

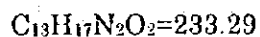
(1) Schematic diagram of Ogawa Passive sampler of NO_x and SO₂ sampling

The sampler consists of a cylindrical polymer body ($\phi 20\text{mm} \times 30\text{mm}$) and a plastic pin-clip holder, shown in the Figure. There are two cavities at the ends of the cylinder, each of which holds one coated filter between two stainless steel screens. Because the core of the body is solid, each cavity is isolated from the other one. The diffusion barrier endcaps hold the screens and filters in place by friction fit.

Filter for NO₂: $\phi 14.5\text{mm}$ fiber filter coated with TEA (Triethanolamine)

Filter for NO_x: $\phi 14.5\text{mm}$ fiber filter coated with TEA and PTIO

PTIO = 2-Phenyl-4,4,5,5-tetramethylimidazoline-3-oxide-1-oxyl



On the filter, NO is oxidized to NO₂ by PTIO and collected as NO_x with NO₂.

Filter for SO₂: $\phi 14.5\text{mm}$ fiber filter coated with TEA (special purity for SO₂)

- Item for NO_x

NO₂: Measured by Result from NO₂ filter

NO : Difference between the values of NO_x and NO₂ filter

In the event of outdoor sampling, the sampler is used in the shelter for protection from exposure to the sun and rainfall.

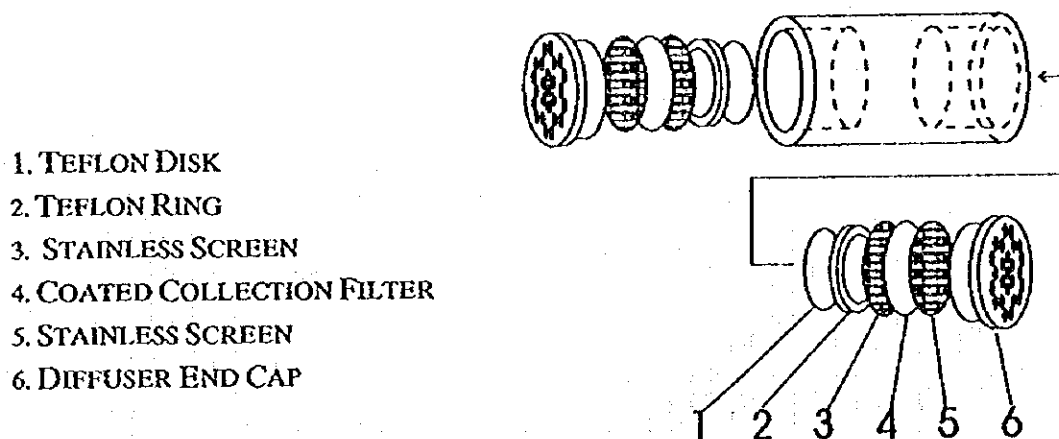


Fig.3.4.2-C1 Schematic diagram NO_x and SO₂ sampler

(2) Outline of the analysis

NO₂ and NO_x : Extraction with water (extracted as NO₂)

Addition of color producing reagent

Spectrophotometric analysis (analyzed as NO₂)

(Equipment ; Shimadzu UV-120 Spectrophotometer with 1 cm cell)

SO₂ : Extraction with water (extracted as SO₃²⁻)

Oxidation by H₂O₂ with Pt catalyst (oxidized to SO₄²⁻)

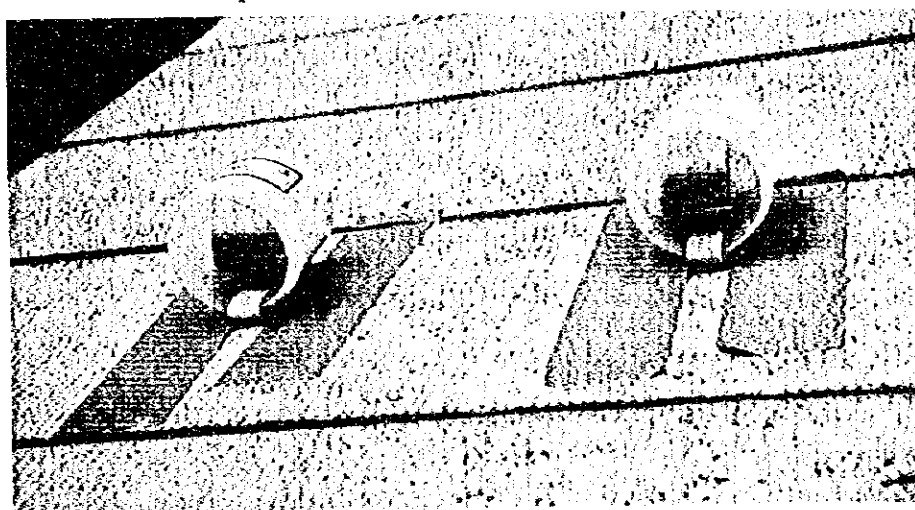
Ion Chromatography analysis (analyzed as SO₄²⁻)

The specification of the Ion Chromatography is shown in Appendix 3.4.2-E.

