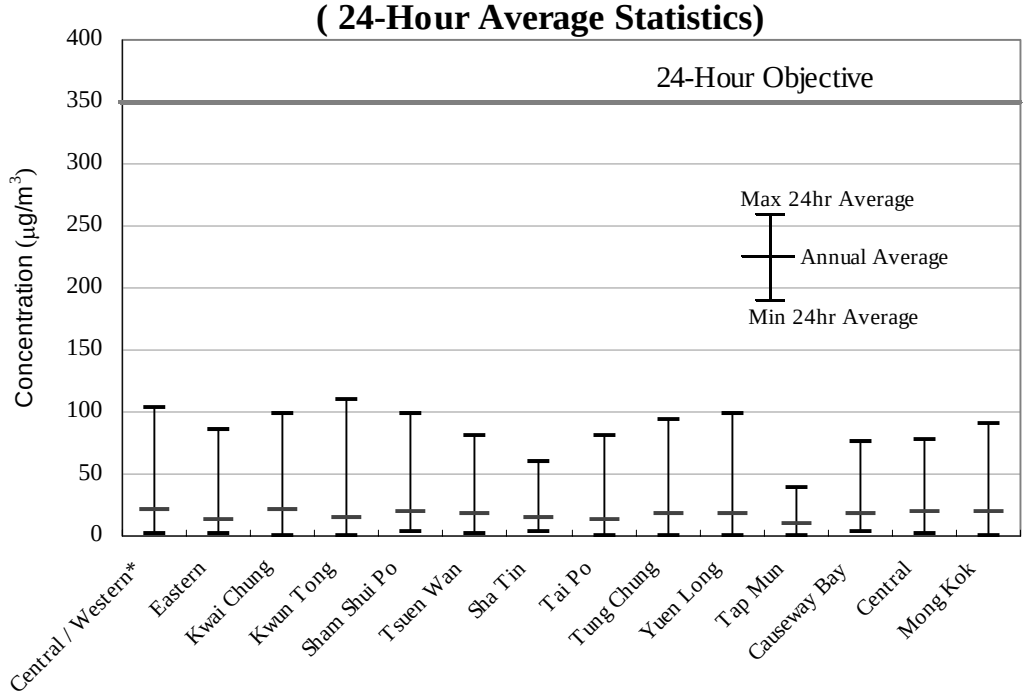
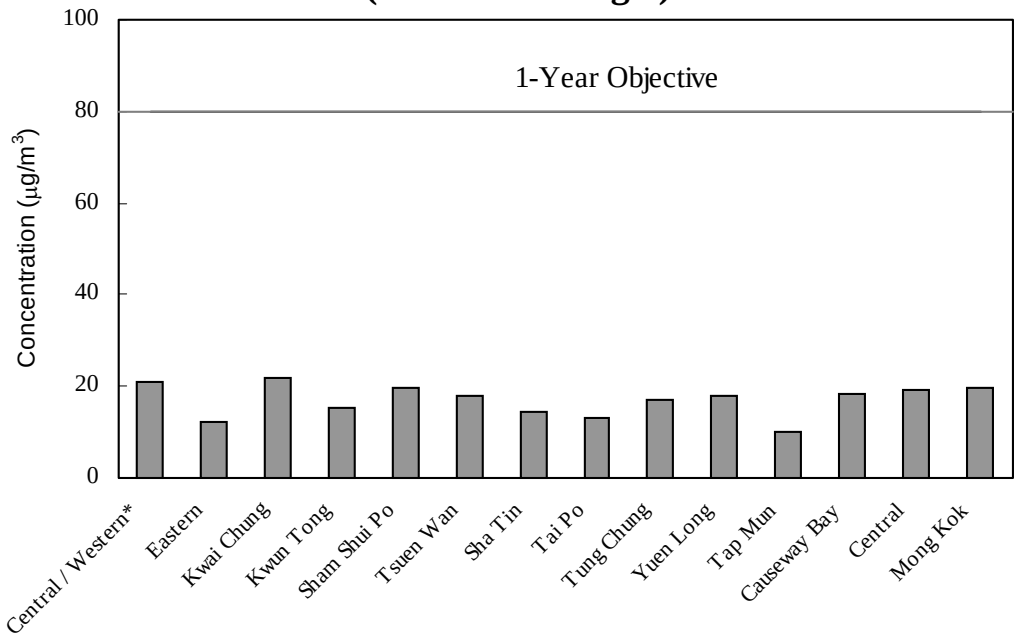


Figure 2c: Sulphur Dioxide Monitoring 2001
(Annual Average)



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 2001. Similar to previous years, concentrations of SO_2 in Hong Kong remained very low in 2001. All of the 14 stations complied with all relevant AQOs for SO_2 during the year. The highest 1-hour average (311 μg/m^3) and the highest 24-hour average (109 μg/m^3) were recorded at Yuen Long and Kwun Tong station respectively, while the highest annual average (22 μg/m^3) was recorded at Kwai Chung station. All of the readings were well below their respective AQO limits.

3.2 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 collectively in the air pollution literature as NO_x, usually enter the atmosphere as a result of combustion processes that involve high temperatures, such as those produced by power plants and vehicular engines.

Nitrogen dioxide (NO_2) is formed from oxidation of nitric oxide (NO) emitted from fuel combustion. Emissions from power stations 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 greater concern due to their dominant impact on the roadside air quality. 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 2001. In 2001, there were total 7 counts and 1 count of exceedance of 1-hr AQO limit for roadside stations and general stations respectively, with the highest 1-hour average (329 μg/m^3) recorded at Central roadside station. There were 34 counts and 4 counts of exceedance of 24-hr AQO limit for roadside stations and general stations respectively, with the highest 24-hr average (199 μg/m^3) recorded at Central roadside station as well.

As in 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 2001. The highest annual average (105 $\mu g/m^3$) was recorded at Causeway Bay roadside station.

Figure 3a: Nitrogen Dioxide Monitoring 2001
(1-Hour Average Statistics)

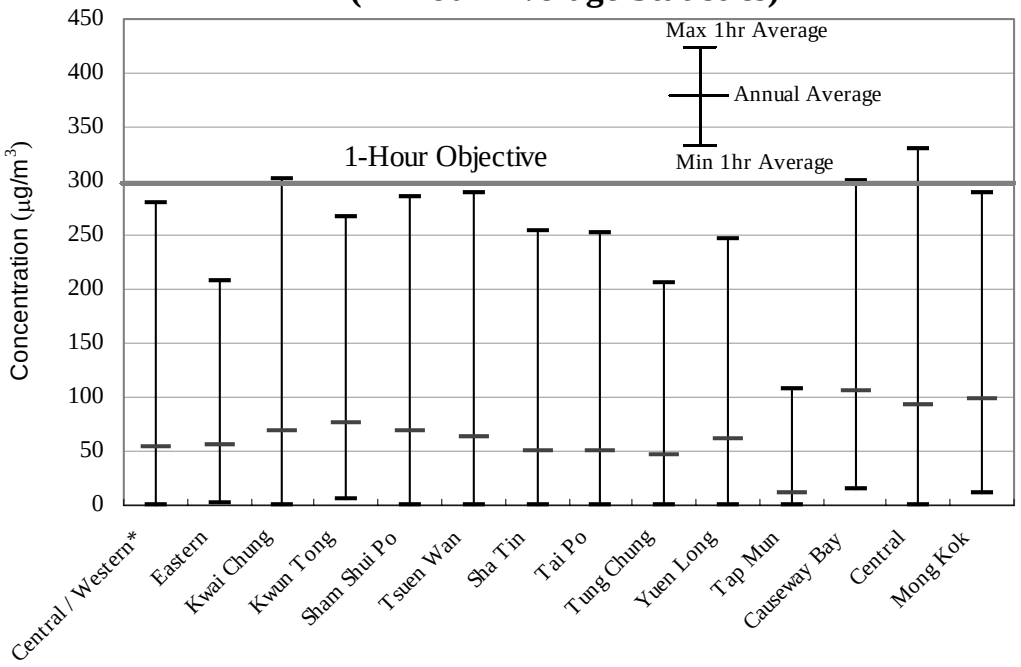


Figure 3b: Nitrogen Dioxide Monitoring 2001
(24-Hour Average Statistics)

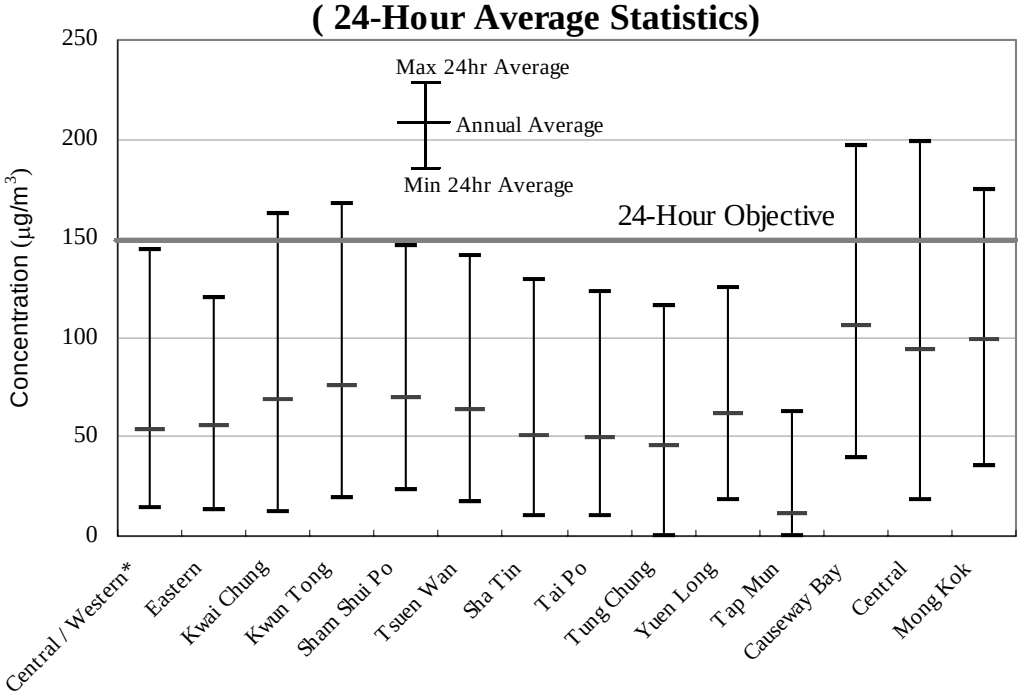
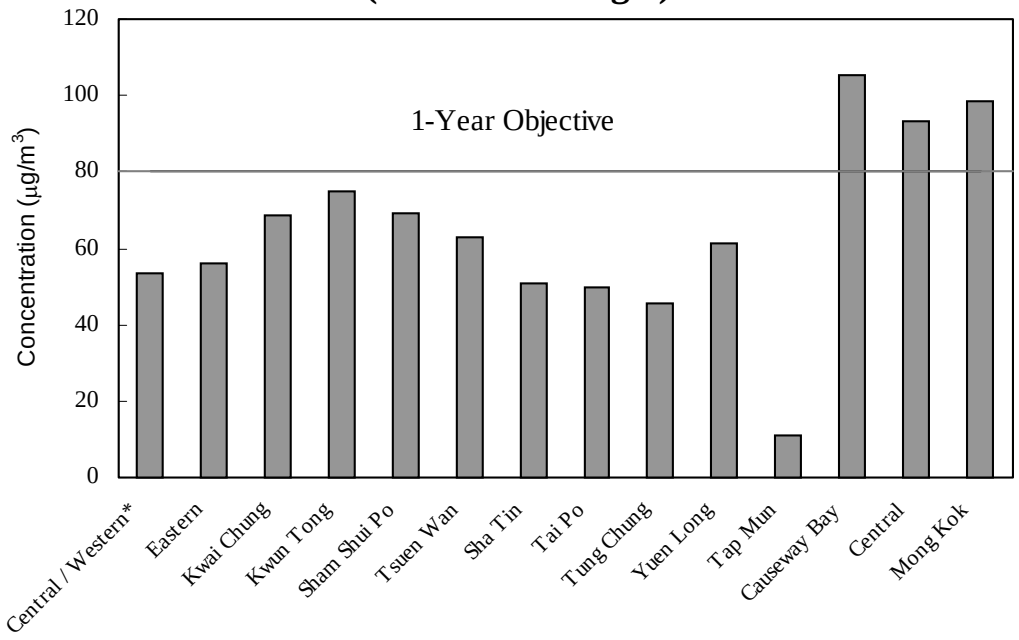


Figure 3c: Nitrogen Dioxide Monitoring 2001
(Annual Average)

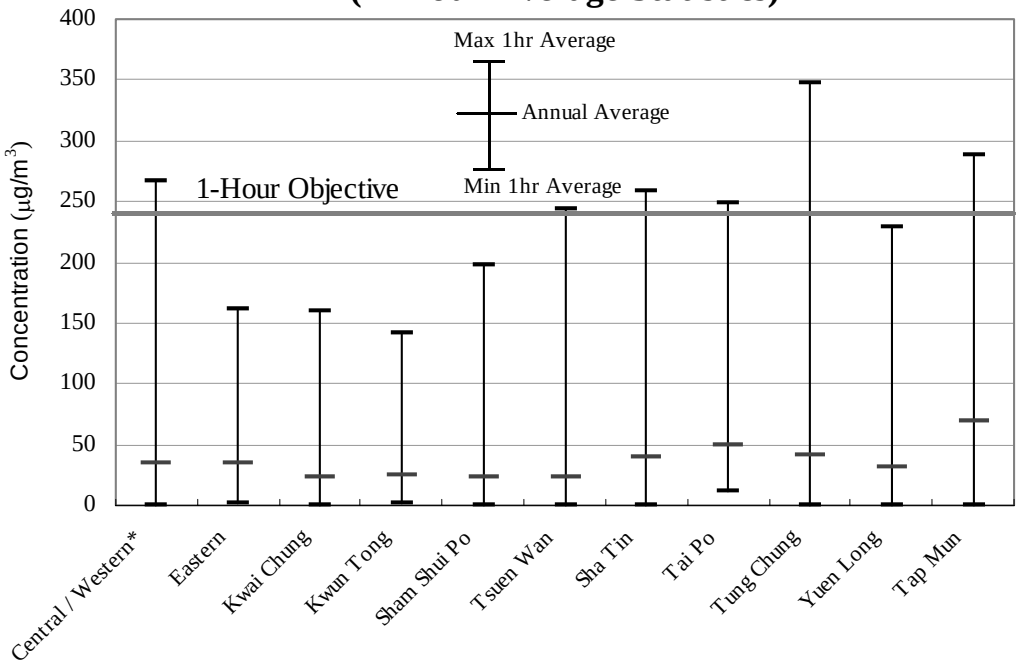


3.3 Ozone (O_3)

Ozone (O_3), a major constituent of photochemical smog, is formed by a series of complicated photochemical reactions of oxygen, nitrogen oxides and 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 2001. Tung Chung Station and Tap Mun Station recorded 21 counts and 7 counts of exceedance of 1-hr AQO limit respectively and both stations breached the AQO for ozone. The highest 1-hr average (348 $\mu g/m^3$) was recorded at Tung Chung station in 2001. Tap Mun Station's highest 1-hr average was recorded at 288 $\mu g/m^3$. Sha Tin and Tai Po stations both recorded 2 counts of exceedance, with highest values of 258 $\mu g/m^3$ and 248 $\mu g/m^3$ respectively. Central/Western and Tsuen Wan stations both recorded 1 count of exceedance, with the highest values of 267 $\mu g/m^3$ and 243 $\mu g/m^3$ respectively during the year.

