AIR QUALITY IN HONG KONG

1998

Air Services Group
Environmental Protection Department
The Government of the Hong Kong
Special Administrative Region

Air Quality in Hong Kong
1998

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Summary

The overall air quality in Hong Kong in 1998 was slightly better than that in 1997, with noticeable decrease in sulphur dioxide, nitrogen dioxide and suspended particulates at most stations. Despite the improvement, violations of several short-term and long-term AQO for nitrogen dioxide and suspended particulates were still recorded at some general and roadside monitoring stations. The ambient ozone concentrations in 1998 remained at a similar level as 1997. Several incidents of high ozone levels had been observed at the new rural station in Tap Mun although there was eventually no AQO exceedance recorded in the year. Similar to the past few years, the ambient levels of sulphur dioxide, carbon monoxide and lead in 1998 were all well below their respective AQO levels.

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1. Introduction

The Environmental Protection Department (EPD) operated in 1998 a network of twelve air quality monitoring stations for measuring major air pollutants. During the year, one general station in the rural area of Tap Mun and two roadside stations in the Causeway Bay and Central districts were added to the monitoring network to provide further information on the background and roadside air quality in Hong Kong. The objectives of EPD's air quality monitoring network include understanding the air pollution problems of Hong Kong, assessing how far the Hong Kong Air Quality Objectives (HKAQO) are being achieved and providing the public with information on the current and forecast air quality.

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

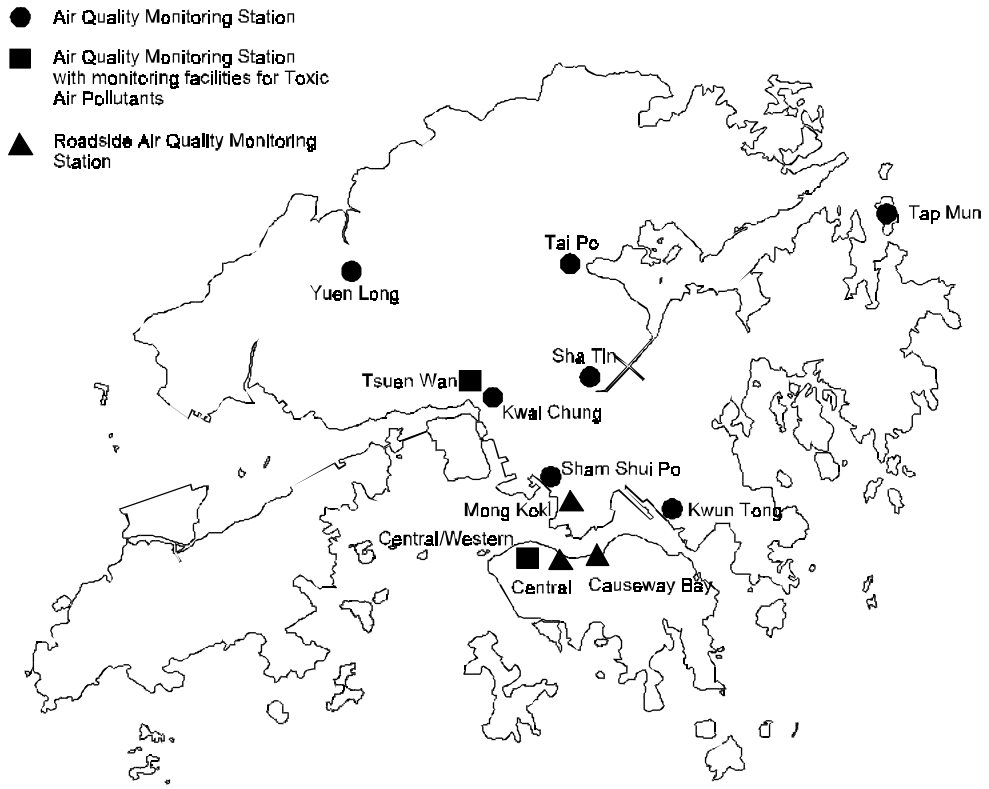


FIGURE 1 LOCATION OF EPD's AIR QUALITY MONITORING STATIONS

In addition to EPD's monitoring network, the Hongkong Electric Co. Ltd. (HEC) and China Light & Power Co. Ltd. (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 are shown in Figure A1 of Appendix A.

2. Air Quality Objectives and their Compliance Status

The Hong Kong Air Quality Objectives (HKAQO) are established to protect public health. Several of these objectives were violated at some EPD monitoring stations in 1998. Similar to previous years, particulate pollution remains the greatest concern among all major air pollutants. For instance, violations of the annual AQO for total suspended particulates (TSP) and respirable suspended particulates (RSP) were recorded for both general and roadside stations in 1998. The roadside station at Causeway Bay also violated the 24-hour AQO for RSP.

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	800		350		80
Total suspended particulates			260		80
Respirable suspended particulates [5]			180		55
Nitrogen dioxide	300		150		80
Carbon monoxide	30000	10000			
Photochemical oxidants (as Ozone [6])	240				
Lead				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 particles in air with a nominal aerodynamic diameter of 10 micrometres or smaller.
[6] Photochemical oxidants are determined by measurement of ozone only.

Table 2: Air Quality Objectives Compliance Status for 1998

Station	Nitrogen Dioxide			Total Suspended Particulates		Respirable Suspended Particulates	
	1-hour	24-hour	1-year	24-hour	1-year	24-hour	1-year
Kwun Tong	~	~	~	~	~	~	~
Sha Tin	✔	✔	✔	✔	✔	✔	✔
Tai Po	✔	✔	✔	✔	✔	✔	✔
Yuen Long	✔	✔	✔	✔	✗	✔	✗
Sham Shui Po	✔	✔	✔	✔	✗	✔	✔
Central/Western	✔	✔	✔	✔	✔	✔	✔
Tsuen Wan	✔	✔	✔	✔	✔	✔	✔
Kwai Chung	✔	✔	✔	✔	✔	✔	✔
Mong Kok	✔	✔	✗	✔	✗	✔	✗
Causeway Bay	✔	✗	✗	--	--	✗	✗
Central	~	✗	~	--	--	~	~
Tap Mun	~	~	~	--	--	~	~

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, ozone and lead all complied with the HKAQO.

For respirable suspended particulates, continuous monitoring data are used for the assessment of AQO compliance of the Causeway Bay, Central and Tap Mun stations.

For gaseous air pollutants, only the 24-hour and annual AQO for nitrogen dioxide were violated at the roadside monitoring stations at Causeway Bay, Central and Mong Kok in 1998. Same as last year, all HEC and CLP air quality monitoring stations complied with the relevant AQO for sulphur dioxide and nitrogen dioxide.

3. Gaseous Pollutants

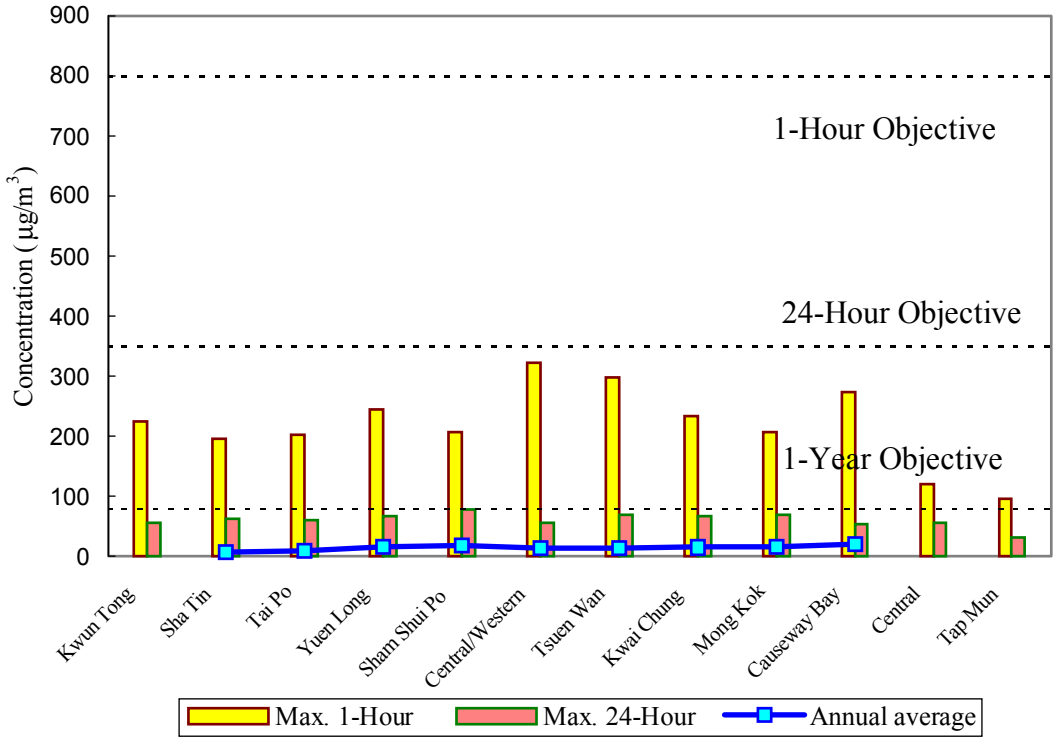
3.1 Sulphur Dioxide (SO_2)

Sulphur dioxide (SO_2) is formed primarily from combustion of sulphur-containing fossil fuels. In urban area diesel vehicles and industrial emissions are the more important source of SO_2 because of their close proximity to the receptors. Besides being harmful to both plants and people, SO_2 also contributes to the local and regional acid rain problem.

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 disease.

Due to the past control efforts, the SO_2 concentration has been maintaining at a very low level throughout the territory and none of the monitoring stations recorded violation of any relevant AQO in 1998. Even for the roadside monitoring stations in Causeway Bay, Central and Mong Kok, the highest readings for different averaging times were still less than half of the respective permissible limits.

Figure 2: Sulphur Dioxide Monitoring 1998

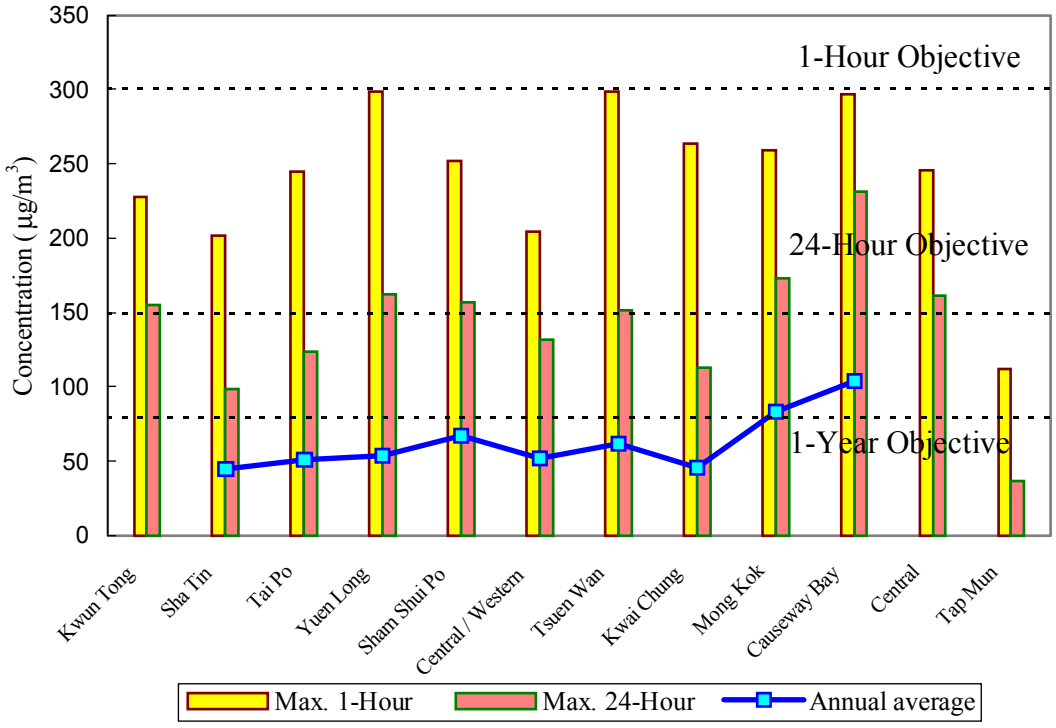


3.2 Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2) is formed from oxidation of nitric oxide (NO) emitted from fuel combustion. As with sulphur dioxide, motor vehicles (diesel vehicles in particular) are the major source of NO_2 in urban area. Long term exposures to NO_2 can lower a person's resistance to respiratory infections and aggravate more serious chronic respiratory diseases.

The NO_2 concentrations in Hong Kong remained at a fairly high level in 1998. The accumulation and photochemical oxidation of nitric oxide from vehicular emissions under calm wind conditions led to several exceedances of the 24-hour AQO levels at both general and roadside stations in 1998, although violations of this AQO were only seen at the Causeway Bay and Central stations. All stations, except Causeway Bay and Mong Kok, complied with the annual AQO, with annual averages ranging from 56% to 86% of the permissible level of 80 $\mu g/m^3$. The annual averages recorded at Causeway Bay and Mong Kok in 1998 were high, approaching 130% and 104% of the annual AQO, respectively.

Figure 3: Nitrogen Dioxide Monitoring 1998

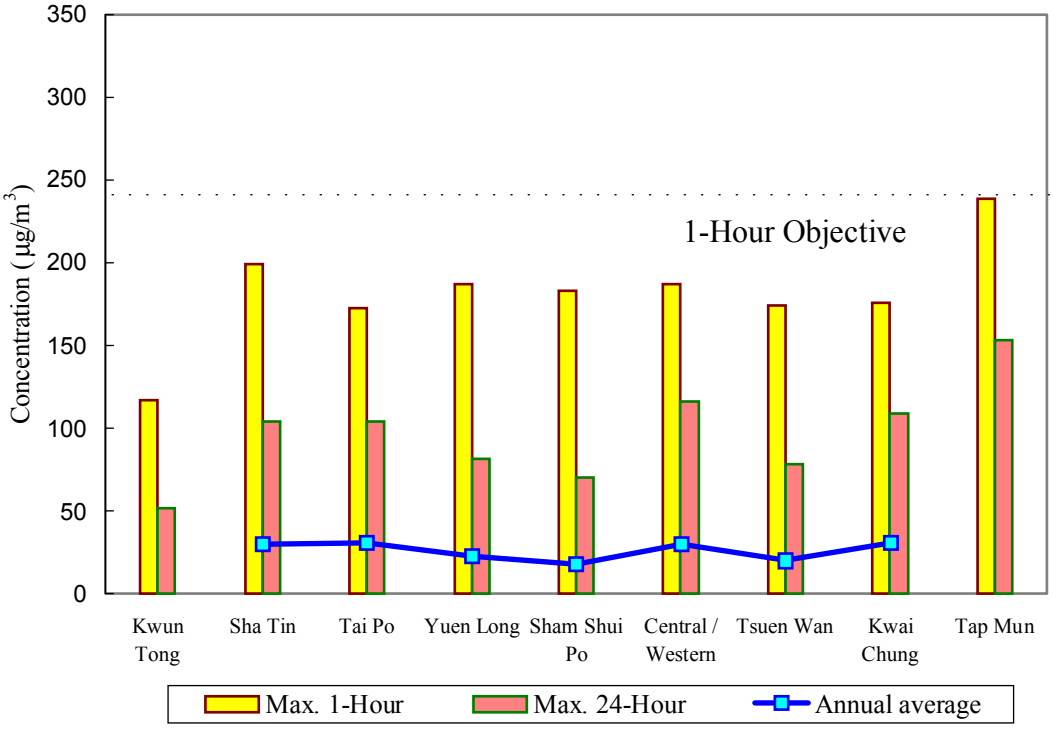


3.3 Ozone (O_3)

Ozone (O_3), a major constituent of photochemical smog, is formed by a series of complicated photochemical reactions of oxygen, nitrogen oxides and reactive hydrocarbons in the presence of sunlight and warm temperature. Being a strong oxidant, it can cause eye and nose irritations even at low concentration levels. At elevated levels, it can increase susceptibility to respiratory infections.

In 1998, ambient level of ozone was measured at all nine general monitoring stations. Although there was no exceedance of the 1-hour AQO level during the year, several incidents of high levels had been observed at the Tap Mun station. The highest level recorded there was 239 $\mu g/m^3$, just slightly lower than the permissible limit of 240 $\mu g/m^3$. Similar to previous cases of ozone pollution, all these incidents could be directly related to the photochemical reactions triggered by bright sunlight under calm wind conditions.

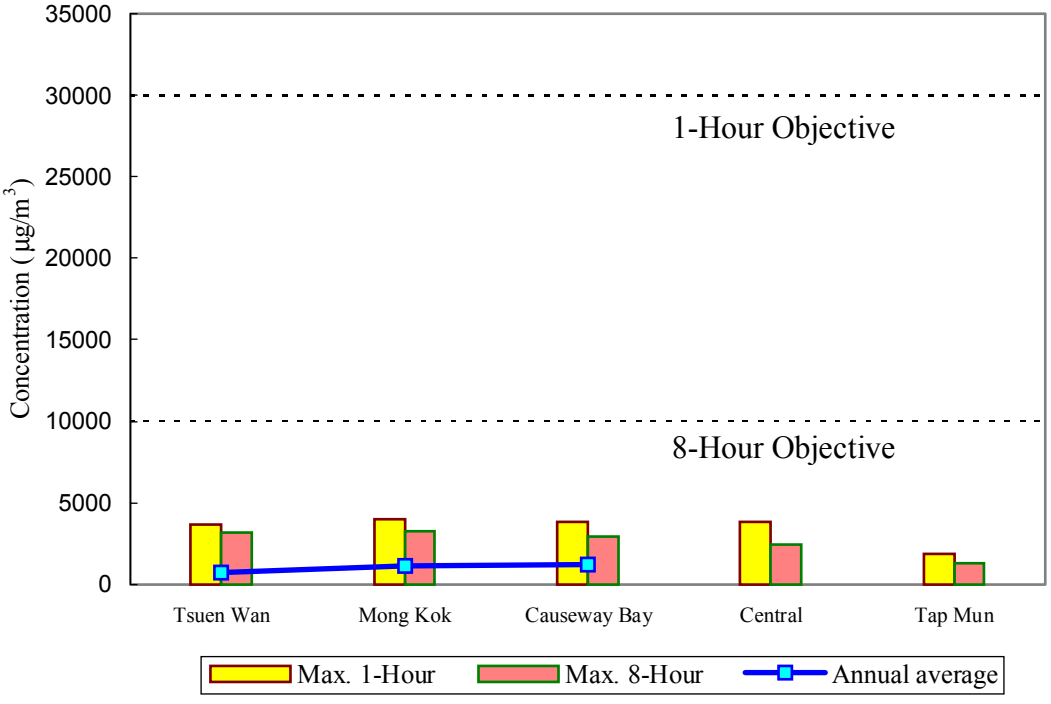
Figure 4: Ozone Monitoring 1998



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 coordination. The health threat from CO is more severe for those who suffer from heart disease.

Figure 5: Carbon Monoxide Monitoring 1998



In Hong Kong, the ambient and roadside concentrations of CO continue to stay at a very low level. For instance, the highest 1-hour and 8-hour concentration averages in 1998, both recorded at the Mong Kok roadside station, were less than one seventh and one third of the respective AQO.

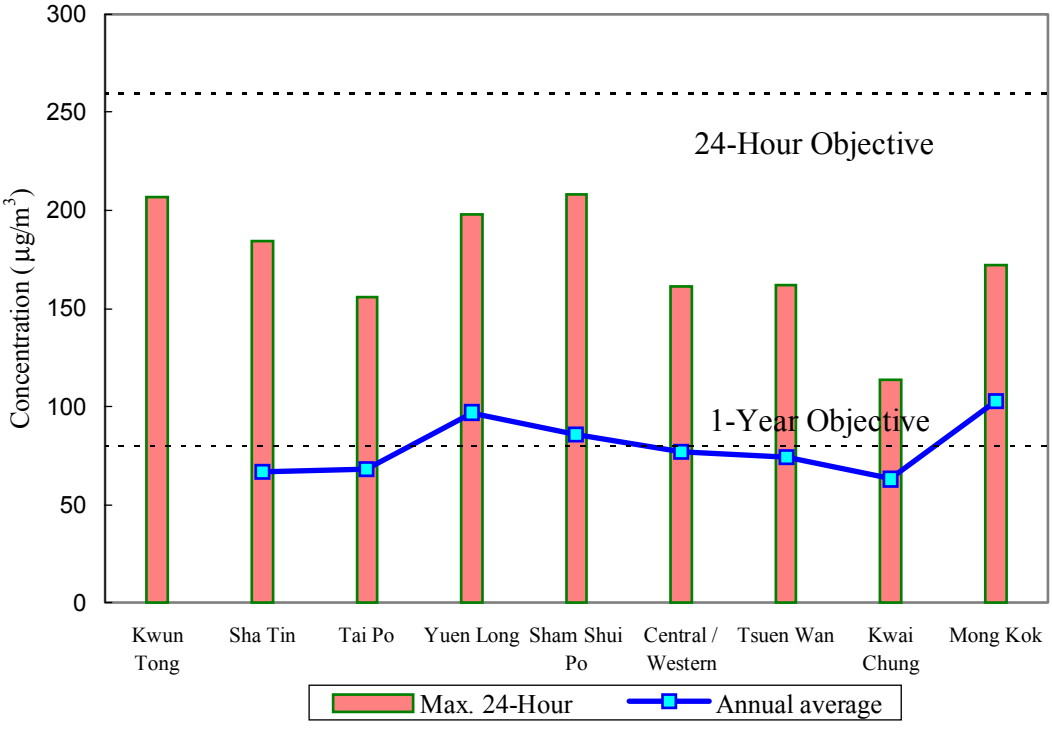
4. Particles

4.1 Total Suspended Particulates (TSP)

Total suspended particulates (TSP) are small airborne particles 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. Particles with a diameter of 10 micrometres or less are called respirable suspended particulates, or PM10 for short. This type of particles is usually of much greater health concern (see below). On the contrary, particles that are larger than 10 micrometres in diameter are mainly related to soiling and dust nuisance.

Levels of TSP in 1998 remained high throughout the territory although a slight decrease in the overall concentration was noted when compared with the figures of 1997. Three out of the nine monitoring stations with TSP monitoring did not comply with the annual AQO. The highest annual average in 1998 was 22% lower than last year's value and was again recorded at the Mong Kok roadside station. Among all monitoring stations, Kwai Chung station had the lowest annual level of TSP, which was about 80% of the permissible limit.

Figure 6: TSP Monitoring 1998



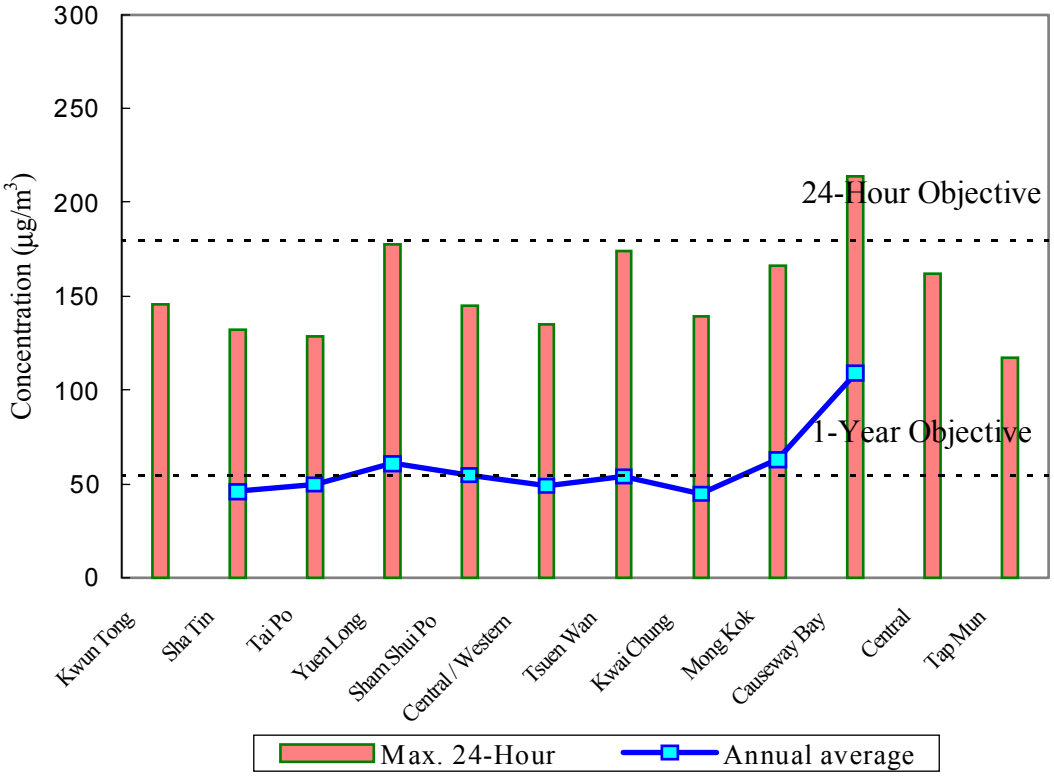
4.2 Respirable Suspended Particulates (RSP)

Respirable suspended particulates (RSP) refer to those airborne particles with 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 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 particles in RSP will also have a major impact on visibility.

Although there were only three stations violating the annual AQO for RSP in 1998, down from six in 1997, the RSP concentrations across the territory still remained at a rather high level. The highest annual average, which was almost double of the annual AQO, was recorded at the new roadside station in Causeway Bay, further confirming that diesel vehicle exhaust was the major cause of high RSP level in urban areas. As in the case of TSP, Kwai Chung also had the lowest annual level of RSP in 1998.

Figure 7: RSP Monitoring 1998



4.3 Lead

Among various TAPs, lead is the only one with the AQO established. Motor vehicles using leaded petrol are the major source of lead in ambient air. Due to the Government's efforts in reducing the use of leaded petrol, the ambient lead concentration continued to stay at a very low level in 1998 and was well within the relevant limit of 1.5 µg/m^3.

5. Toxic Air Pollutants

Two groups of toxic air pollutants (TAPs), viz. heavy metals and organic substances, have been monitored at the Central/Western and Tsuen Wan stations since 1997. The annual averages of the ten most important TAPs in 1998 are summarised in Table C10. Detailed description of the monitoring operation can be found in appendix B.4.

The monitoring data collected so far indicate that the level of toxic air pollutants in Hong Kong is in general lower than or comparable to those observed in other urban areas.