Figure 4a: Ozone Monitoring 2001
(1-Hour Average Statistics)



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 continuously monitored at 6 stations including 3 roadside stations and 3 general stations during 2001. Similar to previous years, both the ambient and roadside CO concentrations remained very low in 2001. During the year, all of the 6 stations complied with the 1-hour and 8-hour AQO. The highest 1-hour and 8-hour averages were recorded at Causeway Bay roadside station (4950 $\mu g/m^3$) and Mong Kok roadside station (4098 $\mu g/m^3$) respectively, of about one sixth and one half of the respective AQO limits.

Figure 5a: Carbon Monoxide Monitoring 2001
(1-Hour Average Statistics)

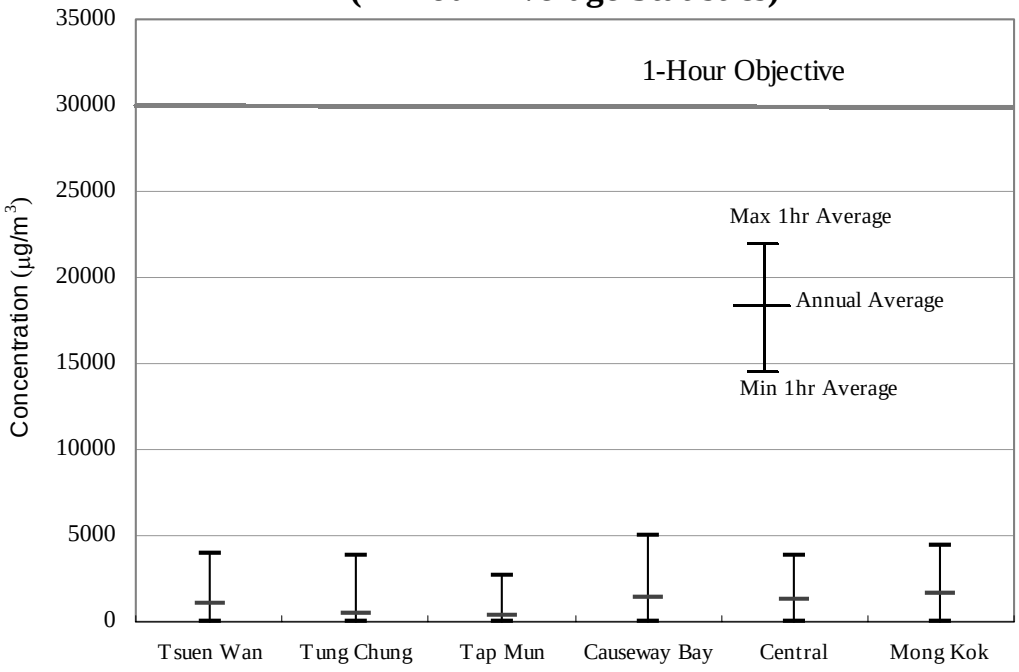
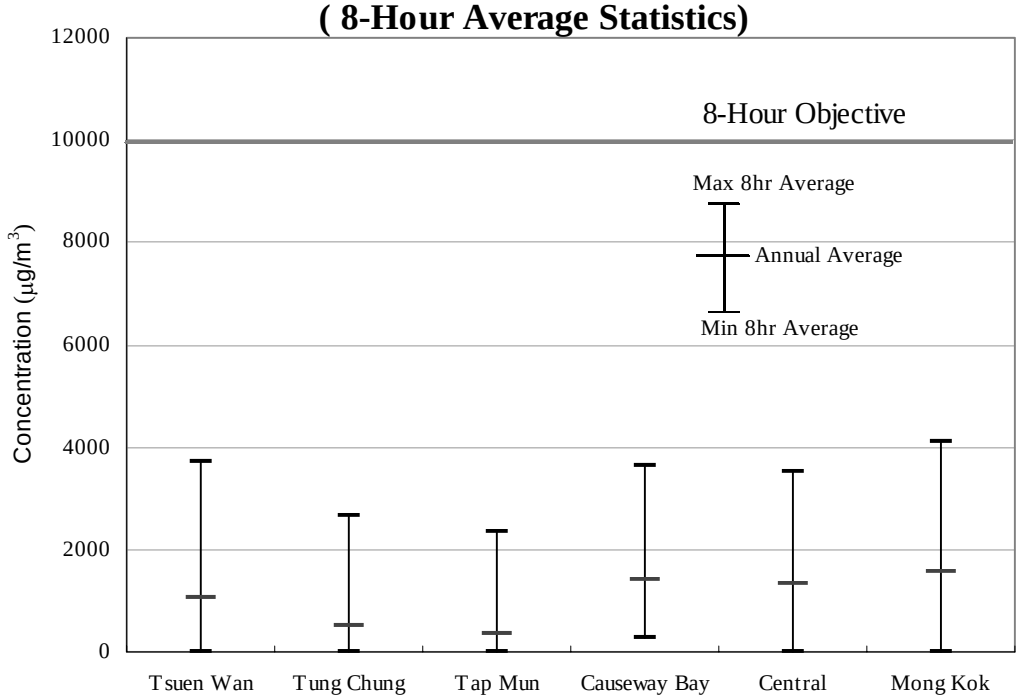


Figure 5b: Carbon Monoxide Monitoring 2001
(8-Hour Average Statistics)



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.

TSP measurement was conducted by sampling using High-volume samplers at 9 general and 1 roadside stations during 2001. The highest 24-hr average (237 $\mu g/m^3$) was recorded at Mong Kok roadside station, whilst second highest (226 $\mu g/m^3$) was recorded at Yuen Long station. No station had recorded any exceedance of the 24-hr AQO limit for TSP.

In 2001, the highest annual average (120 $\mu g/m^3$) 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 (94 $\mu g/m^3$).

Figure 6a: TSP Monitoring 2001
(24-Hour Average Statistics)

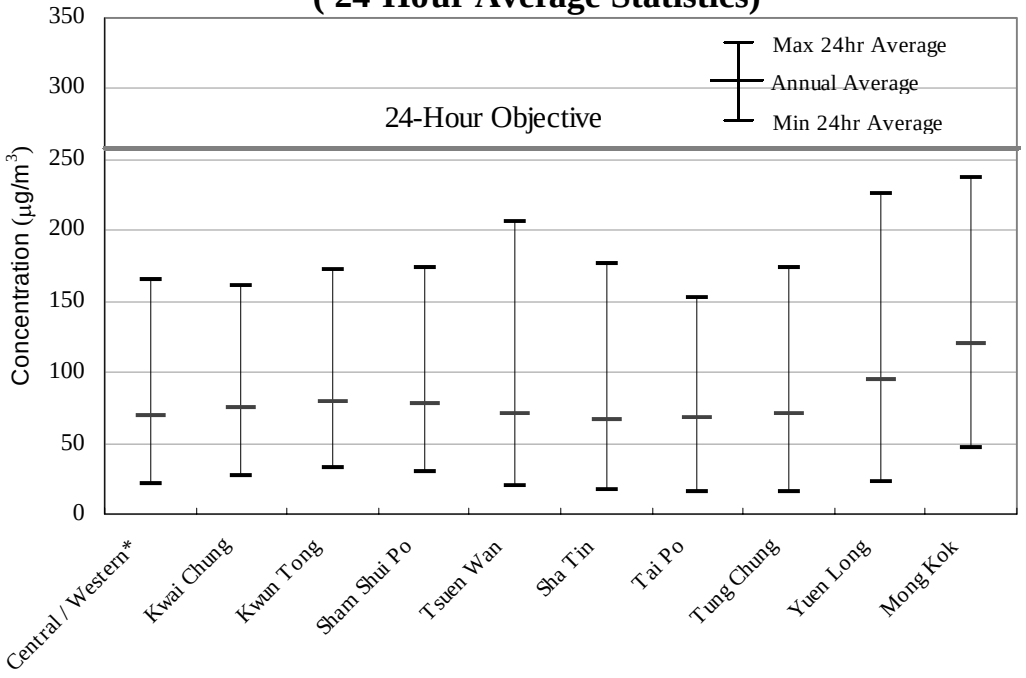
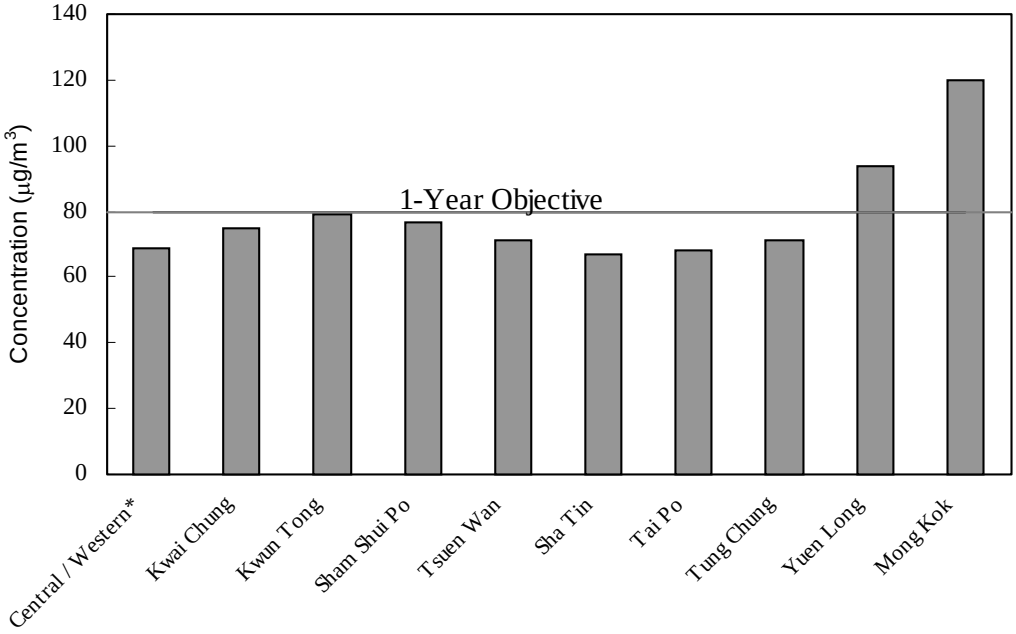


Figure 6b: TSP Monitoring 2001
(Annual Average)



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 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 will also have a major impact on visibility.

RSP was measured at all 14 stations in the monitoring network in 2001. Most of these stations were also equipped with high-volume sampler to collect particulate samples for chemical analysis. In 2001, the highest 24-hr average (182 $\mu g/m^3$) was recorded at Causeway Bay roadside station. The second highest 24-hr average (167 $\mu g/m^3$) was recorded at Yuen Long station. There was no station exceeding the 24-hr AQO for RSP in the year.

In 2001, the highest annual average (97 $\mu g/m^3$) 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 70 $\mu g/m^3$ and 73 $\mu g/m^3$ respectively. Two general stations, viz Yuen Long and Kwun Tong stations recorded exceedance of the annual AQO of RSP, with annual averages of 57 $\mu g/m^3$ and 56 $\mu g/m^3$ respectively.