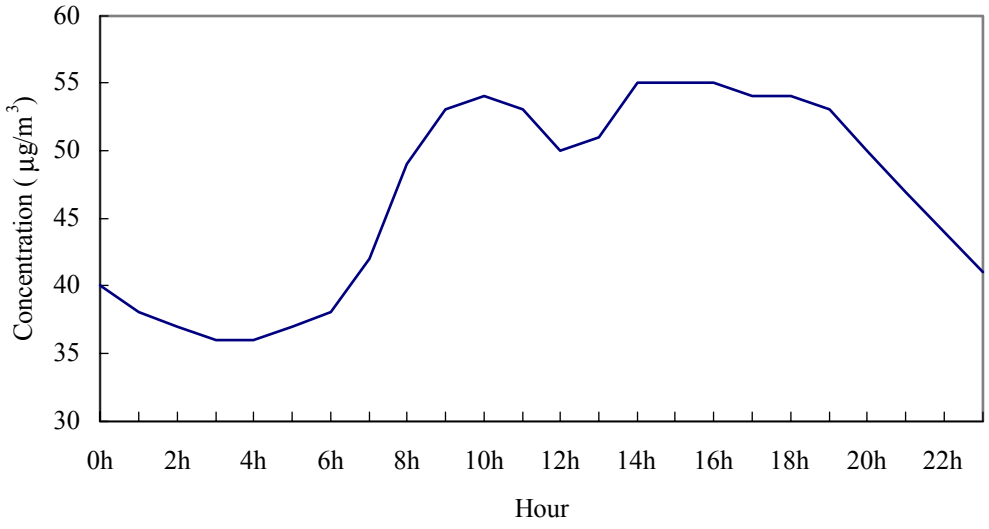
6. Variation of Air Pollution Levels Over Time

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

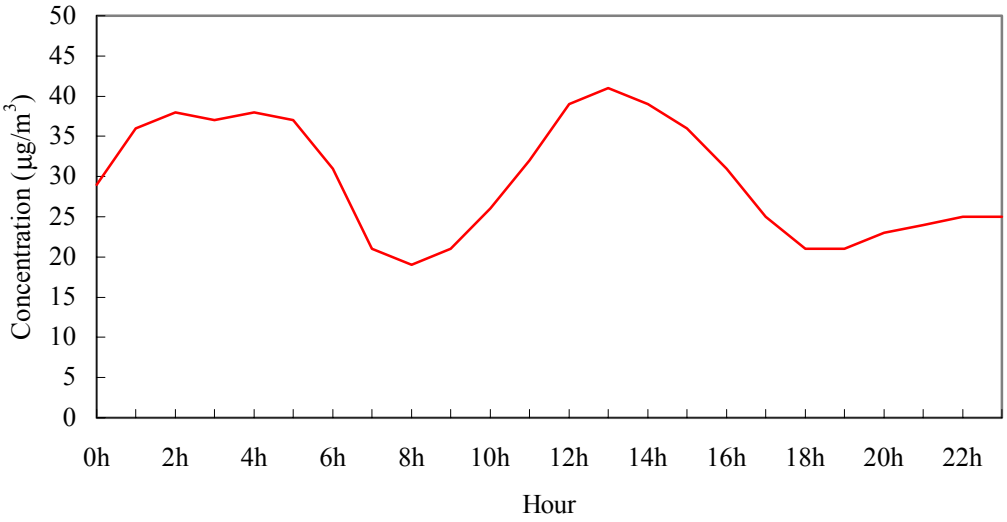
The daily variation of the concentrations of most air pollutants, other than ozone and those formed by atmospheric chemical reactions of other air pollutants, follows closely to the pattern of human activities. For instance, higher concentration is usually observed in the morning and in the late afternoon when more traffic and other activities occur. Likewise, the lowest concentration often occurs at night hours when there are less human activities.

Figure 8: Hourly variations of RSP 1998 (Central/Western)



The average daily variation of ozone concentrations in 1998 was of a slightly different daily pattern. As ozone is produced from reactions of the vehicle emissions in the presence of sunlight, the levels usually build up in the afternoon when the solar radiation levels are the highest. Minimum concentrations were observed at rush hours when nitric oxide emissions from vehicles were destroying ozone.

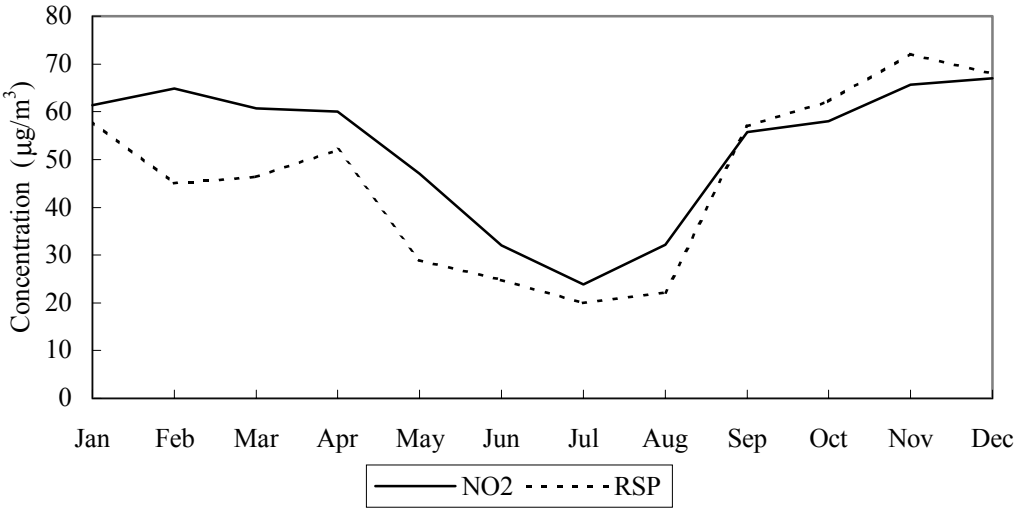
Figure 9: Hourly variations of Ozone 1998 (Central/Western)



6.2 Over a Year

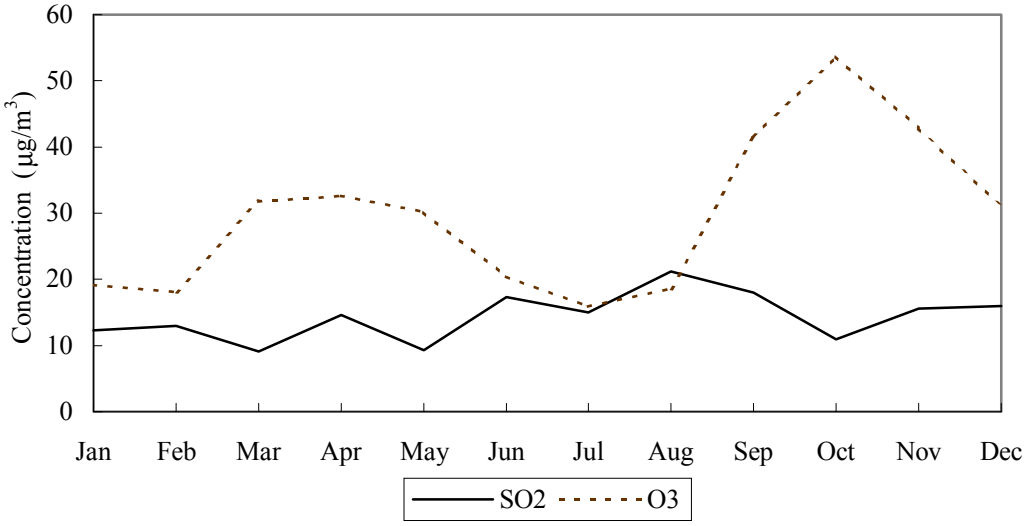
Because of the washout effects of rainfall and/or better dispersion of pollutants, the air pollution levels of nitrogen dioxide and RSP were substantially lower in the summer months. Higher concentrations were, in general, observed in the winter when the weather conditions that trapped the pollutants close to their sources and hindered pollutant dispersion occurred during this period.

Figure 10: Monthly variations of NO_2 and RSP 1998 (Central/Western)



The patterns for sulphur dioxide and ozone differ slightly from nitrogen dioxide and particulates. Sulphur dioxide did not show significant variation throughout the year since higher emissions in the summer months as a result of higher electricity demand might have offset the decrease caused by the washout and dispersion effects mentioned above. For ozone, higher average concentrations occurred around October as this period had more clear and sunny days to provide suitable conditions for photochemical formation of ozone from vehicle emissions.

Figure 11: Monthly variations of SO_2 and O_3 1998 (Central/Western)

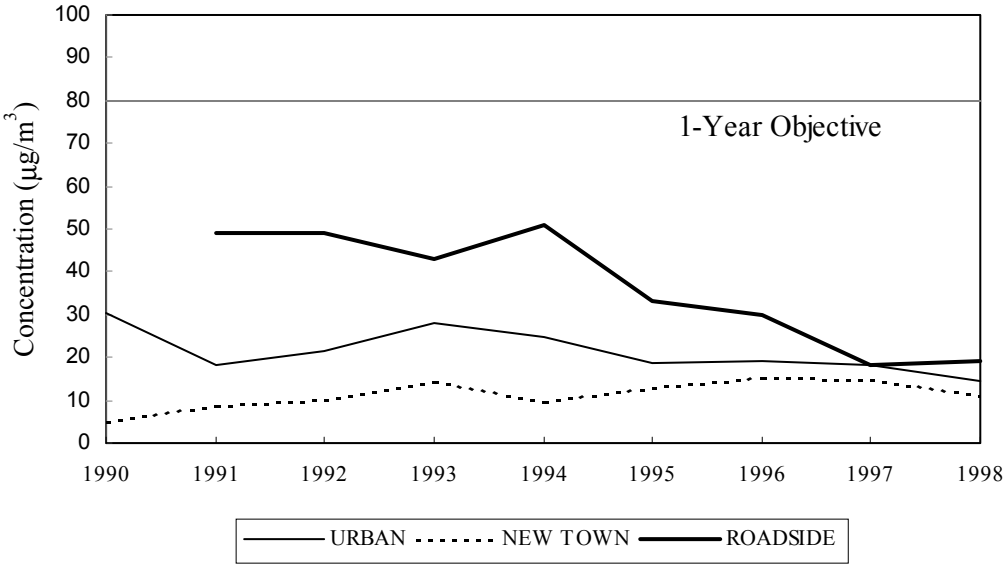


6.3 Long Term Trends

6.3.1 Sulphur Dioxide (SO_2)

Since the enforcement of the Air Pollution Control (Fuel Restriction) Regulations for stationary sources and the more recent Air Pollution Control (Motor Vehicle Fuel) Regulation for mobile sources, the SO_2 concentration in ambient air has reduced and maintained at a level far below the statutory limit of 80 µg/m^3. For example, the annual averages of urban and roadside stations (please refer to Table B1 for area type classification of monitoring stations) in 1998 were about 44% and 63%, respectively, lower than their corresponding values measured before the enforcement of the latter regulation. The slightly higher roadside level compared with the urban and new town levels could be attributed to the street canyon effect. With more and more vehicles switching to low sulphur content fuel, the SO_2 pollution problem should become less significant in the future.

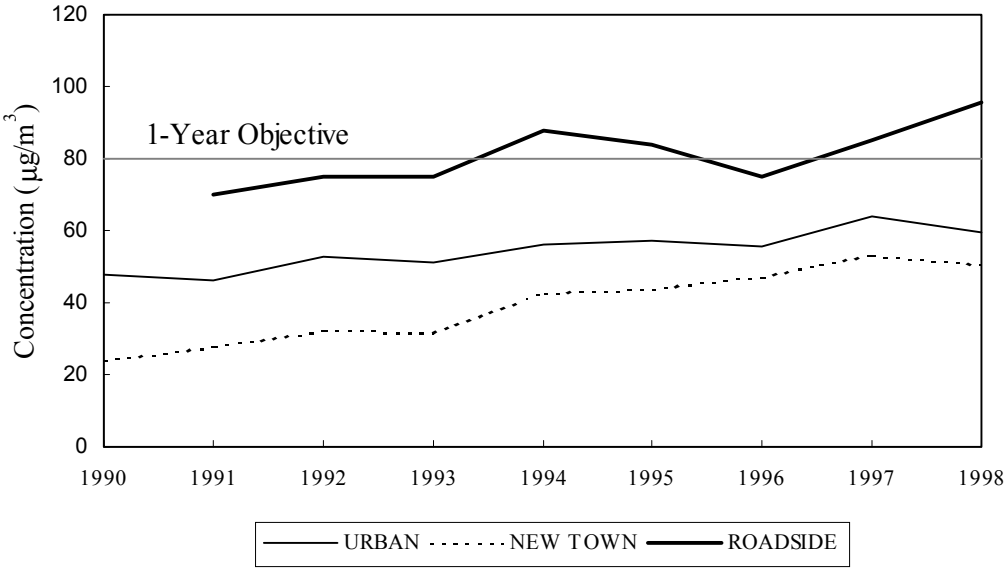
Figure 12: SO_2 long term trend



6.3.2 Nitrogen Dioxide (NO_2)

While the increasing trend of ambient NO_2 levels in urban and new town areas appeared to be slowing down in 1998, the roadside level of NO_2 showed a definite increase of 10% over the 1997 value. The increase could be attributed to the addition of a new roadside station in the heavy traffic area in Causeway Bay. Due to closer proximity to the emission sources, the roadside NO_2 level exceeded the permissible limits of 80 $\mu g/m^3$ by about 18% in 1998.

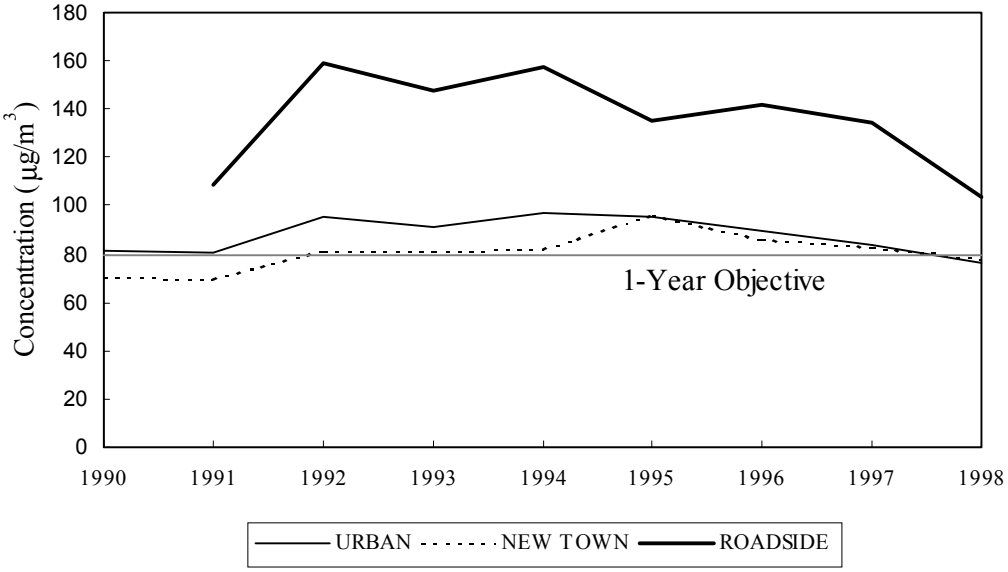
Figure 13: NO_2 long term trend



6.3.3 Total Suspended Particulates (TSP)

The ambient TSP concentrations have been maintaining at a rather high level throughout the territory since 1990, although apparent decreasing trend was observed in 1998. The most significant drop in 1998 occurred in the roadside areas where the TSP concentrations dropped back to the 1991 level. In spite of the drop, the 1998 level was still 30% above the permissible limit of 80 $\mu g/m^3$. As with NO_2, the elevated roadside level of TSP was also due to the close proximity to the emission sources.

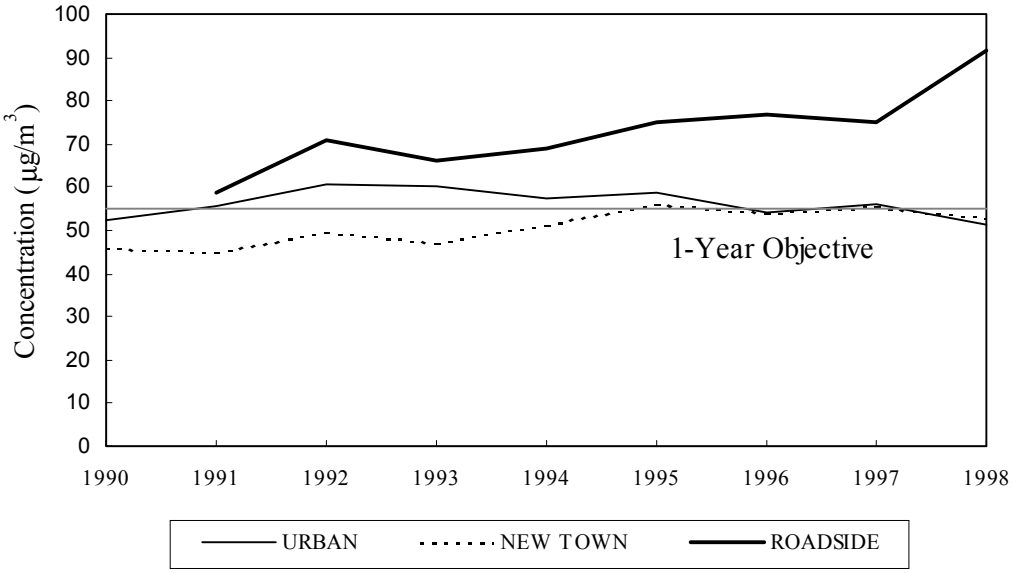
Figure 14: TSP long term trend



6.3.4 Respirable Suspended Particulates (RSP)

Similar to TSP, the concentration of RSP measured in the urban area was at approximately the same level as the new town area since 1996. An apparent drop of 8% was observed in 1998. As in the case of NO_2, the increase of about 15% in roadside RSP level could be attributed to the addition of the Causeway Bay Station in 1998 where higher RSP concentrations were usually measured.

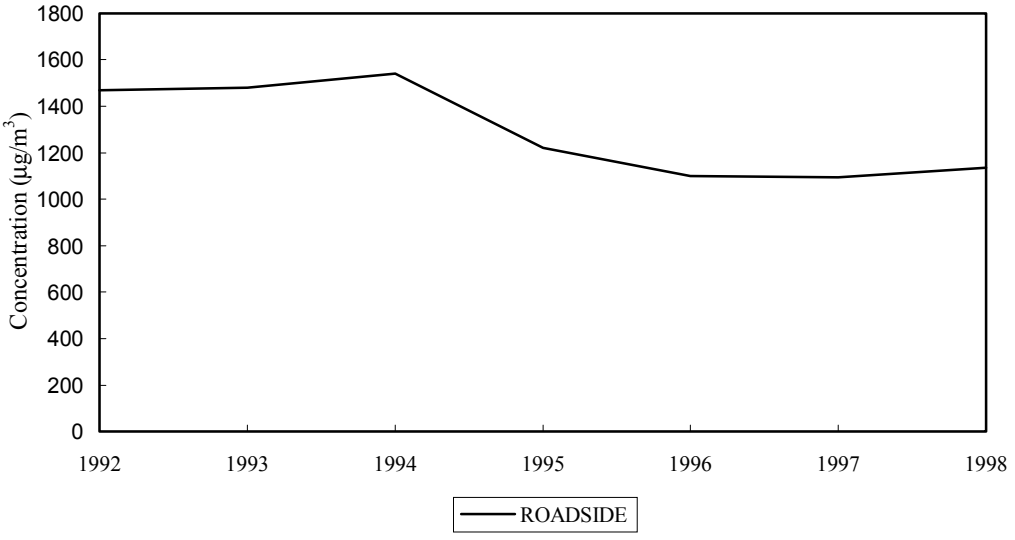
Figure 15: RSP long term trend



6.3.5 Carbon Monoxide (CO)

The concentrations of CO remained low in the past few years. It could be due to the increase in the number of vehicles fitted with catalytic converters. Even at the roadside close to the vehicular emission sources, the levels were always well within the relevant AQOs.

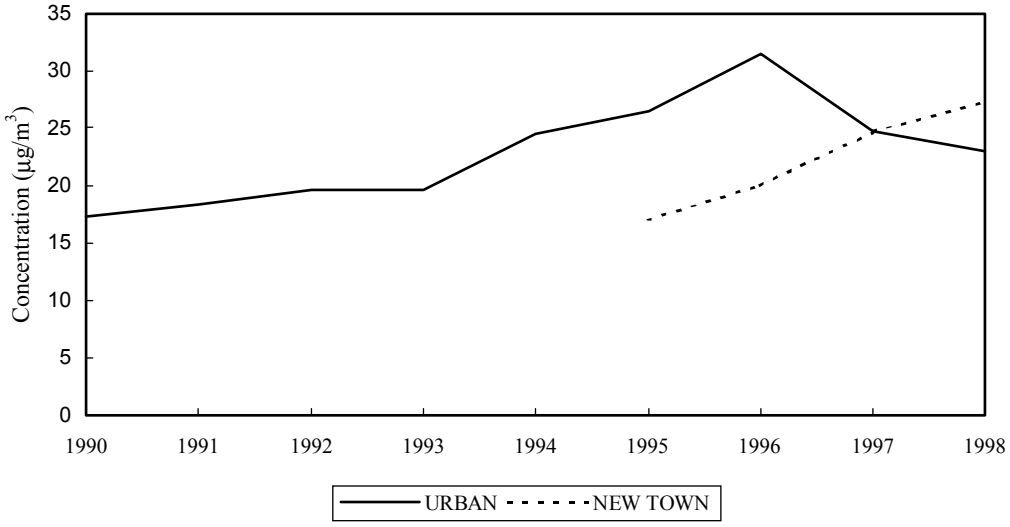
Figure 16: CO long term trend



6.3.6 Ozone (O_3)

In 1998, urban level of ozone showed a significant drop of about 24% compared to previous year's value after peaking at 32 μg/m^3 in 1996. The drop was caused in part by the inclusion of data from three more urban station, viz. Kwun Tong, Sham Shui Po and Tsuen Wan. Similarly the increase in ozone concentration in 1998 was due to the inclusion of data from Tai Po and Sha Tin stations. Although there were insufficient data to calculate the annual ozone level of Tap Mun, comparison of the monthly averages of Tap Mun with those of other stations clearly indicated a high ozone background level there. More monitoring data, however, will be required to establish the long term trend of the background ozone level.

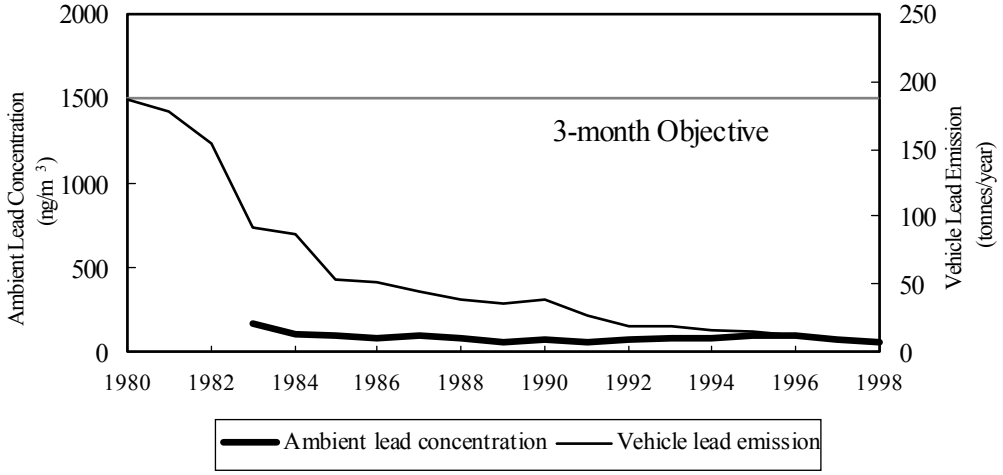
Figure 17: O_3 long term trend



6.3.7 Airborne Lead

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 show that the ambient lead concentration was already at a rather low level when unleaded petrol was introduced to Hong Kong in April 1992. In fact, the ambient lead concentration has been maintaining at that level since the early eighties.

Figure 18. Vehicle lead emission and ambient lead concentration



Appendix A

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

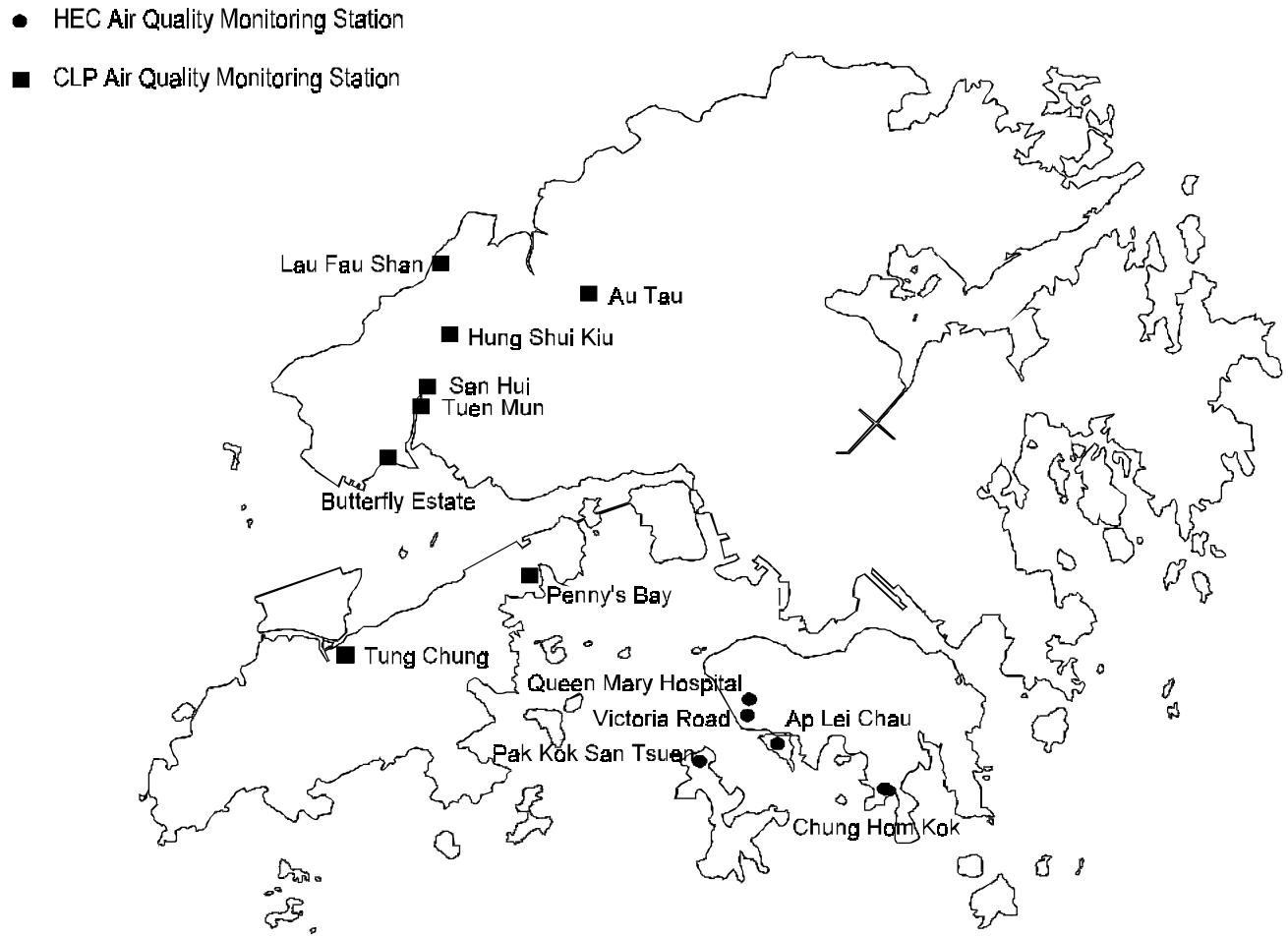


Figure A1 LOCATION OF HEC & CLP AIR QUALITY MONITORING STATIONS FOR SULPHUR DIOXIDE AND NITROGEN DIOXIDE

A.1 The Hongkong Electric Co. Ltd.

Air Quality Monitoring Stations	Annual Mean Concentration[1]	Range of Monthly Mean Concentration
Sulphur Dioxide (SO_2)		
Chung Hom Kok	5	3 - 7
Victoria Road	7	4 - 11
Queen Mary Hospital	15	8 - 20
Ap Lei Chau[2]	9	5 - 11
Pak Kok San Tsuen	8	3 - 10
Nitrogen Dioxide (NO_2)		
Chung Hom Kok[3]	19	19 - 19
Victoria Road	26	12 - 39
Queen Mary Hospital	32	12 - 96
Ap Lei Chau[2]	26	11 - 47
Pak Kok San Tsuen	23	10 - 36

A.2 China Light & Power Co. Ltd.