Figure 7a: RSP Monitoring 2001
(24-Hour Average Statistics)

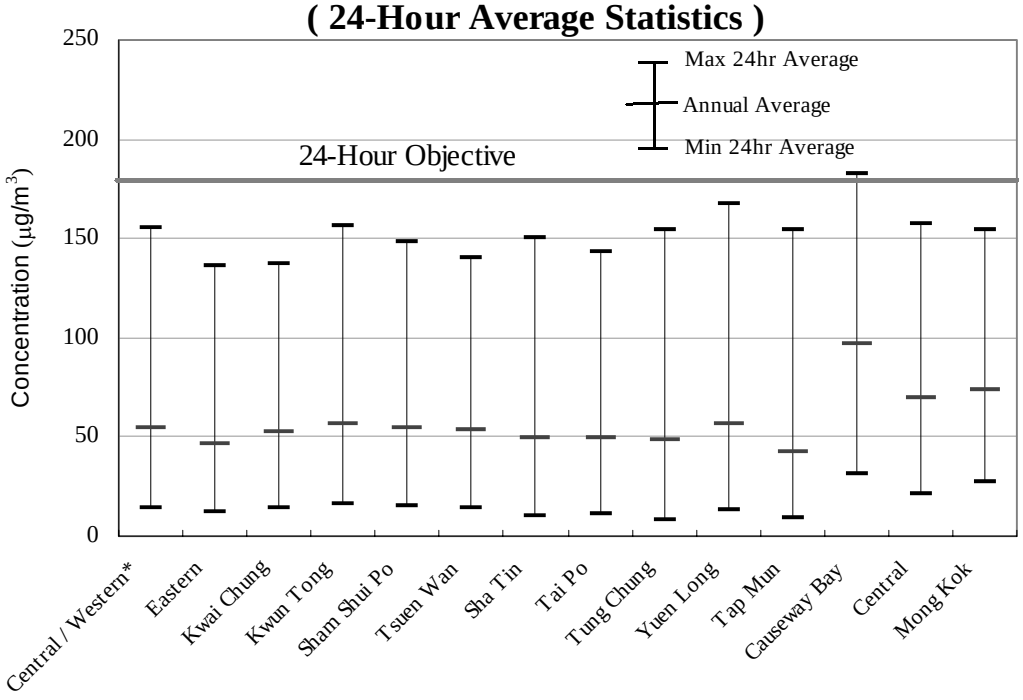
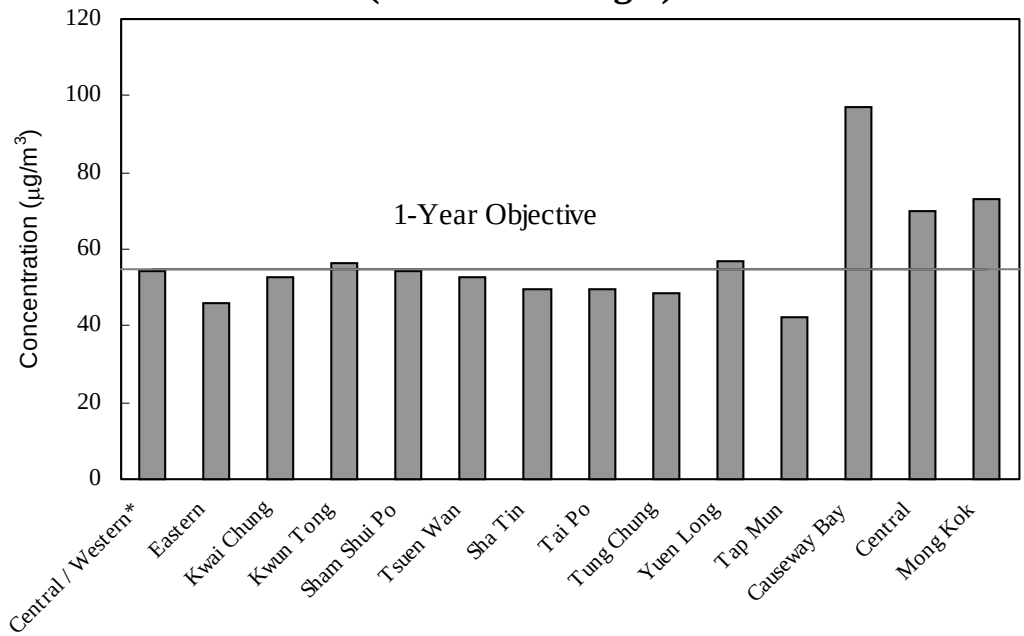


Figure 7b: RSP Monitoring 2001
(Annual Average)



4.3 Lead (Pb)

Lead is the only one AQO pollutant 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 concentration continued to linger at very low levels during 2001. The overall 3-month averages ranged from 33 ng/m^3 (second quarter) to 108 ng/m^3 (fourth quarter) and were well within the relevant limit of 1,500 ng/m^3.

5. 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 2001, 10 of them are considered more important in terms of their health impacts and their annual averages are summarised in Table C8. Detailed description of the 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.

6. 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.

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 and rural stations.

Figure 8: 2001 Diurnal variations of NO_2

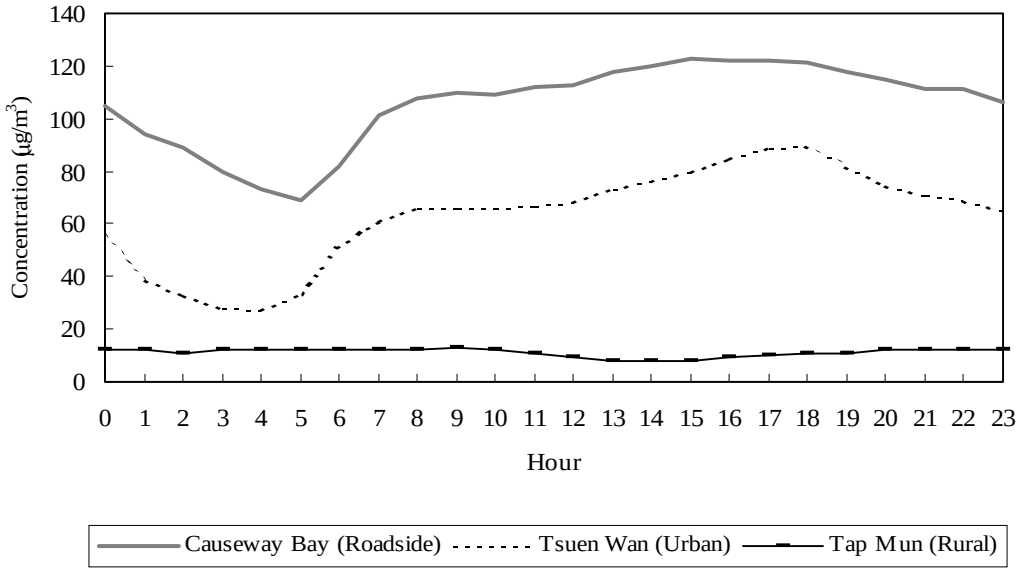
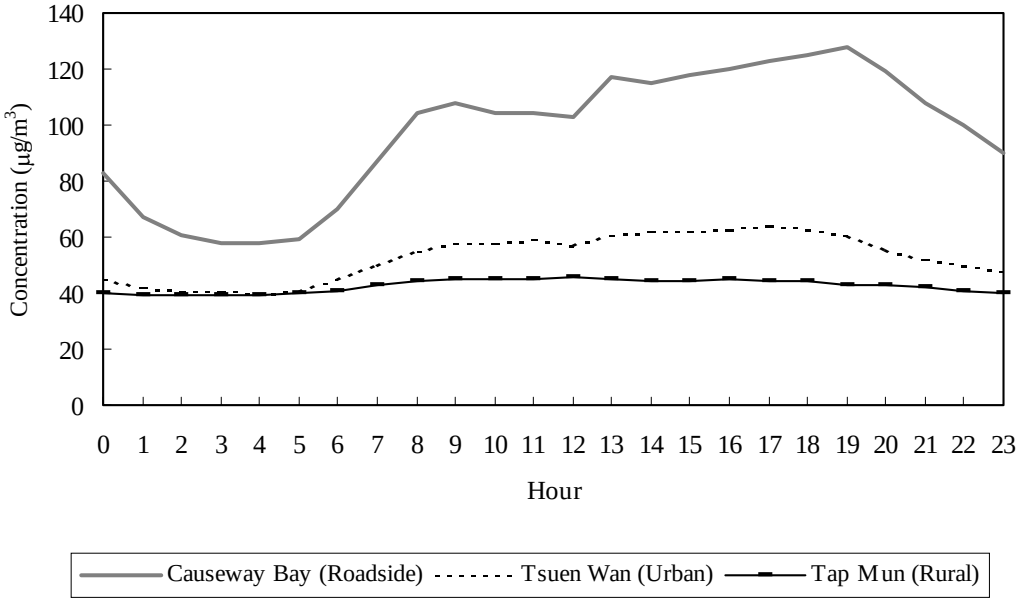
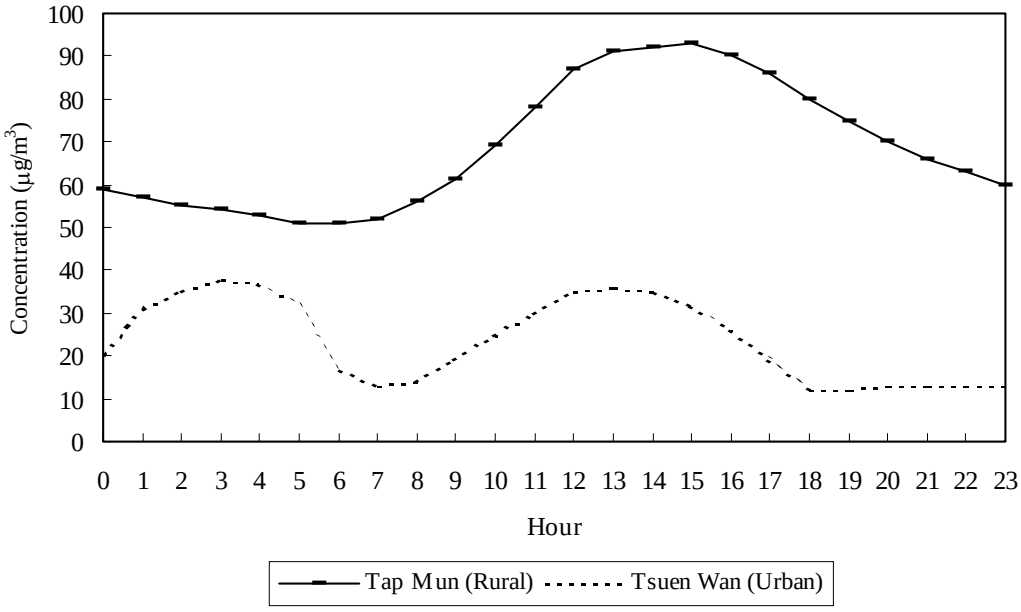


Figure 9: 2001 Diurnal variations of RSP



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: 2001 Diurnal variations of O_3



6.2 Over a Year

Concentrations of NO_2 and RSP are substantially lower in summer due to a number of reasons. The higher temperature in summer months induces a larger mixing height, 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.

The formation of ozone is dependent on a number of factors including the availability of precursor pollutants such as NO_2. The average ozone levels are low from June to August when NO_2 levels are also low during the same period.

Figure 11: Monthly variations of NO_2 and RSP at Tsuen Wan in 2001

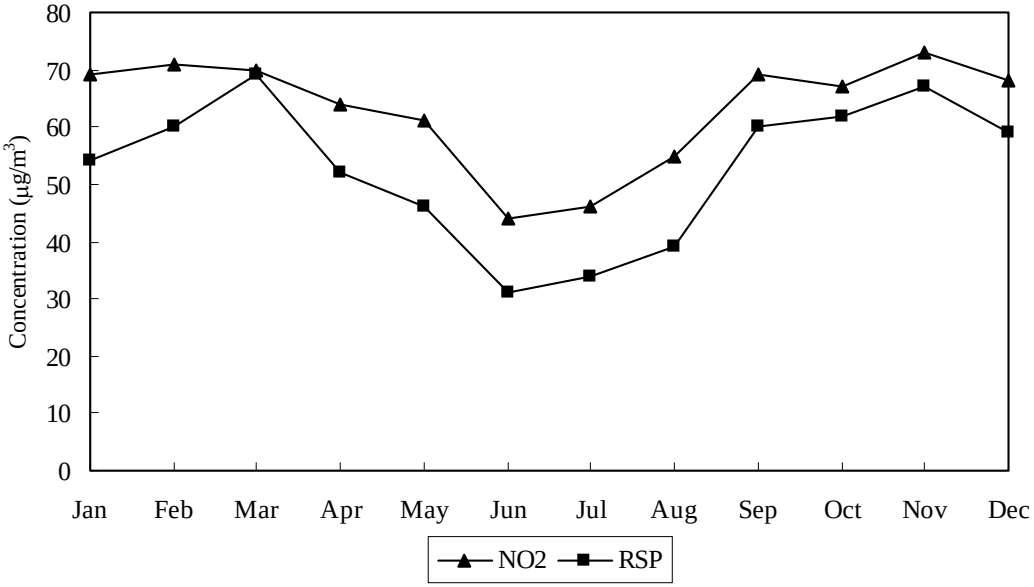
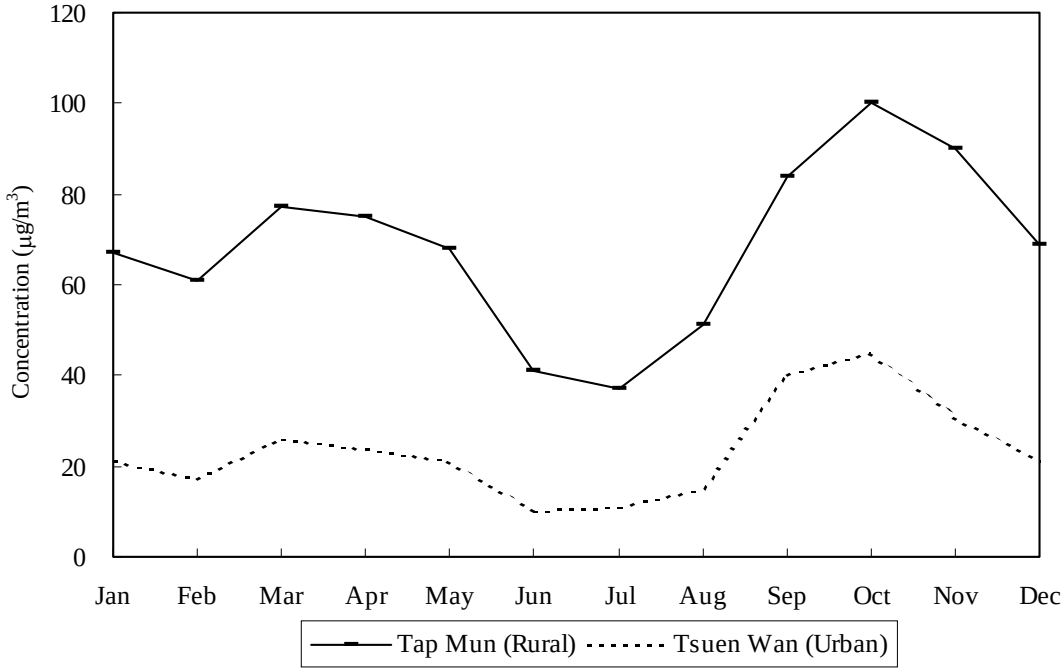


Figure 12: Monthly variations of O_3 in 2001



6.3 Long Term Trends

The long-term trends for various air pollutants presented in this section are based on data from various air quality monitoring stations categorised into 4 groups of land use setting, namely Urban, New Town, Rural and Roadside as defined in Table 4 below.