Air Quality Monitoring Station	Annual Mean Concentration	Range of Monthly Mean Concentration
Sulphur Dioxide (SO_2)		
San Hui	32	22 - 42
Tuen Mun	17	8 - 24
Hung Shui Kiu	23	5 - 41
Au Tau	74	65 - 87
Butterfly Estate	8	2 - 15
Penny's Bay	4	3 - 6
Lau Fau Shan	9	4 - 16
Tung Chung	8	2 - 20
Nitrogen Dioxide (NO_2)		
Tuen Mun	49	25 - 70
Butterfly Estate	41	19 - 65
Penny's Bay	32	12 - 48
Lau Fau Shan	34	22 - 48
Tung Chung	27	12 - 43

Notes:

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

[2] Only 7 months data (June to December) are available for calculating the Annual Mean Concentration.

[3] Ambient air monitoring commenced in December 1998.

Appendix B

AIR QUALITY MONITORING OPERATION

B.1 Network Operation

The air quality network of twelve monitoring stations is operated by the Air Services Laboratory (ASL) of the Environmental Protection Department. The ASL has been accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) since August 1995 for 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).

In order to provide good representation of the air quality in areas of high population density, the locations of the twelve 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 2 stations: Central/Western and Kwun Tong. 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^-, Ca, Mg, 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 ASL 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 (since 15 June 1998)
- 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 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 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, warning limits of ±7% and control limits of ±10% are adopted. In 1998, 150 audit checks were carried out on the stations' analyzers and samplers. As shown in Figure B1 and based on the 95% probability limits, the accuracy of the network varied between – 6.5% and 8.7%, which was within the control limit of ±10%.

The precision, a measure of the repeatability, of the measurements is checked in accordance with EPD's quality manuals. In 1998, 947 precision checks were carried out on the analyzers and samplers. As shown in Figure B2 and based on the 95% probability limits, the precision of the network varied between – 6.7% and 8.3%, which was again within the target of ±10%.

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 the Woodward-Clyde Inc. on a 1-year contract and were sent to the Xenon Laboratory in Canada for analysis.

Table B1. Fixed Network Monitoring Stations: Site Information

Monitoring Station	Abbr.	Address	Area Type	Sampling Height (Above P.D.H.K.)	Above Ground	Date Start Operation
Kwun Tong (City District Office)	KT	6 Tung Yan Street, Kwun Tong	Urban : Mixed residential/ commercial/industrial	34m	25m (6 floors)	Jul 83
Central/Western (Upper Level Police Station)	C/W	1 High Street, Sai Ying Pun	Urban : Residential	78m	18m (4 floors)	Nov 83
Sham Shui Po (Police Station)	SSP	37A Yen Chow St., Sham Shui Po	Urban : Mixed residential/commercial	21m	17m (4 floors)	Jul 84
Kwai Chung (Chen Zao Man College)	KC	1-5 Kwai Hop St., Kwai Hing	Urban : Mixed residential/ commercial/industrial	82m	25m (6 floors)	Jul 88
Tsuen Wan (Princess Alexandra Community Centre)	TW	60 Tai Ho Rd., Tsuen Wan	Urban : Mixed residential/ Commercial/industrial	21m	17m (4 floors)	Aug 88
Tai Po (Tai Po Govt. Office Bldg.)	TP	1 Ting Kok Rd., Tai Po	New Town : Residential	31m	25m (6 floors)	Feb 90
Sha Tin (Sha Tin Govt. Secondary School)	ST	11-17 Man Lai Rd., Tai Wai, Sha Tin	New Town : Residential	27m	21m (5 floors)	Jul 91
Yuen Long (Yuen Long District Branch Offices Bldg.)	YL	269 Castle Peak Road Yuen Long	New Town : Residential with fairly rapid development	31m	25m (6 floors)	July 95
Mong Kok (Mong Kok Rd. Pumping Station)	MK	4E Mong Kok Rd., Mong Kok	Urban Roadside : Mixed residential/commercial area surrounded by some moderately tall buildings	7m	2m (1 floor)	Apr 91
Causeway Bay	CB	1 Yee Woo Street Causeway Bay	Urban Roadside : Busy commercial area surrounded by many tall buildings	6.5m	2m	Jan 98
Central	CL	Junction of Des Voeux Rd. Central/Chater Rd.	Urban Roadside : Busy commercial/financial area surrounded by many tall buildings	8.5m	4.5m	Oct 98
Tap Mun (Tap Mun Police Station)	TM	Tap Mun	Background : Rural	26m	11m (3 floors)	Apr 98

Note: P.D. = Principal datum

Table B2. Summary of the Parameters Monitored in the Network (1998)

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

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	TECO Model 42, API 200A Monitor Laboratories 8840
O_3	UV absorption	TECO 49, API 400
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	Once per month	24 hours
Dioxins	USEPA Method TO-9 / 23	Graseby GPSI / Polyurethane Foam	Once 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, 1998

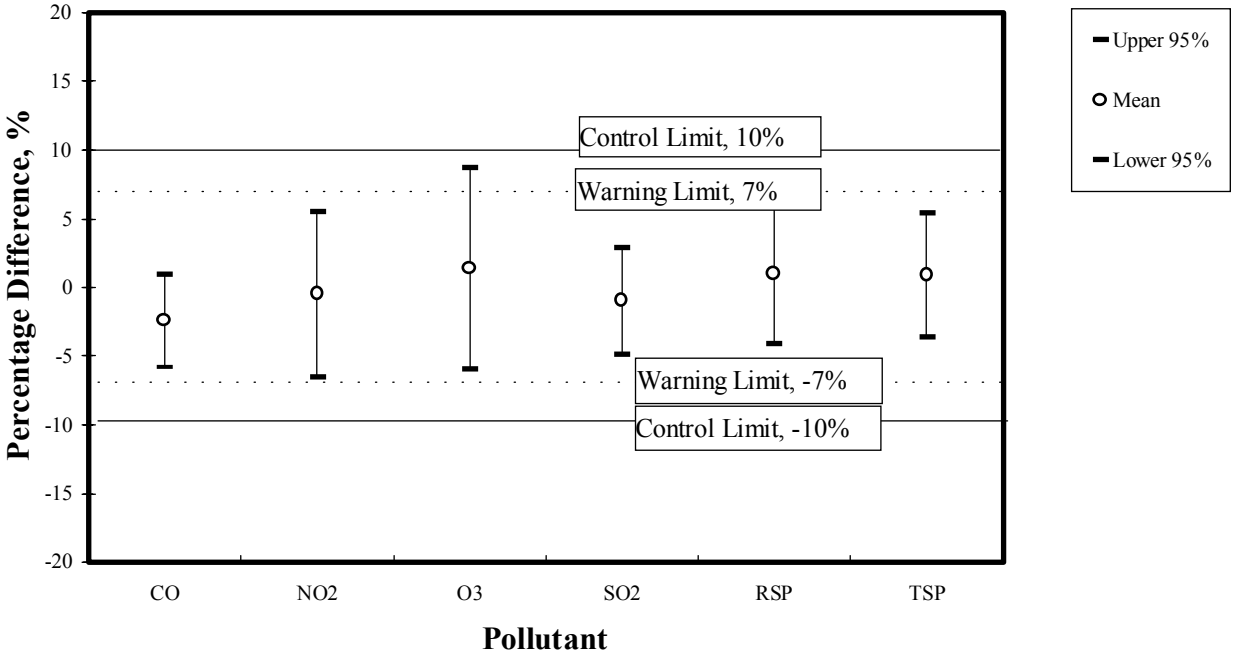
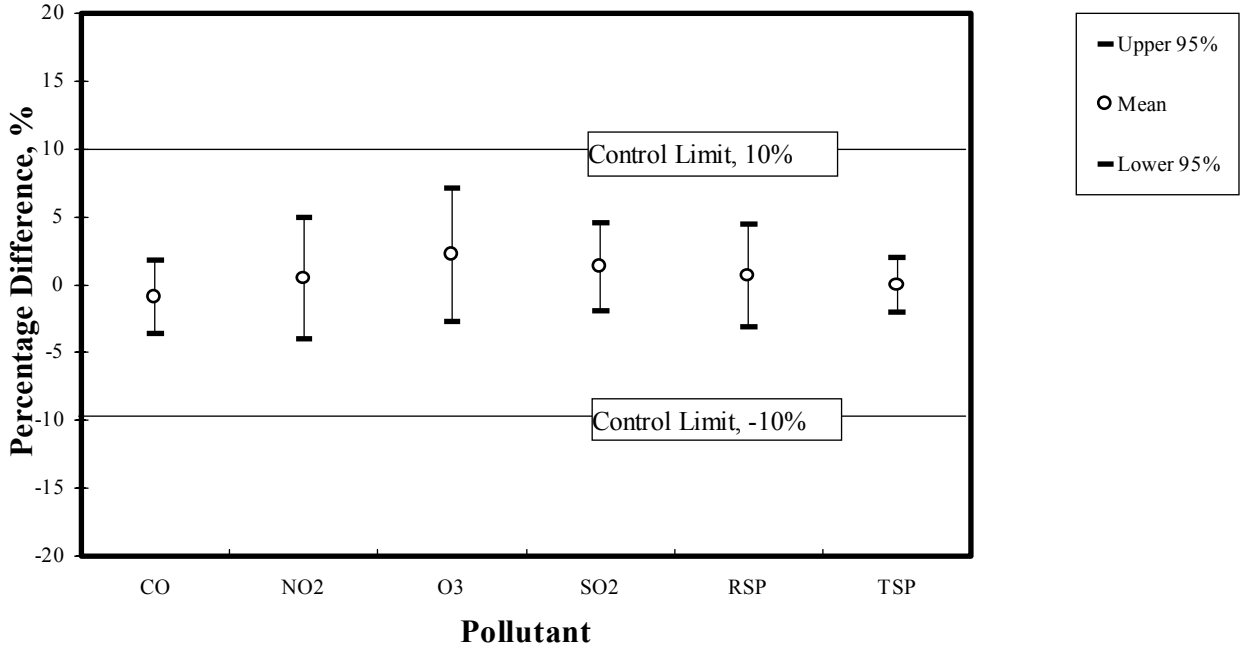


Figure B2: Precision of Air Quality Monitoring Network, 1998



Appendix C

Tables of Air Quality Data

TABLE C1: THE HIGHEST 4 HOURLY POLLUTANT CONCENTRATIONS MEASURED IN 1998

Pollutant: Sulphur Dioxide

Station	1st High	2nd High	3rd High	4th High
Kwun Tong	225	219	202	196
Sha Tin	197	182	173	131
Tai Po	204	203	155	135
Yuen Long	245	184	174	160
Sham Shui Po	207	202	195	186
Central / Western	322	260	247	240
Tsuen Wan	299	196	196	174
Kwai Chung	234	201	188	186
Mong Kok	207	196	176	166
Causeway Bay	275	256	254	254
Central	122	93	93	92
Tap Mun	96	93	86	82

Pollutant: Nitrogen Oxides

Station	1st High	2nd High	3rd High	4th High
Kwun Tong	1189	1090	1010	1002
Sha Tin	714	703	667	647
Tai Po	727	641	621	612
Yuen Long	784	780	684	612
Sham Shui Po	814	794	789	777
Central / Western	760	747	717	697
Tsuen Wan	1321	1030	876	857
Kwai Chung	577	564	547	541
Mong Kok	1147	1026	953	910
Causeway Bay	1978	1923	1891	1890
Central	1497	1421	1304	1267
Tap Mun	145	126	123	122

Pollutant: Nitric Oxide

Station	1st High	2nd High	3rd High	4th High
Kwun Tong	667	603	583	557
Sha Tin	403	401	363	328
Tai Po	402	334	334	328
Yuen Long	432	339	337	333
Sham Shui Po	457	438	431	427
Central / Western	411	406	405	398
Tsuen Wan	782	603	479	477
Kwai Chung	267	260	254	250
Mong Kok	599	572	546	514
Causeway Bay	1145	1127	1107	1092
Central	871	861	750	733
Tap Mun	63	51	42	40

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

Pollutant: Nitrogen Dioxide

Station	1st High	2nd High	3rd High	4th High
Kwun Tong	228	219	217	210
Sha Tin	202	189	186	184
Tai Po	245	220	196	192
Yuen Long	299	289	259	257
Sham Shui Po	252	228	223	215
Central / Western	204	203	202	196
Tsuen Wan	299	298	294	271
Kwai Chung	264	256	231	217
Mong Kok	259	251	245	237
Causeway Bay	297	295	293	290
Central	246	239	239	239
Tap Mun	112	107	98	84

Pollutant: Carbon Monoxide

Station	1st High	2nd High	3rd High	4th High
Tsuen Wan	3680	3650	3540	3500
Mong Kok	3970	3900	3900	3780
Causeway Bay	3800	3720	3720	3600
Central	3810	3180	3000	2990
Tap Mun	1810	1480	1420	1360

Pollutant: Ozone

Station	1st High	2nd High	3rd High	4th High
Kwun Tong	117	116	114	112
Sha Tin	199	192	185	184
Tai Po	173	166	165	164
Yuen Long	187	166	165	164
Sham Shui Po	183	166	151	145
Central / Western	187	157	154	151
Tsuen Wan	174	174	172	166
Kwai Chung	176	171	159	154
Tap Mun	239	233	227	197

Pollutant: Respirable Suspended Particulates (Continuous monitoring)

Station	1st High	2nd High	3rd High	4th High
Kwun Tong	297	253	247	240
Sha Tin	284	256	223	213
Tai Po	354	278	270	265
Yuen Long	388	358	323	322
Sham Shui Po	302	248	240	235
Central / Western	298	233	217	215
Tsuen Wan	353	340	316	316
Kwai Chung	340	329	309	303
Mong Kok	306	287	279	269
Causeway Bay	325	319	318	317
Central	243	237	233	230
Tap Mun	239	216	201	171

TABLE C2: THE HIGHEST 2 DAILY POLLUTANT CONCENTRATIONS MEASURED IN 1998

Pollutant: Sulphur Dioxide

Station	1st High	2nd High
Kwun Tong	57	53
Sha Tin	64	37
Tai Po	60	36
Yuen Long	68	62
Sham Shui Po	78	65
Central / Western	56	52
Tsuen Wan	69	45
Kwai Chung	67	64
Mong Kok	70	64
Causeway Bay	55	52
Central	56	46
Tap Mun	33	25

Pollutant: Nitrogen Oxides

Station	1st High	2nd High
Kwun Tong	434	429
Sha Tin	277	247
Tai Po	233	221
Yuen Long	346	322
Sham Shui Po	429	330
Central / Western	324	291
Tsuen Wan	381	378
Kwai Chung	219	217
Mong Kok	537	485
Causeway Bay	1031	986
Central	746	672
Tap Mun	48	47

Pollutant: Nitric Oxide

Station	1st High	2nd High
Kwun Tong	229	205
Sha Tin	134	123
Tai Po	106	96
Yuen Long	184	115
Sham Shui Po	178	174
Central / Western	149	134
Tsuen Wan	183	179
Kwai Chung	87	86
Mong Kok	263	239
Causeway Bay	589	567
Central	426	349
Tap Mun	12	11

Pollutant: Nitrogen Dioxide

Station	1st High	2nd High
Kwun Tong	155	134
Sha Tin	99	98
Tai Po	124	105
Yuen Long	162	111
Sham Shui Po	157	128
Central / Western	132	116
Tsuen Wan	151	149
Kwai Chung	113	97
Mong Kok	173	150
Causeway Bay	231	223
Central	161	160
Tap Mun	37	31

Pollutant: Carbon Monoxide *

Station	1st High	2nd High
Tsuen Wan	3130	3010
Mong Kok	3210	3160
Causeway Bay	2890	2880
Central	2390	2360
Tap Mun	1290	1280

Pollutant: Ozone

Station	1st High	2nd High
Kwun Tong	52	48
Sha Tin	104	95
Tai Po	104	98
Yuen Long	82	79
Sham Shui Po	70	67
Central / Western	116	109
Tsuen Wan	78	76
Kwai Chung	109	106
Tap Mun	153	151

Pollutant: Total Suspended Particulates

Station	1st High	2nd High
Kwun Tong	207	178
Sha Tin	184	163
Tai Po	156	146
Yuen Long	198	189
Sham Shui Po	208	161
Central / Western	161	160
Tsuen Wan	162	132
Kwai Chung	114	114
Mong Kok	172	153

Pollutant: Respirable Suspended Particulates (High Volume Sampling)

Station	1st High	2nd High
Kwun Tong	146	101
Sha Tin	118	96
Tai Po	118	111
Yuen Long	136	128
Sham Shui Po	146	116
Central / Western	118	111
Tsuen Wan	118	111
Kwai Chung	96	94
Mong Kok	113	111

Pollutant: Respirable Suspended Particulates (Continuous monitoring)

Station	1st High	2nd High
Kwun Tong	146	142
Sha Tin	132	129
Tai Po	129	126
Yuen Long	178	176
Sham Shui Po	145	134
Central / Western	135	131
Tsuen Wan	174	144
Kwai Chung	139	136
Mong Kok	166	149
Causeway Bay	214	206
Central	162	133
Tap Mun	117	112

Note: 1. All units are in micrograms per cubic metre.
*2. * 8-Hour Average for Carbon Monoxide.*

TABLE C3: MONTHLY AND ANNUAL AVERAGES OF GASEOUS POLLUTANTS FOR 1998

Pollutant: Sulphur Dioxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	8	8	7	9	7	9	22	22	13	10	13 *		12 *
Sha Tin	6	6	3	9	7	10	10	14	6	5	7	7	8
Tai Po	9	8	5	9	9	8	8	14	9	10	11	11	9
Yuen Long	19	17	16	18	17	11	12	16	17	16	18	22	17
Sham Shui Po	10 *	18	12	24	16	21	22	26	18	10	14	14	18
Central / Western	12	13	9	15	9	17	15	21	18	11	16	16	14
Tsuen Wan	9	12	12	17	15	16	16	18	13	12	14	15	14
Kwai Chung	11	13	10	21	16	25	26	22	11	7	10	11	15
Mong Kok	15	18	12	23	15	22	22	23	18	15	16	15	18
Causeway Bay	22	23	16	18	14	13	20	24	22	18	24	26	20
Central									21	16	11	26	19 *
Tap Mun				4	3	1	5	5	6	8	11	11	6 *

Pollutant: Nitrogen Oxides

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	206	223	185	186	164	167	173	164	194	179	209 *		185 *
Sha Tin	95	112	70	96	80	80	74	94	88	82	112	111	91
Tai Po	96	101	77	90	83	79	67	107	97	95	114	124	94
Yuen Long	124	134	115	113	104	94	85	104	105	98	129	143	112
Sham Shui Po	149 *	199	164	180	139	142	120	132	140	122	162	165	151
Central / Western	113	130	100	112	73	68	52	74	92	75	96	113	91
Tsuen Wan	145	192	164	156	128	142	116	123	124	111	139	157	141
Kwai Chung	81	105	78	95	77	100	89	82	68	52	72	80	81
Mong Kok	287	285	238	263	213	241	210	229	273	282	296	276	258
Causeway Bay	638	689	606	541	487	400	395	494	516	510	619	676	543
Central									410	390	415	458 *	406 *
Tap Mun				11	9	7	14	17	14	9	14	12	12 *

Pollutant: Nitric Oxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	88	98	73	73	66	77	83	76	77	62	75 *		77 *
Sha Tin	32	39	19	30	23	31	30	39	28	19	35	35	30
Tai Po	27	30	18	24	22	28	25	43	28	21	31	39	28
Yuen Long	46	49	38	36	34	39	37	42	32	23	37	45	38
Sham Shui Po	51 *	81	57	66	47	60	52	56	45	30	51	56	55
Central / Western	34	42	26	34	17	23	18	28	24	11	20	31	26
Tsuen Wan	53	82	62	56	44	62	51	52	39	27	41	54	52
Kwai Chung	23	34	20	27	19	38	34	30	17	7	14	18	23
Mong Kok	131	128	95	112	88	119	108	113	120	114	124	117	114
Causeway Bay	342	379	317	284	263	221	220	273	255	251	319	358	287
Central									202	186	205	243 *	199 *
Tap Mun				1	1	1	2	3	2	1	1	1	1 *

Pollutant: Nitrogen Dioxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	72	73	73	75	63	50	46	47	76	85	94 *		68 *
Sha Tin	46	51	42	51	45	33	28	35	44	53	59	57	45
Tai Po	55	56	49	54	49	36	29	41	55	63	67	64	51
Yuen Long	53	59	57	57	52	35	28	40	57	63	73	74	54
Sham Shui Po	70 *	75	76	78	67	50	40	46	71	76	83	80	67
Central / Western	61	65	61	60	47	32	24	32	56	58	66	67	52
Tsuen Wan	64	68	70	70	60	48	39	44	64	70	76	75	62
Kwai Chung	46	53	47	53	48	42	37	36	42	41	51	52	46
Mong Kok	87	89	92	92	78	59	46	56	89	108	106	98	83
Causeway Bay	114	109	121	107	85	63	59	78	127	127	131	129	104
Central									101	106	101	86 *	102 *
Tap Mun				10	8	6	10	12	11	7	13	11	10 *

Pollutant: Carbon Monoxide

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Tsuen Wan	1040	880	840	680	600	510	420	430	660	730	910	940	718
Mong Kok	1390	1270	1120	1110	1010	1060	920	950	1190	1170	1300	1260	1146
Causeway Bay	1620	1520	1340	1190	1110	610	850	950	1220	1150	1320	1380	1183
Central									1080	990	1110	1110	1068 *
Tap Mun				440	380	290	290	290	450	470	620	650	432 *

Pollutant: Ozone

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	17	15	23	20	18	9	5	8	23	28	26 *		17 *
Sha Tin	27	21	40	33	28	18	11	13	45	49	37	31	30
Tai Po	25	23	38	36	30	20	17	17	44	51	39	30	31
Yuen Long	17	14	23	25	22	12	10	13	33	46	32	22	23
Sham Shui Po	20 *	12	19	19	17	9	6	8	28	35	25	21	18
Central / Western	19	18	32	33	30	20	16	19	41	54	43	31	30
Tsuen Wan	15	12	20	19	18	12	8	11	34	41	31	23	20
Kwai Chung	28	21	39	29	27	13	7	13	46	58	46	35	31
Tap Mun				77	70	44	31	37	81	96	82	72	66 *

Notes:

1. All units are in micrograms per cubic metre.

2. Value with an '' is below the minimum data requirement for number of data within the period.*

3. Shaded value is below the minimum data requirement for number of data within a quarter.

4. Both monthly and annual averages are based on hourly data.

TABLE C4: MONTHLY AND ANNUAL AVERAGES OF PARTICULATE POLLUTANTS FOR 1998

Pollutant: Total Suspended Particulates (High Volume Sampling)

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	105	85	76	104	69	64	55	53	82	103			80 *
Sha Tin	71	63	81	62	46	34	37	40	87	97	85	100	67
Tai Po	98	54	74	95	44	39	36	38	76	85	92	87	68
Yuen Long	143	99	99	101	62	52	48	65	86	118	143	163	97
Sham Shui Po	112	79	98	96	67	55	62	56	85	91	121	109	86
Central / Western	125	84	73	91	40	41	29	39	73	95	110	113	77
Tsuen Wan	92	73	93	70	59	51	48	49	68	79	106	101	74
Kwai Chung	87	70	60	69	46	45	40	45	61	74	82	89	63
Mong Kok	140	103	127	105	76	77	73	81	100	115	120	126	103

Pollutant: Respirable Suspended Particulates

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Kwun Tong	66	58	48	68	51	43	37	34	59	60			53 *
Sha Tin	49	47	55	45	29	25	24	27	65	67	58	62	46
Tai Po	72	43	56	68	33	29	24	27	58	61	65	63	50
Yuen Long	93	65	59	63	39	33	25	40	55	71	96	102	61
Sham Shui Po	77	56	60	64	44	37	34	30	53	55	78	71	55
Central / Western	83	52	55	61	25	27	19	25	47	58	71	74	49
Tsuen Wan	64	54	65	52	44	36	32	32	53	61	82	75	54
Kwai Chung	66	50	44	49	29	30	25	29	44	51	64	66	45
Mong Kok	90	65	71	66	45	48	40	49	61	68	82	80	63
Causeway Bay	114	96	106	131	133	110	95	94	107	101	118	104	109
Central									85	86	103 *	134 *	87 *
Tap Mun				39	25	19	19	18	41	51	64	59	37 *

Notes:

1. All units are in micrograms per cubic metre.

2. Value with an '' is below the minimum data requirement for no. of data within the period.*

3. Shaded value is below the minimum data requirement for no. of data within a quarter.

4. Both monthly and annual averages are based on hourly data.

5. For respirable suspended particulates, continuous monitoring data are reported for the Causeway Bay, Central and Tap Mun stations.

TABLE C5: STATISTICAL ANALYSIS OF THE HOURLY MEASUREMENTS OF POLLUTANTS FOR 1998

Pollutant: Sulphur Dioxide

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Kwun Tong	7477	85.4	1	3	7	13	25	42	67	87	6	12	225	57
Sha Tin	8593	98.1	0	0	3	9	20	30	47	63	4	8	197	64
Tai Po	8598	98.2	1	3	6	12	19	27	40	54	6	9	204	60
Yuen Long	8415	96.1	3	7	13	21	32	43	67	91	11	17	245	68
Sham Shui Po	8078	92.2	3	7	12	19	39	59	88	105	11	18	207	78
Central / Western	8366	95.5	0	3	9	17	33	50	75	101	7	14	322	56
Tsuen Wan	8417	96.1	0	3	9	18	34	48	69	84	8	14	299	69
Kwai Chung	8557	97.7	1	4	8	19	39	54	75	92	8	15	234	67
Mong Kok	8396	95.8	4	7	13	21	35	52	74	89	12	18	207	70
Causeway Bay	8357	95.4	6	10	16	25	37	49	64	80	15	20	275	55
Central	2402	82.0	1	6	14	27	42	52	65	74	11	19	122	56
Tap Mun	5874	89.0	0	0	2	7	18	27	38	47	3	6	96	33

Pollutant: Nitrogen Oxides

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Kwun Tong	7462	85.2	40	108	180	250	319	371	442	510	147	185	1189	434
Sha Tin	8591	98.1	19	34	62	115	203	272	375	446	60	91	714	277
Tai Po	8577	97.9	29	46	76	118	179	236	312	371	73	94	727	233
Yuen Long	8498	97.0	40	63	94	141	206	254	325	392	91	112	784	346
Sham Shui Po	8043	91.8	41	90	143	193	254	306	386	464	124	151	814	429
Central / Western	8553	97.6	21	38	72	122	182	230	316	382	66	91	760	324
Tsuen Wan	8477	96.8	35	82	128	178	247	310	410	491	112	141	1321	381
Kwai Chung	8467	96.7	18	38	66	108	159	199	256	306	60	81	577	219
Mong Kok	8277	94.4	97	159	248	337	426	480	562	621	225	258	1147	537
Causeway Bay	8153	93.1	186	327	515	712	923	1070	1237	1371	459	543	1978	1031
Central	2015	68.8	107	196	358	557	797	919	1033	1104	319	406	1497	746
Tap Mun	5668	85.9	3	4	8	14	27	37	50	60	8	12	145	48

Pollutant: Nitric Oxide

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Kwun Tong	7462	85.2	6	37	69	107	151	181	223	260	49	77	667	229
Sha Tin	8591	98.1	0	2	11	35	87	129	190	228	10	30	403	134
Tai Po	8577	97.9	2	7	15	34	70	103	145	179	14	28	402	106
Yuen Long	8498	97.0	5	11	27	51	85	114	157	192	23	38	432	184
Sham Shui Po	8043	91.8	4	22	46	74	107	140	194	235	33	55	457	178
Central / Western	8553	97.6	1	3	11	33	69	97	144	185	10	26	411	149
Tsuen Wan	8477	96.8	3	17	41	69	108	142	204	245	28	52	782	183
Kwai Chung	8467	96.7	1	3	11	33	60	81	114	140	10	23	267	87
Mong Kok	8277	94.4	28	60	106	157	206	237	284	329	90	114	599	263
Causeway Bay	8153	93.1	78	155	267	386	516	611	712	798	230	287	1145	589
Central	2015	68.8	30	74	163	290	424	501	582	640	135	199	871	426
Tap Mun	5668	85.9	0	0	1	1	3	5	8	14	1	1	63	12