Table 4: 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

6.3.1 Sulphur Dioxide (SO_2)

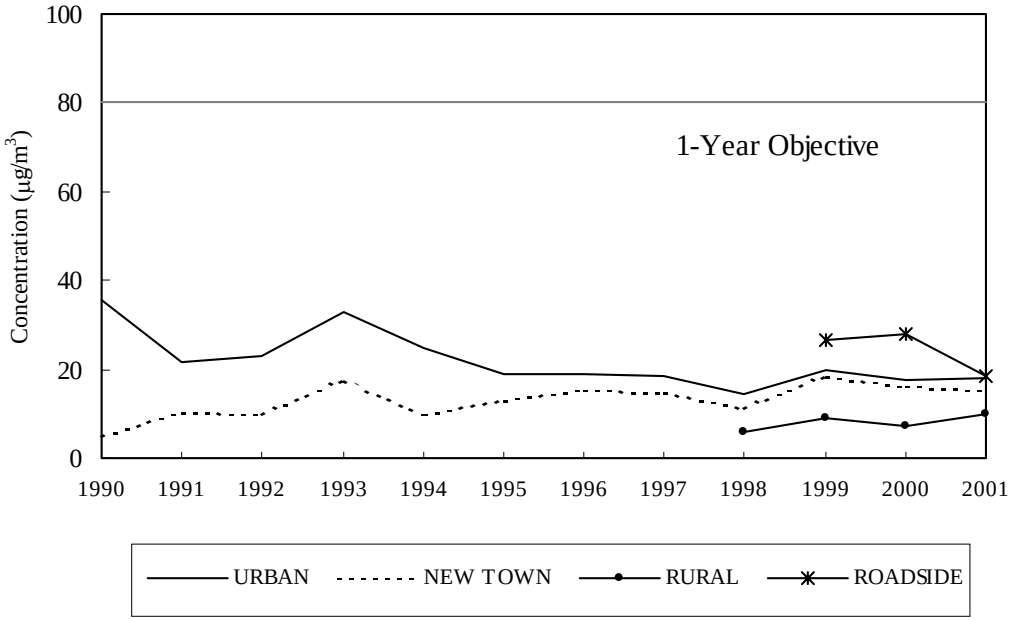
Since the enforcement of the Air Pollution Control (Fuel Restriction) Regulations in 1990 for cutting sulphur content of industrial fuels and the Air Pollution Control (Motor Vehicle Fuel) Regulations in 1995 for controlling motor vehicle fuel quality, SO_2 concentrations in Hong Kong have reduced and 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 2001 (19 $\mu g/m^3$) dropped by 32% compared with the 2000 value (28 $\mu g/m^3$).

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

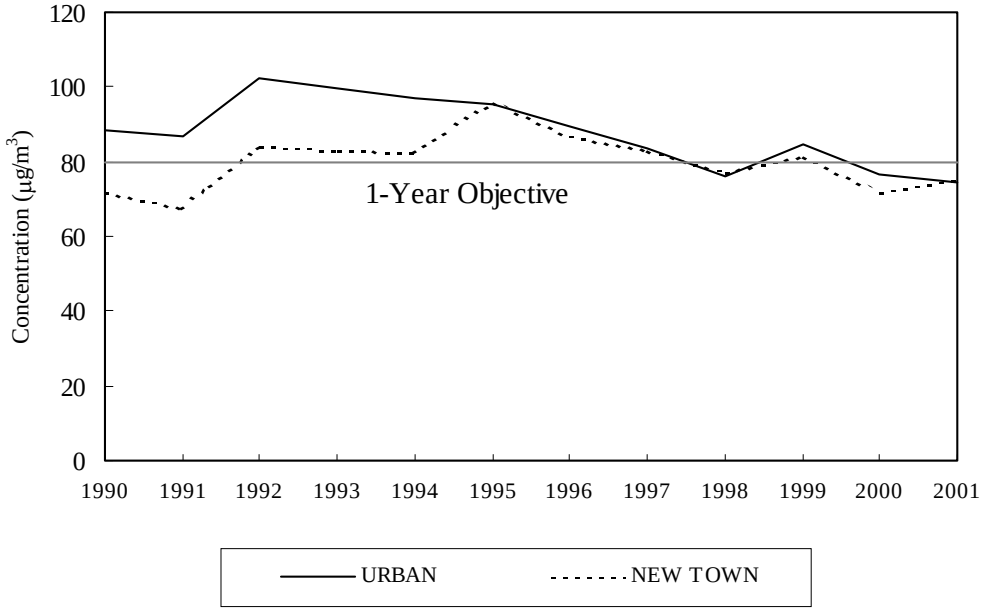
Figure 13: SO_2 long term trend



6.3.2 Total Suspended Particulates (TSP)

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

Figure 14: TSP long term trend

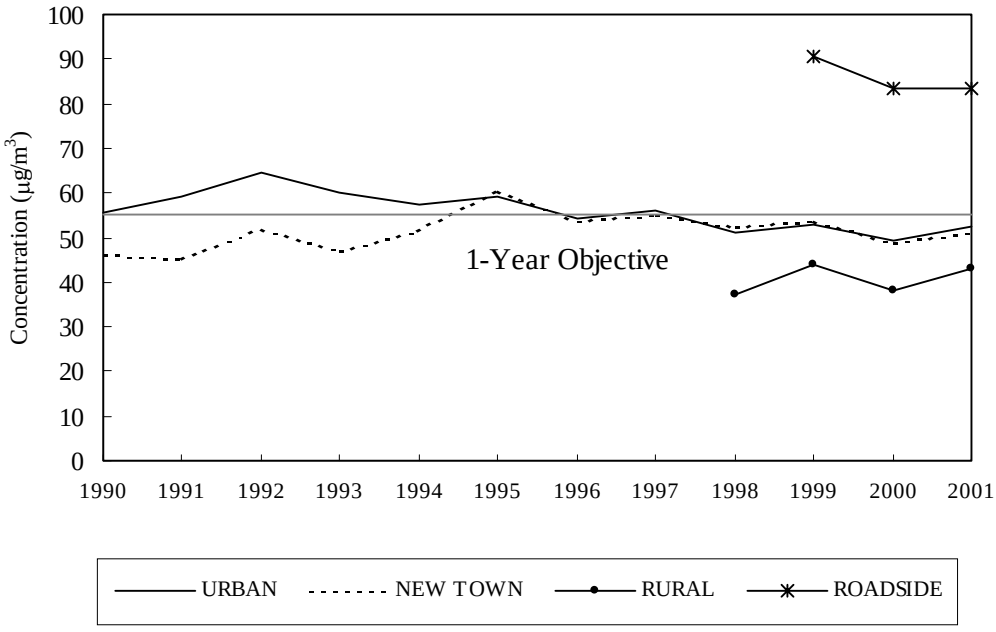


6.3.3 Respirable Suspended Particulates (RSP)

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 2001 reduced by 8% compared with 1999.

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

Figure 15: RSP long term trend



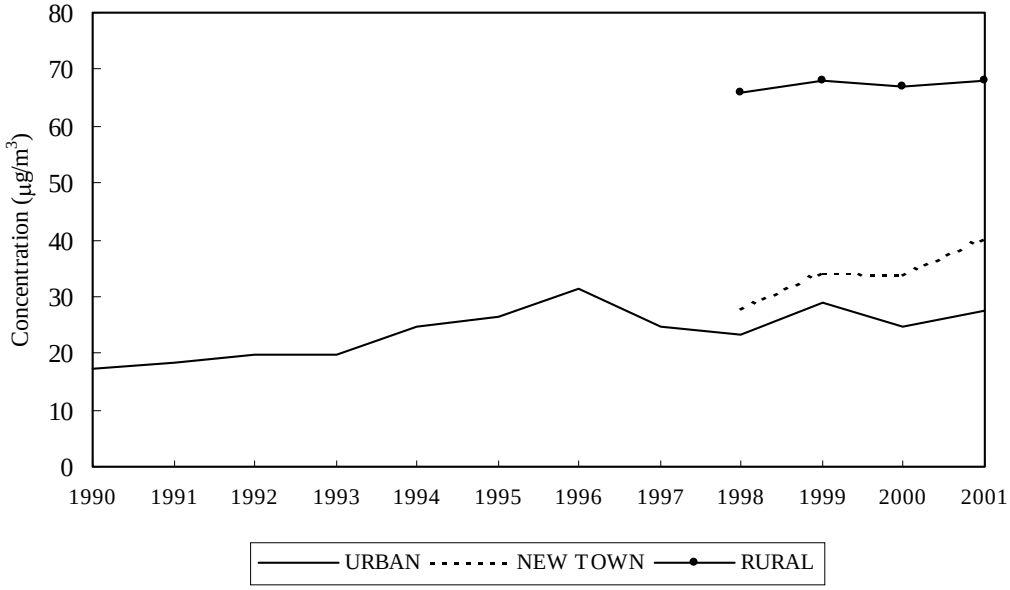
6.3.4 Ozone (O_3)

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

During the past 10 years, ozone levels in the territory showed a slow rising trend. The annual average of ozone for urban stations in 2001 (27 $\mu g/m^3$) was 50% higher than the 1990 value (18 $\mu g/m^3$).

Ozone is a regional air pollution issue. The rising trend of ozone recorded in the territory generally reflects deterioration in air quality on a regional scale over the past decade. The Hong Kong Special Administrative Region Government and Guangdong Provincial Government are jointly working on a plan to improve regional air quality.

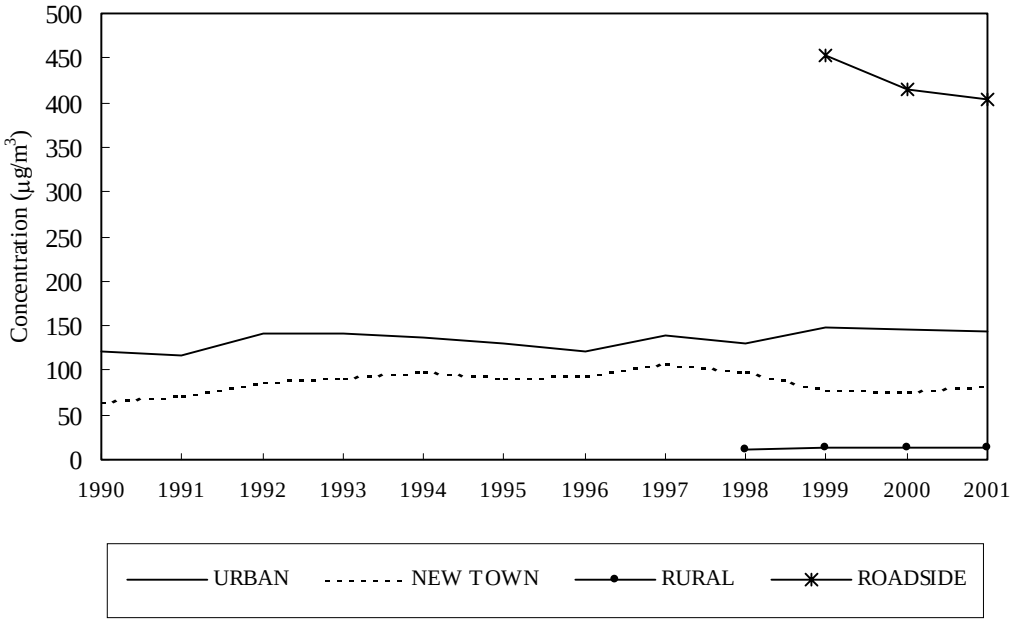
Figure 16: O_3 long term trend



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

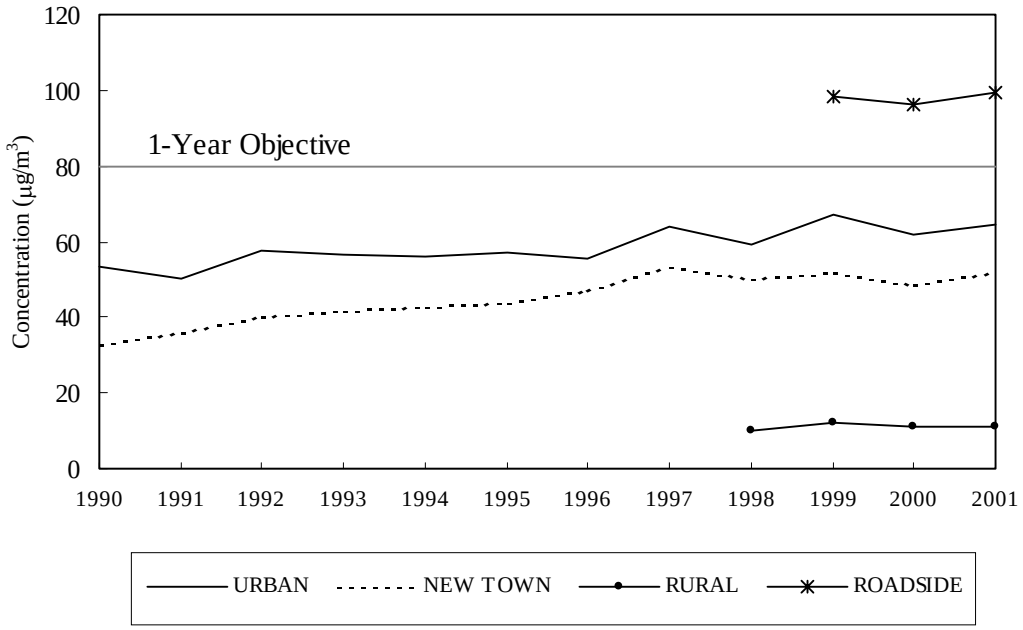
From Figure 17, the annual average of NO_x in urban areas has increased slightly since 1996 but levelled off after 1999. The annual average of NO_x at roadside in 2001 reduced by 11% compared with 1999, which generally reflects a reduction in emission levels as a result of vehicle emission control measures 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 air. Since 1990, the NO_2 levels in urban and new town areas have exhibited slow rising trends but they levelled off from 1999.