Pollutant: Nitrogen Dioxide

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Kwun Tong	7462	85.2	28	42	65	88	110	124	143	157	59	68	228	155
Sha Tin	8591	98.1	15	26	41	59	81	96	115	129	37	45	202	99
Tai Po	8577	97.9	21	31	47	67	88	100	117	131	45	51	245	124
Yuen Long	8498	97.0	23	34	50	69	90	106	125	140	47	54	299	162
Sham Shui Po	8043	91.8	29	42	63	88	109	123	140	152	60	67	252	157
Central / Western	8553	97.6	17	28	50	71	90	104	122	136	43	52	204	132
Tsuen Wan	8477	96.8	27	40	58	79	100	115	136	152	55	62	299	151
Kwai Chung	8467	96.7	16	29	42	58	78	92	113	128	38	46	264	113
Mong Kok	8277	94.4	40	55	79	107	131	146	167	182	76	83	259	173
Causeway Bay	8153	93.1	51	71	102	133	157	172	196	218	95	104	297	231
Central	2015	68.8	51	72	98	128	157	177	203	220	94	102	246	161
Tap Mun	5668	85.9	2	4	7	12	23	30	38	46	7	10	112	37

Pollutant: Carbon Monoxide

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 8 hour
Tsuen Wan	8375	95.6	360	490	680	900	1120	1250	1470	1700	646	718	3680	3130
Mong Kok	8316	94.9	670	860	1090	1380	1680	1880	2140	2390	1075	1146	3970	3210
Causeway Bay	8309	94.9	570	810	1130	1490	1890	2130	2470	2680	1025	1183	3800	2890
Central	2414	82.4	590	760	1010	1320	1700	1870	2060	2220	949	1068	3810	2390
Tap Mun	6019	91.2	240	290	380	550	690	780	880	940	397	432	1810	1290

Pollutant: Ozone

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Kwun Tong	7398	84.4	2	5	11	23	41	53	70	80	10	17	117	52
Sha Tin	8387	95.7	2	5	19	46	74	91	107	118	15	30	199	104
Tai Po	8547	97.6	3	8	23	47	72	88	107	119	18	31	173	104
Yuen Long	8418	96.1	2	4	13	32	57	75	102	119	11	23	187	82
Sham Shui Po	7909	90.3	1	4	10	25	46	60	78	89	10	18	183	70
Central / Western	8479	96.8	5	9	21	43	69	84	100	111	19	30	187	116
Tsuen Wan	8394	95.8	2	5	12	28	51	65	85	99	11	20	174	78
Kwai Chung	8496	97.0	1	6	21	50	74	88	104	115	15	31	176	109
Tap Mun	5846	88.6	21	35	60	93	121	135	155	165	51	66	239	153

Pollutant: Respirable Suspended Particulates

Station	No. of hours	Data capture (%)	<----------Percentiles----------> 10	25	50	75	90	95	98	99	Geometric mean	Arithmetic mean	Highest 1 hour	Highest 24 hour
Kwun Tong	7154	81.7	19	28	42	60	82	99	119	136	41	47	297	146
Sha Tin	8598	98.2	18	25	39	60	85	100	121	138	38	46	284	132
Tai Po	8663	98.9	15	22	36	58	84	100	124	143	36	44	354	129
Yuen Long	8484	96.8	21	29	46	76	109	129	156	174	46	57	388	178
Sham Shui Po	8064	92.1	18	27	41	62	84	99	120	137	40	47	302	145
Central / Western	8603	98.2	15	22	40	64	88	103	126	141	38	47	298	135
Tsuen Wan	8380	95.7	22	31	44	65	89	108	133	155	44	51	353	174
Kwai Chung	8486	96.9	14	22	35	55	79	97	119	137	34	42	340	139
Mong Kok	8478	96.8	29	41	57	77	98	113	135	155	55	62	306	166
Causeway Bay	8384	95.7	55	76	105	137	167	186	211	229	100	109	325	214
Central	1475	50.4	43	59	80	111	143	159	177	187	78	87	243	162
Tap Mun	6258	94.8	12	16	26	52	76	89	114	125	29	37	239	117

Note: All units are in micrograms per cubic metre.

TABLE C6(a):1998 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-
Kwun Tong	80	3.3	0.07	0.97	3.9	45	4.2	527	29	1059	2184	413	5.6	182	37	94	0.17	2.3	2479	450	2414	11	8502	0.10	1362	3906
Shatin	67	4.3	0.06	1.15	3.0	58	2.7	442	25	971	2305	352	5.1	174	28	80	0.18	1.8	1826	595	1612	10	8910	0.11	1443	2831
Tai Po	68	4.8	0.06	1.39	3.0	68	2.6	394	23	871	1424	325	4.9	141	24	74	0.17	2.7	1748	697	1511	9	9777	0.12	2382	3609
Yuen Long	97	5.8	0.08	1.87	4.8	91	3.9	663	34	1246	2492	357	7.6	217	26	182	0.18	2.0	1613	874	1765	11	10064	0.26	2343	4822
Sham Shui Po	86	6.0	0.06	1.39	6.3	66	3.7	544	32	1067	2287	459	7.9	161	31	79	0.18	3.0	2603	647	2559	11	10145	0.16	1870	4251
Central / Western	77	4.7	0.07	1.56	3.5	61	2.7	455	25	785	2011	525	6.3	158	17	59	0.18	1.9	3538	689	4095	16	10246	0.08	1994	4454
Tsuen Wan	74	4.5	0.06	1.48	4.3	68	2.7	414	24	813	1765	343	8.9	153	24	100	0.19	2.1	1926	639	1862	12	9339	0.16	1912	3480
Kwai Chung	63	3.8	0.05	1.51	5.8	57	3.0	376	21	699	1809	326	12.2	141	14	126	0.18	1.8	1904	565	1799	9	9027	0.08	1824	3176
Mong Kok	103	4.0	0.07	1.37	7.1	64	6.0	621	37	1310	3076	487	9.2	211	40	146	0.18	1.7	2705	649	3195	13	9680	0.30	1641	4335
Average	79	4.6	0.06	1.41	4.6	64	3.5	493	28	980	2150	399	7.5	171	27	105	0.18	2.1	2260	645	2312	11	9521	0.15	1864	3874

Note: *1. All figures are in nanograms per cubic metre except TSP which is in micrograms per cubic metre.*

2. All values presented are annual arithmetic means.

3. Analysis of the concentrations of total carbon (C) and total hydrocarbon (THC) in TSP ceased in 1998.

TABLE C6(b):1998 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-
Kwun Tong	0.00	0.00	0.00	0.00	0.05	0.00	0.60	0.03	1.20	2.47	0.47	0.01	0.21	0.04	0.11	0.00	0.00	2.81	0.51	2.73	0.01	9.63	0.00	1.54	4.42
Shatin	0.01	0.00	0.00	0.00	0.09	0.00	0.66	0.04	1.46	3.45	0.53	0.01	0.26	0.04	0.12	0.00	0.00	2.74	0.89	2.42	0.01	13.35	0.00	2.16	4.24
Tai Po	0.01	0.00	0.00	0.00	0.10	0.00	0.58	0.03	1.27	2.08	0.48	0.01	0.21	0.04	0.11	0.00	0.00	2.56	1.02	2.21	0.01	14.30	0.00	3.48	5.28
Yuen Long	0.01	0.00	0.00	0.00	0.09	0.00	0.68	0.04	1.28	2.56	0.37	0.01	0.22	0.03	0.19	0.00	0.00	1.66	0.90	1.81	0.01	10.34	0.00	2.41	4.95
Sham Shui Po	0.01	0.00	0.00	0.01	0.08	0.00	0.63	0.04	1.24	2.66	0.53	0.01	0.19	0.04	0.09	0.00	0.00	3.03	0.75	2.98	0.01	11.82	0.00	2.18	4.95
Central / Western	0.01	0.00	0.00	0.00	0.08	0.00	0.59	0.03	1.02	2.61	0.68	0.01	0.21	0.02	0.08	0.00	0.00	4.59	0.89	5.31	0.02	13.28	0.00	2.59	5.78
Tsuen Wan	0.01	0.00	0.00	0.01	0.09	0.00	0.56	0.03	1.10	2.40	0.47	0.01	0.21	0.03	0.14	0.00	0.00	2.62	0.87	2.53	0.02	12.69	0.00	2.60	4.73
Kwai Chung	0.01	0.00	0.00	0.01	0.09	0.00	0.59	0.03	1.10	2.85	0.51	0.02	0.22	0.02	0.20	0.00	0.00	3.00	0.89	2.84	0.01	14.23	0.00	2.87	5.01
Mong Kok	0.00	0.00	0.00	0.01	0.06	0.01	0.60	0.04	1.27	2.99	0.47	0.01	0.20	0.04	0.14	0.00	0.00	2.63	0.63	3.10	0.01	9.40	0.00	1.59	4.21
Average	0.01	0.00	0.00	0.01	0.08	0.00	0.61	0.03	1.22	2.68	0.50	0.01	0.21	0.03	0.13	0.00	0.00	2.85	0.82	2.88	0.01	12.12	0.00	2.38	4.84

TABLE C7(a): 1998 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-
Kwun Tong	53	3.0	0.06	0.84	2.8	39	1.8	192	14	499	690	254	5.6	141	20	36	0.18	1.6	1641	411	1190	9	8065	27061	1949	0.16	1928	2730
Shatin	46	4.0	0.06	1.07	2.7	51	1.5	191	15	525	830	216	5.1	145	21	28	0.19	1.6	1266	534	820	8	8422	22353	1327	0.12	1892	2036
Tai Po	50	4.4	0.06	1.19	2.3	60	1.5	195	14	471	540	206	4.9	113	16	54	0.18	2.3	1178	652	751	9	9302	25323	1380	0.15	2611	2599
Yuen Long	61	5.2	0.05	1.65	3.2	75	1.9	256	18	524	860	204	6.2	153	14	32	0.18	1.9	1137	776	1088	11	9266	30449	1880	0.33	2873	3705
Sham Shui Po	55	5.4	0.06	1.21	4.3	54	1.5	215	17	463	761	255	6.8	120	16	25	0.19	2.9	1592	560	1108	10	8846	27119	2043	0.18	2227	2997
Central / Western	49	3.9	0.06	1.30	2.7	52	1.4	190	15	360	660	275	6.0	128	11	26	0.20	1.8	1940	567	1824	11	8772	21900	1516	0.10	2298	3028
Tsuen Wan	54	4.2	0.06	1.38	3.2	59	1.4	181	14	395	648	214	7.8	127	13	27	0.19	2.0	1334	626	1008	10	9069	27951	1913	0.25	2351	2545
Kwai Chung	45	3.5	0.05	1.31	4.7	52	1.4	166	12	335	605	201	10.8	118	10	38	0.18	1.7	1299	559	926	9	8782	22308	1392	0.11	2250	2345
Mong Kok	63	3.8	0.05	1.29	3.8	55	2.0	211	17	496	859	254	6.3	136	16	41	0.19	1.7	1576	533	1474	10	8611	33311	3190	0.31	2322	3296
Average	53	4.1	0.06	1.25	3.3	55	1.6	200	15	452	717	231	6.6	131	15	34	0.19	1.9	1440	580	1132	10	8793	26420	1843	0.19	2306	2809

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

2. All values presented are annual arithmetic means.

TABLE C7(b): 1998 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-
Kwun Tong	0.01	0.00	0.00	0.01	0.07	0.00	0.36	0.03	0.95	1.31	0.48	0.01	0.27	0.04	0.07	0.00	0.00	3.12	0.78	2.26	0.02	15.32	51.40	3.70	0.00	3.66	5.19
Shatin	0.01	0.00	0.00	0.01	0.11	0.00	0.42	0.03	1.15	1.81	0.47	0.01	0.32	0.05	0.06	0.00	0.00	2.76	1.16	1.79	0.02	18.36	48.72	2.89	0.00	4.12	4.44
Tai Po	0.01	0.00	0.00	0.00	0.12	0.00	0.39	0.03	0.94	1.08	0.41	0.01	0.23	0.03	0.11	0.00	0.00	2.35	1.30	1.50	0.02	18.54	50.48	2.75	0.00	5.20	5.18
Yuen Long	0.01	0.00	0.00	0.01	0.12	0.00	0.42	0.03	0.86	1.40	0.33	0.01	0.25	0.02	0.05	0.00	0.00	1.86	1.27	1.78	0.02	15.12	49.69	3.07	0.00	4.69	6.05
Sham Shui Po	0.01	0.00	0.00	0.01	0.10	0.00	0.39	0.03	0.84	1.38	0.46	0.01	0.22	0.03	0.05	0.00	0.01	2.89	1.02	2.01	0.02	16.07	49.28	3.71	0.00	4.05	5.45
Central / Western	0.01	0.00	0.00	0.01	0.10	0.00	0.38	0.03	0.73	1.34	0.56	0.01	0.26	0.02	0.05	0.00	0.00	3.93	1.15	3.70	0.02	17.78	44.38	3.07	0.00	4.66	6.14
Tsuen Wan	0.01	0.00	0.00	0.01	0.11	0.00	0.34	0.03	0.74	1.21	0.40	0.01	0.24	0.02	0.05	0.00	0.00	2.48	1.17	1.88	0.02	16.89	52.06	3.56	0.00	4.38	4.74
Kwai Chung	0.01	0.00	0.00	0.01	0.12	0.00	0.37	0.03	0.74	1.34	0.44	0.02	0.26	0.02	0.08	0.00	0.00	2.88	1.24	2.05	0.02	19.44	49.37	3.08	0.00	4.98	5.19
Mong Kok	0.01	0.00	0.00	0.01	0.09	0.00	0.33	0.03	0.78	1.36	0.40	0.01	0.22	0.02	0.06	0.00	0.00	2.49	0.84	2.33	0.02	13.61	52.64	5.04	0.00	3.67	5.21
Average	0.01	0.00	0.00	0.01	0.10	0.00	0.38	0.03	0.86	1.36	0.44	0.01	0.25	0.03	0.07	0.00	0.00	2.75	1.10	2.14	0.02	16.79	49.78	3.43	0.00	4.38	5.29

TABLE C8: TOTAL WET AND DRY DEPOSITION FOR 1998

(a) WET DEPOSITION

	Monitoring Station	Kwun Tong	Central / Western
	WET DEPOSITION (Ton/Ha)	21680	14984
	WEIGHTED MEAN pH (based on volume-weighted mean hydrogen ion concentrations ($[H^+]$)	4.36	4.27
	WEIGHTED MEAN pH (based on volume-weighted mean pH)	4.60	4.48
	NO. OF SAMPLES	29	28
Filtrate (Kg/Ha)	**NH_4^+**	7.92	5.39
	NO_3^-	18.20	13.00
	$SO_4^=$	36.45	29.43
	Cl^-	28.23	20.21
	Na^+	18.79	11.05
	K^+	6.24	4.00
	Formate	4.38	3.03
	Acetate	4.37	3.04
	Ca	8.05	4.89
	Mg	1.52	1.29
Residue (Kg/Ha)	**WEIGHT**	113.33	107.34
	Si	4.62	5.05
	Al	1.99	1.81
	Ca	0.26	0.27
	Fe	1.19	0.60
	Mg	0.29	0.18
	V	0.09	0.06
	Mn	0.08	0.06
	Cu	0.09	0.08
	Ba	0.18	0.11

(b) DRY DEPOSITION

	Monitoring Station	Kwun Tong	Central / Western
	NO. OF SAMPLES	37	41
Filtrate (Kg/Ha)	**NH_4^+**	0.22	0.46
	NO_3^-	5.80	5.52
	$SO_4^=$	9.00	9.83
	Cl^-	8.56	11.63
	Na^+	4.84	6.94
	K^+	0.63	0.69
	Formate	0.30	0.35
	Acetate	0.29	0.32
	Ca	6.58	6.22
	Mg	0.63	0.81
Residue (Kg/Ha)	**WEIGHT**	99.05	47.23
	Si	15.40	8.20
	Al	5.03	2.65
	Ca	1.70	0.70
	Fe	2.31	1.26
	Mg	0.26	0.17
	V	0.01	0.01
	Mn	0.06	0.03
	Cu	0.02	0.02
	Ba	0.04	0.02

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

TABLE C9: DIURNAL VARIATION OF AIR POLLUTANT CONCENTRATIONS FOR 1998

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
Kwun Tong	7	7	6	6	5	5	6	10	14	16	16	16	16	16	16	18	20	18	14	12	10	10	9	8
Sha Tin	5	5	4	4	3	3	4	6	8	9	9	9	8	8	8	9	9	10	10	10	10	10	8	7
Tai Po	8	7	6	6	5	6	8	11	12	11	10	10	10	9	9	9	10	11	12	12	11	11	10	8
Yuen Long	13	13	11	12	10	10	12	16	20	22	23	23	20	18	19	18	19	21	20	19	17	16	15	14
Sham Shui Po	13	13	12	12	12	12	14	16	19	22	21	20	19	20	21	21	21	22	22	21	20	19	16	14
Central / Western	10	11	9	10	9	10	9	11	15	17	17	16	14	16	18	20	21	19	20	18	16	15	13	12
Tsuen Wan	9	8	7	7	6	6	7	11	16	19	20	19	19	18	19	21	21	22	19	16	14	13	12	10
Kwai Chung	13	12	11	10	9	9	9	11	15	18	19	19	18	18	19	21	21	21	20	18	17	15	14	13
Mong Kok	10	11	10	11	9	10	11	16	22	27	28	26	24	23	24	24	23	22	20	19	17	15	14	12
Causeway Bay	17	15	15	14	12	11	14	21	28	27	26	25	25	24	24	25	24	22	21	20	19	19	18	18
Central	12	11	9	10	9	8	9	16	29	27	27	26	21	22	21	22	22	24	25	22	20	19	17	16
Tap Mun	3	3	3	4	3	4	5	9	11	12	11	10	8	6	6	6	6	6	6	4	5	5	5	5

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
Kwun Tong	147	71	57	48	43	64	161	253	281	268	233	209	197	195	204	216	241	264	269	249	201	194	198	189
Sha Tin	100	68	55	46	41	45	85	132	124	98	80	74	65	63	66	72	82	98	116	130	133	138	136	126
Tai Po	101	72	56	46	45	53	93	142	135	101	88	82	79	76	76	80	88	105	128	132	120	121	121	114
Yuen Long	104	79	66	56	54	70	114	152	143	122	111	104	95	93	95	104	119	134	155	161	145	142	137	129
Sham Shui Po	131	83	69	61	58	64	113	174	213	207	182	166	155	162	172	178	189	203	210	193	169	161	152	151
Central / Western	74	54	49	45	43	44	57	95	126	131	120	107	92	95	101	105	113	120	123	114	104	98	94	89
Tsuen Wan	116	68	54	44	40	53	109	176	204	198	172	156	146	147	152	160	174	195	209	189	162	155	156	149
Kwai Chung	71	48	40	33	29	32	51	87	104	107	97	90	83	83	86	94	101	110	120	114	98	89	89	85
Mong Kok	202	132	131	113	104	113	184	300	357	359	330	297	274	276	307	312	319	343	352	320	273	270	271	259
Causeway Bay	455	331	305	244	223	192	390	735	766	728	655	610	599	610	581	608	657	664	665	654	609	586	605	566
Central	259	156	136	116	131	137	237	476	654	599	570	507	454	483	473	499	526	564	573	539	460	432	396	379
Tap Mun	11	11	11	11	11	12	13	16	17	16	15	12	10	9	9	10	10	11	11	11	12	11	11	11

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
Kwun Tong	57	20	15	12	10	18	67	119	135	125	103	87	80	77	81	87	101	113	117	107	82	79	82	79
Sha Tin	37	23	16	12	10	11	29	54	48	33	24	20	16	15	15	17	19	25	35	46	49	54	54	50
Tai Po	34	21	14	10	9	12	31	57	52	32	25	21	20	17	17	18	19	25	37	41	37	40	41	39
Yuen Long	38	26	20	16	15	23	47	66	57	43	36	31	26	25	25	27	33	40	52	58	52	53	53	50
Sham Shui Po	46	26	19	16	15	17	39	70	92	88	72	62	54	56	60	62	67	74	78	71	59	57	53	54
Central / Western	20	13	11	10	9	10	14	29	45	47	40	32	25	24	25	27	30	33	34	31	28	27	26	25
Tsuen Wan	40	19	13	9	7	12	38	75	91	86	69	58	51	50	50	54	60	72	81	72	59	57	59	56
Kwai Chung	21	12	9	6	5	5	12	28	36	38	32	28	23	22	22	24	26	29	35	34	28	25	26	26
Mong Kok	84	47	48	40	35	40	78	145	176	175	155	134	120	118	133	135	140	156	164	147	120	119	121	116
Causeway Bay	226	155	142	109	100	84	205	416	433	407	357	325	316	321	303	318	350	356	358	352	327	314	326	302
Central	115	59	49	40	48	51	110	252	358	317	293	253	219	233	223	239	257	281	291	273	226	212	193	185
Tap Mun	1	1	1	1	1	1	2	2	3	3	2	1	1	1	1	1	1	1	1	1	1	1	1	1

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
Kwun Tong	60	41	34	30	28	37	59	72	75	77	76	76	75	76	80	83	88	91	90	85	76	74	72	69
Sha Tin	44	34	30	27	25	28	40	50	51	48	44	43	41	40	43	47	53	60	62	60	57	56	53	50
Tai Po	49	39	34	31	31	34	45	56	57	52	50	49	49	49	50	53	59	67	72	70	63	60	58	54
Yuen Long	47	40	36	32	31	35	43	51	56	56	56	57	55	55	58	63	69	74	76	72	66	61	57	53
Sham Shui Po	61	44	40	36	35	37	54	66	73	73	73	72	72	77	81	83	87	89	90	84	78	74	71	68
Central / Western	44	34	31	29	29	29	36	50	57	60	59	58	55	58	62	64	68	70	71	67	61	57	54	51
Tsuen Wan	55	40	35	30	29	35	51	61	65	67	67	67	69	71	75	78	82	85	85	79	72	68	67	64
Kwai Chung	39	29	26	23	21	23	33	44	48	49	48	48	47	49	52	57	61	65	67	62	55	51	49	45
Mong Kok	74	60	58	53	51	53	64	79	88	91	93	92	91	95	103	105	105	105	102	95	89	87	86	82
Causeway Bay	110	95	89	77	71	64	77	100	104	106	110	113	116	119	119	122	123	120	118	115	110	106	107	104
Central	83	66	61	55	58	59	69	91	107	114	121	120	119	127	132	135	133	134	129	122	114	108	101	97
Tap Mun	9	9	10	9	10	11	11	12	12	12	11	10	8	8	8	8	9	9	10	10	10	10	9	10

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	700	640	590	540	490	510	560	680	760	750	730	710	710	710	730	740	770	820	910	900	840	830	810	770
Mong Kok	970	850	840	760	710	730	830	1080	1240	1230	1210	1150	1130	1160	1300	1330	1330	1460	1660	1520	1310	1290	1270	1150
Causeway Bay	1030	890	830	750	670	630	770	990	1190	1240	1280	1310	1350	1330	1340	1370	1410	1500	1550	1580	1440	1410	1370	1210
Central	850	770	710	690	700	720	790	970	1230	1260	1250	1200	1160	1140	1210	1260	1320	1370	1470	1360	1160	1090	1030	980
Tap Mun	410	410	410	420	420	430	440	470	470	460	460	470	460	450	450	440	420	420	410	410	410	410	410	410

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
Kwun Tong	15	27	30	33	33	26	13	9	9	11	15	19	22	22	21	19	15	11	9	9	11	11	10	11
Sha Tin	23	29	30	31	31	29	20	16	20	26	34	40	47	50	48	45	38	29	24	22	21	20	20	20
Tai Po	23	29	30	31	30	27	19	16	20	29	37	44	50	52	52	50	44	32	23	21	22	22	21	21
Yuen Long	16	18	21	22	22	18	14	12	15	21	28	36	44	48	47	41	31	21	13	11	12	12	13	14
Sham Shui Po	15	27	29	31	31	29	16	10	10	13	18	22	26	26	24	21	17	12	9	9	10	10	10	11
Central / Western	29	36	38	37	38	37	31	21	19	21	26	32	39	41	39	36	31	25	21	21	23	24	25	25
Tsuen Wan	16	26	30	33	33	27	15	11	13	16	21	26	30	31	31	28	21	15	10	10	12	12	12	12
Kwai Chung	30	37	38	39	40	37	29	21	21	25	31	37	41	42	41	38	32	24	19	19	22	23	24	25
Tap Mun	57	56	53	52	50	49	47	49	54	60	69	80	87	89	90	89	86	80	74	70	65	62	61	58

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
Kwun Tong	39	36	35	34	33	34	40	48	54	57	56	55	52	55	55	54	56	55	55	54	49	46	45	43
Sha Tin	43	40	39	38	37	38	42	47	47	48	49	49	45	46	48	49	49	50	50	52	52	50	48	45
Tai Po	41	39	38	37	37	38	42	48	48	46	46	46	44	44	44	45	45	46	49	51	49	47	44	43
Yuen Long	49	47	45	44	44	46	52	59	62	62	63	63	62	59	60	60	61	63	65	67	62	58	55	52
Sham Shui Po	38	37	36	35	35	36	40	46	52	55	55	54	52	54	55	55	55	56	56	56	51	46	42	40
Central / Western	40	38	37	36	36	37	38	42	49	53	54	53	50	51	55	55	55	54	54	53	50	47	44	41
Tsuen Wan	44	41	39	38	38	39	43	49	54	58	58	57	56	57	60	59	60	60	61	60	56	52	48	46
Kwai Chung	36	35	34	33	33	33	35	38	42	46	47	47	45	46	49	51	50	48	47	47	44	42	40	38
Mong Kok	51	48	46	45	44	45	51	61	71	72	70	68	66	68	70	70	70	71	72	73	68	63	59	56
Causeway Bay	99	83	75	68	65	62	74	100	115	116	113	112	117	128	128	129	135	138	145	147	132	121	114	108
Central	68	61	62	58	60	62	65	82	103	108	104	103	91	94	101	104	106	105	105	104	95	90	83	79
Tap Mun	33	33	33	33	34	35	37	40	41	41	42	42	41	40	40	39	39	38	37	36	36	35	35	34

Note: All units are in micrograms per cubic metre.

TABLE C10: AMBIENT LEVELS OF TOXIC AIR POLLUTANTS FOR 1998

Toxic Air Pollutants	Concentration Unit	Annual Averages [1]	
		Tsuen Wan	Central/Western
Heavy Metals [2]			
Cadmium	ng/m^3	1.48	1.56
Hexavalent chromium	ng/m^3	0.33	0.52
Lead	ng/m^3	68	61
Nickel	ng/m^3	4.3	3.5
Organic Substances			
Benzene	$\mu g/m^3$	2.6	2.1
Benzo[a]pyrene	ng/m^3	0.41	0.29
1,3-Butadiene	$\mu g/m^3$	0.2	0.2
Formaldehyde	$\mu g/m^3$	4.47	5.28
Perchloroethylene	$\mu g/m^3$	1.6	3.5
Dioxins [3]	pg TEQ/m^3	0.097	0.080

Note:

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

[2] For lead, nickel and cadmium, the reported figures are the respective 1998 annual average concentrations in the elemental analysis of total suspended particulates.

[3] The ambient level of dioxins is expressed here as toxic equivalent (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.