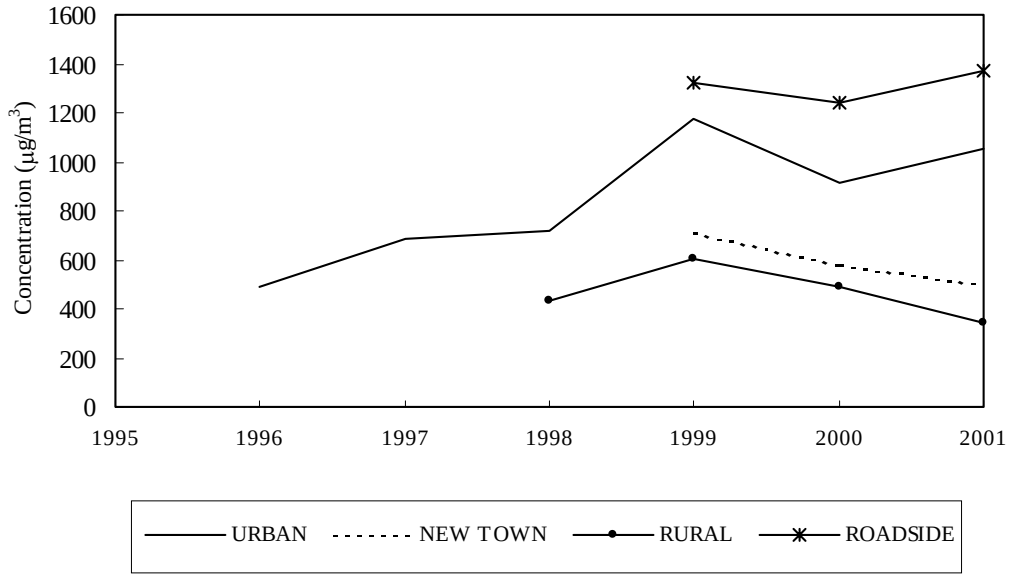
Figure 18: NO_2 long term trend



6.3.6 Carbon Monoxide (CO)

CO levels in Hong Kong remained very low in the past few years, although a rising trend was observed in urban areas from 1996 to 2001. With the implementation of a more stringent vehicle emission standard in 2001, it is expected that CO levels in Hong Kong will continue to be well within the relevant AQOs in the future.

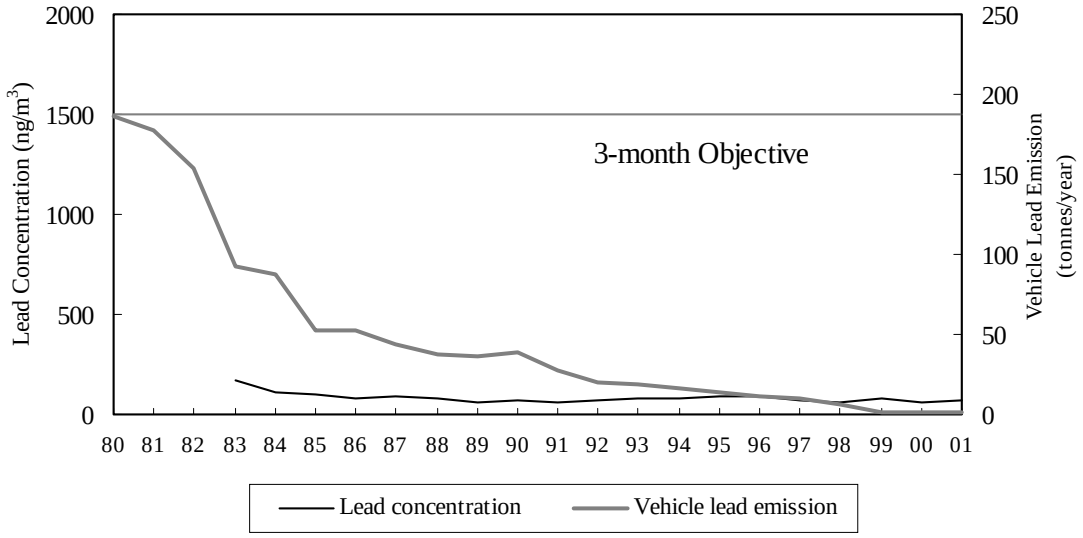
Figure 19: CO long term trend



6.3.7 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. It is expected that ambient lead concentrations will remain very low in the future.

Figure 20 : Vehicle lead emission and lead concentration



6.4 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 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 near Taiwan or Philippines while high pressure dominates over South China region.

Episodes in Hong Kong usually last for a short period ranging from a few hours to a few days. However, there were two special episodes which had affected Hong Kong for a prolonged period in 2001. In early March, elevated RSP levels were recorded across the territory for over one week. The episode was likely associated with the sand storms that hit many other Mainland cities during the same period. In mid September 2001, a tropical cyclone Nari hovered near Taiwan for more than one week, creating stagnant and hot weather conditions over South China region that resulted in active photochemical activities and building up of air pollution levels. During the period, exceedances of AQO for ozone were recorded at a number of general stations and exceedances of AQO for NO_2 were recorded at all roadside stations and a few general stations.

Notwithstanding the above two special episodes, the annual average concentration of RSP and NO_x at roadside in 2001 reduced by 8% and 11% respectively as compared with 1999, reflecting that the vehicle emission control measures implemented by the Government in recent years have brought positive results. The levels of these pollutants would have dropped further were it not for the special episodes.

Appendix A

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

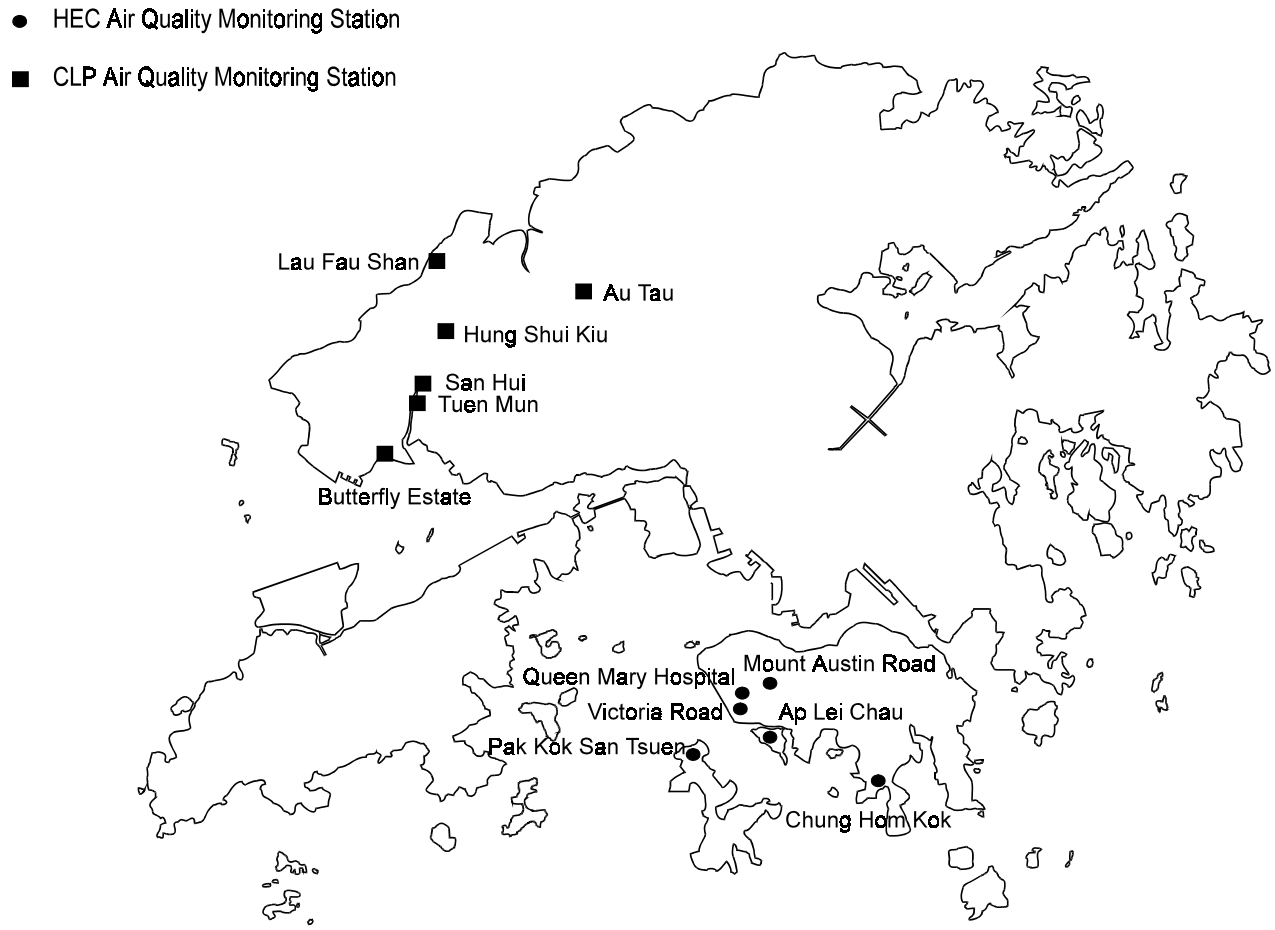


Figure A1 LOCATION OF HEC & CLP AIR QUALITY MONITORING STATIONS FOR SULPHUR DIOXIDE AND NITROGEN DIOXIDE

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	12	7 - 20
Chung Hom Kok	7	4 - 14
Victoria Road	17	13 - 25
Queen Mary Hospital	17	8 - 33
Ap Lei Chau	13	8 - 24
Pak Kok San Tsuen	13	9 - 19
Nitrogen Dioxide (NO_2) [3]		
Mount Austin Road	26	12 - 35
Chung Hom Kok	20	14 - 26
Victoria Road	41	25 - 55
Queen Mary Hospital	30	16 - 46
Ap Lei Chau	30	17 - 45
Pak Kok San Tsuen	29	13 - 43

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	21	13 - 31
Tuen Mun	15	9 - 27
Hung Shui Kiu	15	4 - 31
Au Tau	30	25 - 38
Butterfly Estate [4]	20	18 - 22
Lau Fau Shan	11	4 - 21
Nitrogen Dioxide (NO_2) [3]		
Tuen Mun	49	24 - 74
Butterfly Estate [4]	63	62 - 64
Lau Fau Shan	38	24 - 53

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 restarted in Nov 2001.

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: 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 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 2001, 361 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 –14.6% and 11.7%, 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 2001, 1718 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 -6.9% and 9.5%, 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 Environmental 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	3m	Jan 98
Central	Junction of Des Voeux Road Central and Chater Road, Central	Urban Roadside : Busy commercial/financial area surrounded by many tall buildings	8.5m	4.5m	Oct 98
Mong Kok	Junction of Nathan Road and Lai Chi Kok Road	Urban Roadside : Mixed residential/commercial area surrounded by some moderately tall buildings	8.5m	3m	Jan 01

Note: P.D. = Principal datum

Table B2. Summary of the Parameters Monitored in the Network (2001)

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

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

Table B3 List of Equipment Used in Measuring Air Pollutant Concentration

Pollutants	**Measurement Principle**	**Commercial Instrument**
SO_2	UV fluorescence	TECO Model 43A Monitor Laboratories 8850 Environnement S.A. AF21M
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-9A	Graseby GPSI / Polyurethane Foam	Twice per month	24 hours
Hexavalent Chromium	CARB SOP MLD 039	Xontech 925 / Bicarbonate Impregnated Filter	Every 12 days	24 hours

Figure B1: Accuracy of Air Quality Monitoring Network, 2001

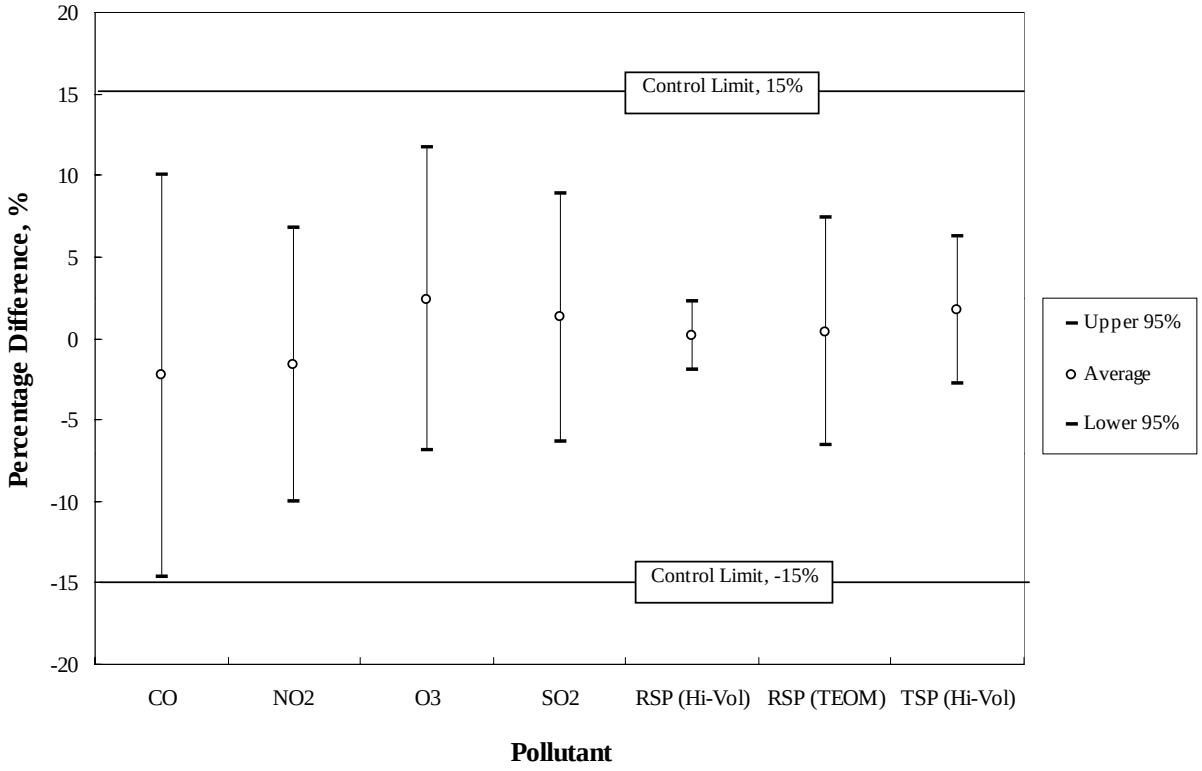
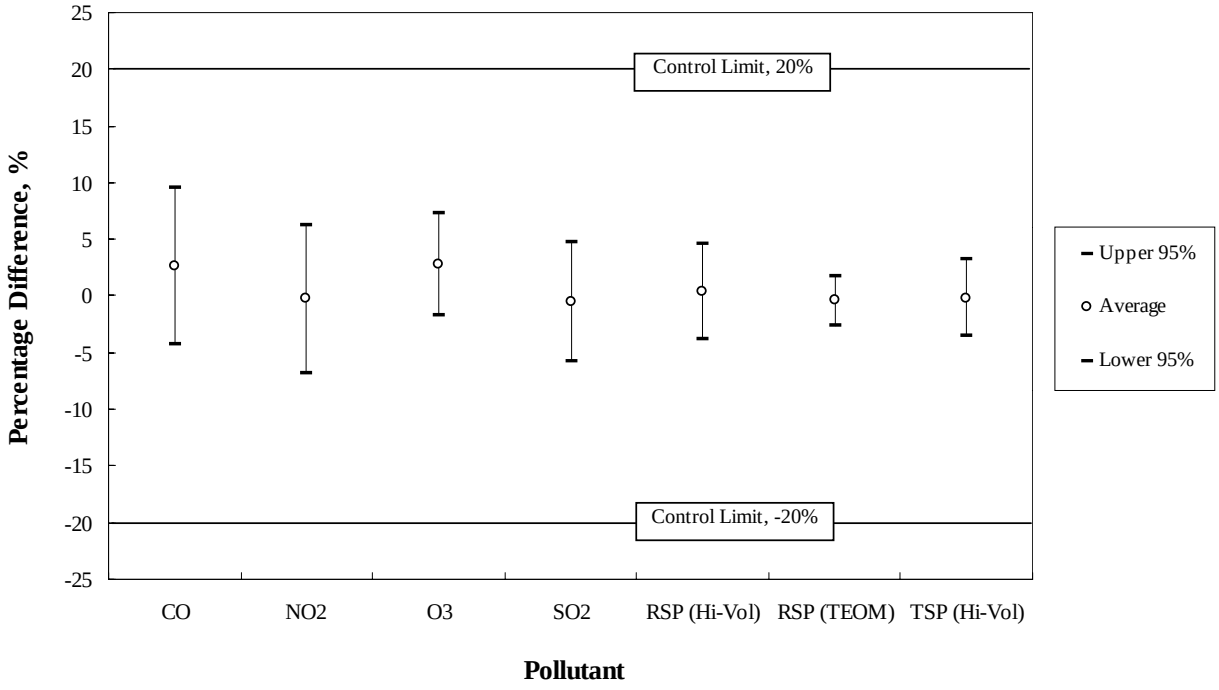


Figure B2: Precision of Air Quality Monitoring Network, 2001



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 2001

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	274	268	265	252
Eastern	196	167	164	160
Kwai Chung	222	215	213	207
Kwun Tong	226	219	205	183
Sham Shui Po	273	239	228	222
Tsuen Wan	244	216	204	189
Sha Tin	184	177	160	137
Tai Po	192	183	159	158
Tung Chung	282	188	187	179
Yuen Long	311	282	272	259
Tap Mun	103	84	82	77
Causeway Bay	151	150	150	147
Central	299	222	218	206
Mong Kok	207	196	195	193

Pollutant: Nitrogen Oxides

Station	1st High	2nd High	3rd High	4th High
Central / Western	952	878	805	803
Kwai Chung	1096	1096	1088	1033
Kwun Tong	1180	1100	994	948
Sham Shui Po	1116	1056	1038	982
Tsuen Wan	790	750	744	730
Sha Tin	887	673	635	621
Tung Chung	472	368	360	344
Tap Mun	289	280	265	253
Causeway Bay	1590	1581	1505	1492
Central	1482	1414	1363	1319
Mong Kok	1354	1262	1259	1202

Pollutant: Nitric Oxide

Station	1st High	2nd High	3rd High	4th High
Central / Western	513	440	433	414
Kwai Chung	577	569	559	542
Kwun Tong	656	616	543	480
Sham Shui Po	632	586	559	531
Tsuen Wan	433	393	389	370
Sha Tin	495	367	344	333
Tung Chung	242	185	163	160
Tap Mun	130	125	114	100
Causeway Bay	924	917	880	874
Central	863	781	738	724
Mong Kok	755	733	680	671

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	280	270	260	254
Eastern	207	194	193	185
Kwai Chung	301	289	286	281
Kwun Tong	267	248	247	240
Sham Shui Po	286	275	264	257
Tsuen Wan	289	251	244	237
Sha Tin	253	244	237	226
Tai Po	251	231	228	224
Tung Chung	206	202	194	192
Yuen Long	247	235	230	226
Tap Mun	108	108	106	105
Causeway Bay	300	293	293	293
Central	329	328	328	320
Mong Kok	288	284	282	278

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

Station	1st High	2nd High	3rd High	4th High
Tsuen Wan	3910	3790	3790	3790
Tung Chung	3790	3780	3390	3380
Tap Mun	2650	2540	2440	2390
Causeway Bay	4950	4600	4490	4370
Central	3790	3680	3680	3680
Mong Kok	4370	4260	4260	4260

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

Station	1st High	2nd High	3rd High	4th High
Central / Western	267	228	227	207
Eastern	162	144	143	141
Kwai Chung	159	149	148	144
Kwun Tong	142	141	136	133
Sham Shui Po	198	198	191	189
Tsuen Wan	243	219	209	205
Sha Tin	258	248	211	208
Tai Po	248	243	240	221
Tung Chung	348	325	324	322
Yuen Long	228	211	208	198
Tap Mun	288	278	276	255

Pollutant: Respirable Suspended Particulates

Station	1st High	2nd High	3rd High	4th High
Central / Western	242	223	222	222
Eastern	193	188	183	183
Kwai Chung	215	213	212	211
Kwun Tong	261	239	233	224
Sham Shui Po	237	229	226	225
Tsuen Wan	237	230	219	215
Sha Tin	225	203	192	191
Tai Po	227	221	217	215
Tung Chung	262	252	231	231
Yuen Long	260	234	232	231
Tap Mun	188	187	184	184
Causeway Bay	275	273	273	267
Central	302	267	257	253
Mong Kok	250	246	234	231

TABLE C2: THE HIGHEST 2 DAILY POLLUTANT CONCENTRATIONS MEASURED IN 2001

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

Station	1st High	2nd High
Central / Western	103	97
Eastern	85	54
Kwai Chung	99	84
Kwun Tong	109	76
Sham Shui Po	99	89
Tsuen Wan	80	77
Sha Tin	59	56
Tai Po	80	63
Tung Chung	94	64
Yuen Long	99	94
Tap Mun	38	37
Causeway Bay	76	72
Central	78	77
Mong Kok	91	73

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

Station	1st High	2nd High
Central / Western	144	133
Eastern	120	109
Kwai Chung	162	160
Kwun Tong	167	144
Sham Shui Po	146	145
Tsuen Wan	141	128
Sha Tin	129	116
Tai Po	123	115
Tung Chung	116	112
Yuen Long	125	122
Tap Mun	63	41
Causeway Bay	197	195
Central	199	199
Mong Kok	174	173

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

Station	1st High	2nd High
Central / Western	155	147
Eastern	136	125
Kwai Chung	137	133
Kwun Tong	156	143
Sham Shui Po	148	140
Tsuen Wan	140	138
Sha Tin	150	121
Tai Po	143	140
Tung Chung	154	138
Yuen Long	167	146
Tap Mun	154	129
Causeway Bay	182	178
Central	157	145
Mong Kok	154	151

Pollutant: Nitrogen Oxides

Station	1st High	2nd High
Central / Western	334	324
Kwai Chung	441	440
Kwun Tong	410	388
Sham Shui Po	414	407
Tsuen Wan	331	325
Sha Tin	310	281
Tung Chung	226	211
Tap Mun	130	57
Causeway Bay	934	912
Central	699	681
Mong Kok	639	633

Pollutant: Nitric Oxide

Station	1st High	2nd High
Central / Western	140	131
Kwai Chung	205	202
Kwun Tong	185	184
Sham Shui Po	186	177
Tsuen Wan	147	144
Sha Tin	129	121
Tung Chung	85	80
Tap Mun	44	10
Causeway Bay	534	524
Central	345	330
Mong Kok	320	307

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

Station	1st High	2nd High
Central / Western	165	162
Kwai Chung	161	152
Kwun Tong	172	148
Sham Shui Po	173	143
Tsuen Wan	206	141
Sha Tin	177	147
Tai Po	153	150
Tung Chung	173	152
Yuen Long	226	215
Mong Kok	237	224

Pollutant: Ozone

Station	1st High	2nd High
Central / Western	98	96
Eastern	78	73
Kwai Chung	83	77
Kwun Tong	63	59
Sham Shui Po	76	69
Tsuen Wan	76	74
Sha Tin	123	110
Tai Po	119	103
Tung Chung	124	113
Yuen Long	92	84
Tap Mun	144	143

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

Station	1st High	2nd High
Tsuen Wan	3706	3691
Tung Chung	2664	2611
Tap Mun	2330	2323
Causeway Bay	3623	3594
Central	3535	3521
Mong Kok	4098	4098

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: 2001 MONTHLY AND ANNUAL AVERAGES OF GASEOUS POLLUTANTS

Pollutant: Sulphur Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	19	25	24	23	25	15	18	21	30	15	15 *	*	21 *
Eastern	10	12	13	9	13	10	15	12	18	11	12	12	12
Kwai Chung	11	22	21	20	29	25	29	26	25	14	22	15	22
Kwun Tong	14	14	13	11	22	18	17	16	22	11	12	12	15
Sham Shui Po	16	26	23	19	24	22	25	19	25	11	13	13	20
Tsuen Wan	14	23	17	13	19	22	24	22	18	8	14	19	18
Sha Tin	12	14	15	12	18	17	18	14	15	10	15	13	14
Tai Po	10	13	15	6	10	17	14	16	16	8	18	15	13
Tung Chung	18	24	16	10	17	10	12	17	22	15	20	24	17
Yuen Long	19	30	19	16	15	12	18	18	23	10	17	18	18
Tap Mun	7	9	9	5	9	7	9	11	12	14	19	10	10
Causeway Bay	24	20	17	14	19	16	21	20	25	11	15	17	18
Central	25	24	18	15	20	14	15	14	24	17	23	23	19
Mong Kok	18	23	19	18	23	22	19	17	23	15	20	20	20

Pollutant: Nitrogen Oxides

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	104	129	108	94	91	76	73	87	106	65	73 *	*	92 *
Kwai Chung	164	222	167	155	167	191	181	177	208	128	180	177	176
Kwun Tong	191	222	196	184	189	167	149	147	185	164	184	201	181
Sham Shui Po	162	185	147	127	122	133	127	122	141	106	134	143	137
Tsuen Wan	134	166	136	135	124	134	127	122	120	98	127	142	130
Sha Tin	104	107	85	72	75	93	92	91	119	63	128	110	95
Tung Chung	82	116	80	67	57	29	32	53	75	55	77	103	69
Tap Mun	11	17	11	10	14	7	14	12	14	10	22	21	14
Causeway Bay	519	522	474	434	417	447	437	410	497	358	418	531	455
Central	335	395	380	312	331	329	319	349	404	302	389	385	352
Mong Kok	372	385	364	353	359	358	323	344	341	315	340	354	350

Pollutant: Nitric Oxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	27	42	29	28	24	26	23	27	26	9	12 *	*	25 *
Kwai Chung	60	92	60	58	64	90	84	76	78	40	67	72	70
Kwun Tong	75	90	72	70	75	76	66	61	69	57	64	77	71
Sham Shui Po	56	68	46	43	39	51	48	42	42	21	36	47	45
Tsuen Wan	43	63	44	47	41	58	53	44	33	21	35	49	44
Sha Tin	34	36	24	20	22	38	37	31	37	13	44	38	31
Tung Chung	19	34	18	16	11	10	9	13	11	6	11	24	15
Tap Mun	0	2	1	2	2	2	3	3	2	1	3	2	2
Causeway Bay	265	273	237	218	210	244	238	215	246	161	199	274	231
Central	150	191	174	143	159	175	168	178	190	131	180	185	168
Mong Kok	177	188	172	171	175	190	169	174	153	133	149	168	168

Pollutant: Nitrogen Dioxide (Annual AQO = 80)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	63	65	63	52	56	39	41	48	66	47	51 *	*	54 *
Eastern	62	61	64	57	51	36	36	43	65	64	70	64	56
Kwai Chung	71	80	75	66	69	52	54	61	88	66	79	68	69
Kwun Tong	79	86	89	81	77	53	50	55	82	79	88	85	75
Sham Shui Po	77	82	77	62	63	55	57	61	78	72	78	71	69
Tsuen Wan	69	71	70	64	61	44	46	55	69	67	73	68	63
Sha Tin	55	55	51	45	46	38	40	47	66	47	65	56	51
Tai Po	53	45	48	37	44	43	39	45	65	48	68	61	50
Tung Chung	53	62	53	43	41	14	17	32	59	46	61	66	46
Yuen Long	65	77	71	62	58	42	42	57	73	55	74	64	61
Tap Mun	10	13	10	8	12	4	10	9	12	8	19	18	11
Causeway Bay	116	112	120	106	97	78	77	85	124	115	119	117	105
Central	105	102	114	91	81	57	57	74	114	106	115	107	94
Mong Kok	108	107	115	107	103	68	65	80	109	110	114	99	99

Pollutant: Carbon Monoxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tsuen Wan	1050	1530	970	840	900	900	1280	980	1040	930	1010	1200	1051
Tung Chung	820	1020	530	510	550	190	240	340	440	650	270	400	494
Tap Mun	610	460	520	410	640 *	*	50 *	340	280	280	170	190	345 *
Causeway Bay	1520	1410	1280	1190	1210	1010	1040	1630	1560	1750	1520	1930	1423
Central	1440	1410	1430	1110	1240	1070	1230	1210	1640	1260	1580	1280	1324
Mong Kok	1940	2080	1420	1630	1510	1150	1140	1350	1580	1600	1610	1860	1571

Pollutant: Ozone

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	31	27	36	37	38	23	22	28	46	60	42 *	*	35 *
Eastern	31	32	42	42	34	18	21	24	41	50	35	39	34
Kwai Chung	22	19	29	28	21	10	9	11	28	48	33	24	23
Kwun Tong	23	23	30	28	26	14	13	17	32	39	34	23	25
Sham Shui Po	18	16	24	22	22	9	10	14	35	44	35	24	23
Tsuen Wan	21	17	26	24	21	10	11	15	40	45	31	21	24
Sha Tin	33	30	46	51	46	26	24	27	43	69	46	33	40
Tai Po	41	40	53	50	50	39	35	41	53	75	61	50	49
Tung Chung	32	18	41	43	48	31	31	36	58	70	51	29	41
Yuen Long	30	26	31	30	33	21	22	29	38	53	38	25	31
Tap Mun	67	61	77	75	68	41	37	51	84	100	90	69	68

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: 2001 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	96	93	89	87	51	26	33	38	73	99	97 *	*	69 *
Kwai Chung	88	91	104	61	68	43	43	58	87	74	99	85	75
Kwun Tong	82	109	95	76	58	53	52	54	78	86	117	97	79
Sham Shui Po	102	113	94	80	63	34	49	48	74	92	100	84	77
Tsuen Wan	68	119	94	60	59	35	58	50	74	68	84	83	71
Sha Tin	65	61	110	63	56	36	38	57	79	82	97	78	67
Tai Po	88	57	97	69	44	34	31	46	91	82	98	87	68
Tung Chung	90	108	104	48	52	19	31	54	78	68	98	101	71
Yuen Long	122	92	131	84	57	43	37	59	119	103	134	148	94
Mong Kok	129	132	180	113	113	74	70	93	111	141	156	131	120

Pollutant: Respirable Suspended Particulates (Annual AQO = 55)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Central / Western	66	66	81	57	47	26	30	36	63	68	65 *	*	54 *
Eastern	51	51	67	49	38	21	26	28	50	55	62	53	46
Kwai Chung	51	58	69	54	49	35	38	39	63	60	65	55	53
Kwun Tong	60	64	77	51	53	32	36	38	62	67	72	63	56
Sham Shui Po	60	63	75	55	48	28	33	37	61	63	68	58	54
Tsuen Wan	54	60	69	52	46	31	34	39	60	62	67	59	53
Sha Tin	54	51	64	46	41	24	29	37	59	60	68	56	49
Tai Po	57	52	66	46	42	26	31	34	60	58	68	57	50
Tung Chung	52	62	62	45	39	19	24	32	58	56	68	67	49
Yuen Long	62	70	73	51	48	26	30	40	63	62	78	78	57
Tap Mun	46	44	59	42	36	19	24	26	46	53	62	50	43
Causeway Bay	104	95	126	104	107	83	81	89	98	100	98	78	97
Central	69	74	90	71	67	48	50	55	81	76	84	73	70
Mong Kok	78	78	89	74	69	54	55	60	80	80	86	75	73

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: 2001 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	7405	84.5	6	9	14	22	45	67	97	118	15	21	274	103
Eastern	7904	90.2	4	5	9	14	21	35	57	78	9	12	196	85
Kwai Chung	8639	98.6	2	5	11	24	61	84	112	131	12	22	222	99
Kwun Tong	8594	98.1	4	7	10	15	30	51	81	104	11	15	226	109
Sham Shui Po	8529	97.4	6	8	12	20	44	64	98	124	13	20	273	99
Tsuen Wan	8571	97.8	3	6	10	22	42	59	80	99	11	18	244	80
Sha Tin	8566	97.8	6	7	10	15	28	42	64	79	11	14	184	59
Tai Po	8318	95.0	2	5	10	16	26	37	58	79	10	13	192	80
Tung Chung	8416	96.1	3	5	10	20	39	56	80	100	11	17	282	94
Yuen Long	8062	92.0	2	6	12	23	37	50	77	107	12	18	311	99
Tap Mun	8362	95.5	2	4	8	14	21	28	37	46	8	10	103	38
Causeway Bay	8586	98.0	8	10	14	20	34	46	66	81	15	18	151	76
Central	8578	97.9	6	9	14	24	38	52	72	88	14	19	299	78
Mong Kok	8463	96.6	7	10	15	22	36	53	77	95	16	20	207	91

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	7361	84.0	25	43	72	114	175	232	325	403	70	92	952	334
Kwai Chung	8610	98.3	37	90	149	234	339	415	524	613	132	176	1096	441
Kwun Tong	8493	97.0	43	114	174	241	305	352	430	499	145	181	1180	410
Sham Shui Po	8522	97.3	38	85	127	171	225	284	379	466	112	137	1116	414
Tsuen Wan	8577	97.9	32	75	117	167	232	287	357	428	103	130	790	331
Sha Tin	8566	97.8	23	37	65	121	204	280	374	435	67	95	887	310
Tung Chung	8401	95.9	9	25	54	100	147	179	218	242	49	69	472	226
Tap Mun	8370	95.5	2	4	8	17	32	44	60	73	9	14	289	130
Causeway Bay	8595	98.1	181	288	425	591	756	881	1029	1110	396	455	1590	934
Central	8553	97.6	108	191	333	478	622	711	811	910	290	352	1482	699
Mong Kok	8529	97.4	120	250	363	446	531	584	673	755	309	350	1354	639

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	7360	84.0	2	5	12	28	62	98	144	191	13	25	513	140
Kwai Chung	8610	98.3	5	23	50	97	157	201	260	308	42	70	577	205
Kwun Tong	8491	96.9	6	34	63	99	138	165	207	248	47	71	656	185
Sham Shui Po	8528	97.4	3	16	35	59	89	122	179	231	29	45	632	186
Tsuen Wan	8577	97.9	2	14	33	60	98	128	174	206	26	44	433	147
Sha Tin	8566	97.8	3	5	13	38	85	128	176	214	14	31	495	129
Tung Chung	8401	95.9	0	2	5	20	44	62	84	100	8	15	242	85
Tap Mun	8370	95.5	0	1	1	2	4	6	10	15	2	2	130	44
Causeway Bay	8595	98.1	71	128	209	312	414	487	574	623	189	231	924	534
Central	8553	97.6	34	77	152	239	325	380	437	488	125	168	863	345
Mong Kok	8529	97.4	41	107	170	223	276	313	368	412	137	168	755	320

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	7361	84.0	19	31	50	70	92	109	133	150	45	54	280	144
Eastern	7908	90.3	23	35	53	74	91	103	119	136	49	56	207	120
Kwai Chung	8610	98.3	27	44	64	86	114	139	165	182	59	69	301	162
Kwun Tong	8491	96.9	32	50	74	97	117	132	154	174	67	75	267	167
Sham Shui Po	8530	97.4	32	47	67	87	107	123	142	161	62	69	286	146
Tsuen Wan	8577	97.9	26	41	59	80	103	120	143	157	55	63	289	141
Sha Tin	8566	97.8	20	31	45	64	90	107	132	151	43	51	253	129
Tai Po	8341	95.2	19	30	44	63	88	106	129	144	42	50	251	123
Tung Chung	8401	95.9	6	20	40	65	90	107	129	145	35	46	206	116
Yuen Long	8064	92.1	28	39	56	78	102	118	141	158	54	61	247	125
Tap Mun	8370	95.5	0	3	7	14	27	37	50	59	8	11	108	63
Causeway Bay	8595	98.1	62	81	104	127	147	162	188	215	99	105	300	197
Central	8553	97.6	41	60	89	122	148	167	194	217	83	94	329	199
Mong Kok	8529	97.4	55	70	96	124	145	157	174	188	92	99	288	174

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	8538	97.5	690	800	1030	1270	1490	1730	1960	2300	991	1051	3910	3706
Tung Chung	8397	95.9	90	220	400	680	1000	1200	1590	1890	377	494	3790	2664
Tap Mun	6853	78.2	10	160	330	490	680	770	860	920	292	345	2650	2330
Causeway Bay	8439	96.3	920	1150	1380	1730	2070	2300	2530	2760	1341	1423	4950	3623
Central	8522	97.3	800	1030	1270	1610	1840	2070	2410	2640	1249	1324	3790	3535
Mong Kok	8475	96.7	920	1270	1490	1840	2180	2410	2760	3220	1493	1571	4370	4098

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	7320	83.6	7	14	27	52	74	86	99	114	25	35	267	98
Eastern	7908	90.3	14	20	31	45	58	66	79	86	29	34	162	78
Kwai Chung	8625	98.5	1	4	15	37	59	73	88	96	13	23	159	83
Kwun Tong	8474	96.7	5	10	19	34	53	68	84	92	18	25	142	63
Sham Shui Po	8519	97.2	2	5	15	33	54	70	87	98	13	23	198	76
Tsuen Wan	8486	96.9	2	5	15	35	58	72	88	103	13	24	243	76
Sha Tin	8456	96.5	6	11	30	63	89	102	115	125	25	40	258	123
Tai Po	8341	95.2	21	27	39	67	90	103	117	132	42	49	248	119
Tung Chung	8356	95.4	2	11	33	60	89	109	143	174	26	41	348	124
Yuen Long	8064	92.1	9	14	23	41	66	82	101	118	24	31	228	92
Tap Mun	8321	95.0	20	37	65	98	121	132	145	155	55	68	288	144

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	7486	85.5	19	28	47	71	99	121	151	166	45	54	242	155
Eastern	8499	97.0	16	24	41	61	82	98	118	132	38	46	193	136
Kwai Chung	8650	98.7	22	33	47	67	89	106	132	156	46	53	215	137
Kwun Tong	8475	96.7	23	34	51	72	95	112	138	158	49	56	261	156
Sham Shui Po	8568	97.8	21	31	49	71	92	110	136	157	46	54	237	148
Tsuen Wan	8621	98.4	22	31	46	68	91	109	134	155	45	53	237	140
Sha Tin	8497	97.0	18	28	44	65	89	104	126	142	41	49	225	150
Tai Po	8462	96.6	18	27	44	65	90	107	130	147	42	50	227	143
Tung Chung	8534	97.4	14	22	41	65	94	116	144	158	38	49	262	154
Yuen Long	8343	95.2	20	30	49	73	104	126	155	175	47	57	260	167
Tap Mun	8488	96.9	14	22	38	57	78	91	111	124	35	43	188	154
Causeway Bay	8364	95.5	46	67	94	122	151	170	197	213	87	97	275	182
Central	8533	97.4	30	44	64	89	116	137	161	177	61	70	302	157
Mong Kok	8649	98.7	37	51	70	90	112	129	151	168	67	73	250	154

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

TABLE C6: 2001 TOTAL WET AND DRY DEPOSITION

(a) WET DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong	Yuen Long
	WET DEPOSITION (TON/HA)	33448	33193	28404
	WEIGHTED MEAN pH (based on volume-weighted mean hydrogen ion concentrations ($[H^+]$)	4.66	4.73	4.66
	WEIGHTED MEAN pH (based on volume-weighted mean pH)	4.88	5.08	5.01
	NO. OF SAMPLES	93	85	86
Filtrate (Kg/Ha)	**NH_4^+**	6.67	8.82	10.21
	NO_3^-	20.60	23.20	29.97
	$SO_4^=$	51.05	51.79	47.84
	Cl^-	31.27	33.49	16.27
	F-	1.08	0.94	1.01
	Na^+	18.86	21.28	12.18
	K^+	9.52	8.35	7.42
	Formate	7.03	6.94	6.54
	Acetate	6.76	6.81	6.04
	Ca^{++}	3.33	3.67	3.98
	Mg^{++}	1.91	2.08	1.19

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

(b) DRY DEPOSITION

	Monitoring Station	Central / Western	Kwun Tong	Yuen Long
	NO. OF SAMPLES	22	26	26
Filtrate (Kg/Ha)	**NH_4^+**	0.60	0.30	0.54
	NO_3^-	9.48	11.53	8.52
	$SO_4^=$	15.34	17.33	15.53
	Cl^-	15.50	13.98	6.46
	Na^+	10.25	8.56	4.20
	K^+	0.78	0.98	1.10
	Formate	0.17	0.31	0.25
	Acetate	0.17	0.20	0.20
	Ca^{++}	7.52	11.82	9.46
	Mg^{++}	1.32	1.17	0.72

TABLE C7: 2001 DIURNAL VARIATIONS OF AIR POLLUTANT

Pollutant: Sulphur Dioxide

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	18	16	16	16	16	16	17	20	23	23	23	24	23	25	25	24	25	25	25	24	24	22	21	19
Eastern	9	9	9	9	9	9	10	13	15	14	15	15	14	14	13	13	14	16	15	14	14	14	11	11
Kwai Chung	16	14	14	14	12	12	12	15	20	23	26	28	29	30	30	30	31	31	29	26	23	19	18	17
Kwun Tong	11	10	10	11	10	10	11	14	18	19	19	19	17	19	20	19	19	19	18	17	16	14	14	13
Sham Shui Po	17	15	14	15	15	16	16	17	18	21	22	22	22	21	23	23	23	24	25	24	21	20	19	18
Tsuen Wan	12	11	11	11	10	10	11	13	18	21	23	23	24	25	25	24	26	25	23	19	18	16	15	14
Sha Tin	12	11	10	11	10	10	10	12	14	16	17	16	16	15	17	18	19	20	19	17	16	15	14	12
Tai Po	11	10	10	10	10	10	10	13	15	16	15	15	14	14	14	15	15	16	16	15	14	14	13	11
Tung Chung	13	13	13	16	13	12	12	13	16	19	21	21	22	23	23	23	22	20	18	17	17	16	16	15
Yuen Long	14	12	12	12	12	12	13	16	22	24	24	22	20	22	22	24	23	23	20	18	18	17	16	14
Tap Mun	9	10	9	9	9	12	11	11	13	14	14	12	11	10	10	9	9	9	9	9	9	9	9	9
Causeway Bay	15	15	14	15	14	14	16	19	22	23	21	22	20	21	21	21	21	20	19	19	18	18	18	17
Central	15	14	13	14	13	13	14	18	24	24	23	23	21	21	24	24	24	23	22	21	19	19	18	18
Mong Kok	16	15	14	15	14	14	15	18	20	22	22	24	22	23	24	24	24	24	24	23	21	19	18	17

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	85	65	55	47	44	47	61	95	120	120	109	102	90	94	97	102	109	116	120	118	111	105	101	96
Kwai Chung	129	79	65	56	53	68	141	212	258	247	212	200	186	181	198	211	223	244	271	248	200	187	181	175
Kwun Tong	139	74	54	47	46	65	157	248	271	255	217	198	175	189	201	214	232	253	268	245	203	192	191	181
Sham Shui Po	122	75	61	55	53	64	113	160	183	180	161	147	138	142	150	157	167	180	188	181	162	155	149	147
Tsuen Wan	101	58	47	39	38	49	104	149	182	178	158	149	139	147	149	154	167	183	195	171	147	141	142	134
Sha Tin	99	74	62	53	50	54	91	130	128	102	83	75	66	65	74	85	97	109	128	135	134	130	130	119
Tung Chung	68	50	43	38	35	39	57	72	82	83	82	77	72	72	72	70	71	78	83	84	81	78	78	74
Tap Mun	14	14	13	14	14	15	15	16	17	17	17	14	12	10	10	10	11	12	13	13	14	14	14	14
Causeway Bay	404	300	275	237	211	194	329	540	583	565	521	504	484	498	498	520	524	547	571	552	536	520	541	467
Central	257	169	139	122	127	133	224	379	526	509	462	416	399	400	408	438	440	460	462	429	412	402	383	354
Mong Kok	299	173	154	133	127	133	295	427	468	448	391	356	351	381	402	414	451	477	482	444	388	404	411	404

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	25	18	15	13	11	12	17	30	41	40	33	29	23	23	23	25	26	29	30	31	30	28	28	28
Kwai Chung	47	24	18	16	14	21	57	94	119	111	89	80	71	66	73	79	85	97	113	103	79	74	72	70
Kwun Tong	49	19	12	10	10	17	61	112	125	114	91	78	65	71	75	80	89	101	109	99	78	73	74	70
Sham Shui Po	39	20	14	12	11	15	36	61	73	71	59	50	43	43	47	48	52	57	62	60	52	51	49	49
Tsuen Wan	30	13	9	8	7	11	34	58	76	74	60	54	46	48	48	49	54	62	69	58	47	46	48	45
Sha Tin	35	24	18	15	14	15	33	52	50	35	25	21	18	17	19	22	25	30	40	46	47	47	48	43
Tung Chung	16	10	7	6	5	7	14	21	25	24	22	18	15	14	13	12	12	13	15	16	17	17	19	18
Tap Mun	2	2	1	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	1	2	2	2	2
Causeway Bay	199	137	125	106	93	85	165	290	313	301	272	259	245	252	250	263	266	280	297	286	278	270	284	239
Central	117	69	54	46	48	52	102	191	277	264	231	201	189	188	191	208	210	223	225	208	200	196	187	172
Mong Kok	141	69	60	49	47	50	143	222	245	229	191	166	161	176	187	194	216	234	239	219	187	200	206	203

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	47	37	32	28	27	28	36	50	58	60	59	58	55	58	61	65	69	72	75	72	66	63	58	54
Eastern	49	39	32	29	29	32	46	59	62	62	60	60	55	60	63	66	72	76	76	71	66	64	59	56
Kwai Chung	56	41	36	31	30	35	52	67	75	77	75	76	77	80	85	90	93	96	97	90	79	74	70	67
Kwun Tong	66	47	37	33	33	42	66	79	82	82	80	80	78	83	88	93	97	101	103	97	87	83	80	76
Sham Shui Po	63	46	40	37	37	41	58	68	72	73	72	72	72	76	80	83	88	92	94	90	83	79	75	72
Tsuen Wan	55	39	33	28	27	33	51	61	66	66	66	67	68	73	76	80	85	89	90	82	75	71	69	65
Sha Tin	49	41	37	34	32	34	44	53	55	51	47	45	42	43	48	55	62	67	69	68	65	62	59	56
Tai Po	48	41	35	32	32	36	47	56	54	49	43	40	39	40	41	46	55	68	74	71	66	62	59	56
Tung Chung	43	35	31	29	27	29	35	40	44	46	48	49	49	51	52	52	54	58	60	59	55	51	49	47
Yuen Long	56	50	42	37	37	40	48	58	63	63	60	58	56	61	64	71	79	85	87	82	76	70	66	61
Tap Mun	12	12	11	12	12	12	12	12	12	13	12	11	9	8	8	8	9	10	11	11	12	12	12	12
Causeway Bay	105	94	89	80	73	69	82	101	108	110	109	112	113	118	120	123	122	122	121	118	115	111	111	106
Central	78	63	55	50	53	53	67	86	103	105	108	109	109	113	116	120	118	119	117	111	105	102	97	91
Mong Kok	88	73	68	63	61	62	81	93	99	104	105	107	109	116	122	123	125	125	121	115	107	104	102	98

Pollutant: Carbon Monoxide

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Tsuen Wan	1010	960	940	910	910	920	960	1040	1110	1090	1070	1050	1050	1070	1070	1070	1080	1120	1170	1170	1130	1130	1110	1070
Tung Chung	470	450	440	440	420	440	450	470	490	490	500	510	540	540	550	530	520	520	530	530	510	500	500	500
Tap Mun	340	330	330	340	340	350	360	370	370	370	360	360	350	350	340	330	330	340	330	330	340	340	330	330
Causeway Bay	1420	1340	1280	1210	1160	1100	1130	1230	1350	1410	1450	1450	1460	1500	1510	1530	1520	1570	1660	1680	1630	1590	1530	1430
Central	1200	1090	1040	1010	1000	1020	1080	1200	1410	1500	1470	1410	1390	1400	1420	1460	1450	1500	1560	1530	1490	1450	1390	1300
Mong Kok	1420	1350	1290	1230	1220	1310	1410	1480	1560	1570	1580	1620	1670	1720	1750	1790	1840	1790	1790	1770	1720	1700	1640	1530

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	34	40	43	45	45	44	37	27	23	26	31	38	45	48	46	43	38	32	26	26	27	27	28	29
Eastern	32	37	40	41	41	38	30	25	25	28	32	37	41	41	41	40	36	32	30	30	30	29	30	30
Kwai Chung	23	33	36	38	39	34	21	14	13	16	22	27	31	32	30	26	22	17	13	13	16	17	17	18
Kwun Tong	22	35	42	44	43	35	18	13	15	18	24	29	34	34	33	29	23	18	14	15	17	17	17	17
Sham Shui Po	19	32	35	37	36	32	18	12	13	17	23	28	32	33	31	28	22	17	13	12	14	14	14	14
Tsuen Wan	20	31	35	38	37	32	17	13	14	19	25	30	35	36	35	32	26	19	12	12	13	13	13	13
Sha Tin	33	37	38	39	39	36	28	24	27	35	45	53	61	64	62	56	48	41	34	31	31	30	29	29
Tai Po	42	44	47	48	46	42	36	33	38	47	57	66	72	74	74	70	62	49	41	39	39	39	39	39
Tung Chung	29	36	37	36	37	34	28	27	29	34	40	50	62	69	74	71	63	50	37	31	30	30	29	29
Yuen Long	24	26	29	32	31	28	24	21	23	30	38	47	55	57	54	48	39	28	22	20	20	21	21	22
Tap Mun	59	57	55	54	53	51	51	52	56	61	69	78	87	91	92	93	90	86	80	75	70	66	63	60

Pollutant: Respirable Suspended Particulates (Continuous Monitoring)

Station	Hr00	Hr01	Hr02	Hr03	Hr04	Hr05	Hr06	Hr07	Hr08	Hr09	Hr10	Hr11	Hr12	Hr13	Hr14	Hr15	Hr16	Hr17	Hr18	Hr19	Hr20	Hr21	Hr22	Hr23
Central / Western	48	46	45	45	44	45	47	51	57	59	60	60	56	59	61	62	62	61	61	61	58	55	53	50
Eastern	41	40	40	40	40	40	41	44	47	50	51	50	50	49	50	51	49	50	51	50	48	46	45	43
Kwai Chung	45	42	41	41	41	42	46	51	55	56	56	57	56	58	59	60	63	64	64	63	58	54	50	48
Kwun Tong	48	45	45	44	44	45	50	57	62	63	61	61	57	60	63	64	64	65	66	65	60	56	54	52
Sham Shui Po	46	44	43	43	43	44	47	51	54	58	59	59	56	58	61	60	61	63	64	65	60	55	51	49
Tsuen Wan	45	42	41	41	40	41	45	50	55	58	58	59	57	61	62	62	63	64	63	61	56	52	50	48
Sha Tin	45	43	42	42	41	42	45	49	51	52	52	50	48	50	53	54	56	56	56	56	54	52	50	48
Tai Po	46	44	43	43	43	43	47	54	54	53	50	50	49	51	50	50	51	53	54	56	55	53	51	49
Tung Chung	42	41	40	40	39	39	40	43	47	52	55	56	56	61	63	60	57	55	52	50	48	46	45	44
Yuen Long	50	47	45	45	45	46	51	57	62	64	62	62	61	62	62	62	62	63	64	64	60	57	55	53
Tap Mun	40	39	39	39	39	40	41	43	44	45	45	45	46	45	44	44	45	44	44	43	43	42	41	40
Causeway Bay	83	67	61	58	58	59	70	87	104	108	104	104	103	117	115	118	120	123	125	128	119	108	100	90
Central	56	50	48	48	49	50	57	68	84	89	86	80	72	76	82	83	84	84	83	79	74	70	66	62
Mong Kok	61	54	52	51	51	52	61	72	79	81	80	79	77	84	84	83	85	88	89	89	84	78	73	68

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

TABLE C8: 2001 AMBIENT LEVELS OF TOXIC AIR POLLUTANTS

Toxic Air Pollutants	Concentration Unit	Annual Averages [1]	
		Tsuen Wan	Central/Western
Heavy Metals [2]			
Cadmium	ng/m^3	1.72	1.35
Hexavalent chromium	ng/m^3	0.24	0.21
Lead	ng/m^3	71	52
Nickel	ng/m^3	7.4	7.6
Organic Substances			
Benzene	µg/m^3	2.49	2.11
Benzo[a]pyrene	ng/m^3	0.54	0.37
1,3-Butadiene	µg/m^3	0.44	0.27
Formaldehyde	µg/m^3	5.57	5.71
Perchloroethylene	µg/m^3	0.93	2.71
Dioxins [3]	pgI-TEQ/m^3	0.055	0.046

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 2001 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.