(3) Pictures of NO_x and SO₂ sampling



Preparation of NO_x and SO₂ sampler



NO_x and SO₂ sampler

Appendix 3.4.2-D

Explanation of VOC measurement

(1) Schematic diagram and of VOC sampling

- Tenax GC tube : I.D ϕ 4mm, O.D ϕ 6mm, 160mm Long glass tube packed with 0.2g of Tenax GC (AKZO Research Lab., Arnhem, The Netherlands ; 60/80 mesh)

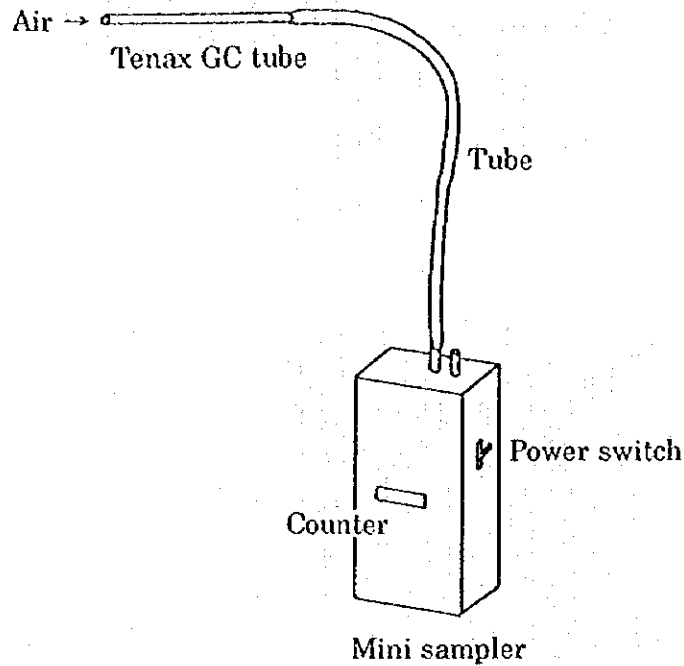


Fig. 3.4.2-D1 Schematic diagram of VOC sampling

(2) Explanation of VOC analysis

a. The specification of VOC analyzing system

Item	Equipment
GC	SIMADZU GC-9A with FID detector
Column	Cross-linked Methyl Silicone 50m length, I.D. ϕ 0.32mm
Carrier gas	He 3mL/min
Data processor	SIMADZU C-R4A

b. The sequence of the analysis

The schematic diagram of VOC analysis is shown in Fig 3.4.2-D2. The collector tube (Tenax GC tube) is desorbed at about 200°C at the desorption chamber. The desorbed sample is carried to the Capillary column. At this stage, because the column oven is kept

cool (-40°C) by liquid N₂, the sample is re-trapped and re-concentrated at the inlet of the column (i.e. Cryofocus). By this re-concentration, it is enabled to avoid the peaks becoming broad. Each component elutes gradually by increasing the column oven temperature, separated by the column, and then analyzed by the FID detector. Aliphatic and aromatic compounds of C₆~C₃ are often detected in the organic compounds taken in urban areas. The components to be analyzed with this analysis system are the following items.

Item: Benzene (C₆H₆)

Toluene (C₆H₅CH₃)

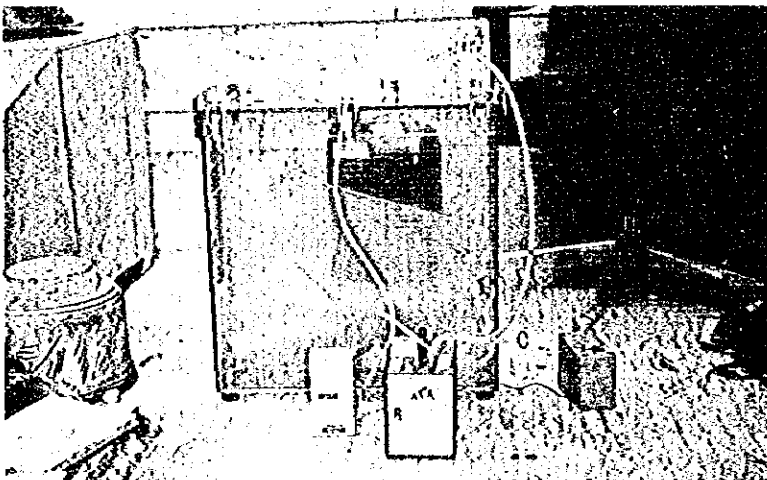
Ethylbenzene (C₆H₅C₂H₅)

m,p-Xylene (C₆H₄(CH₃)₂)

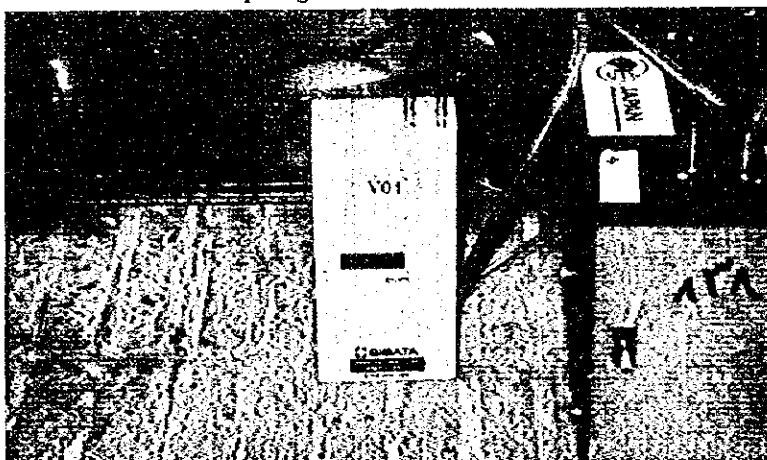
o-Xylene (C₆H₄(CH₃)₂)

The example of the chromatogram is shown in Fig. 3.4.2-D3.

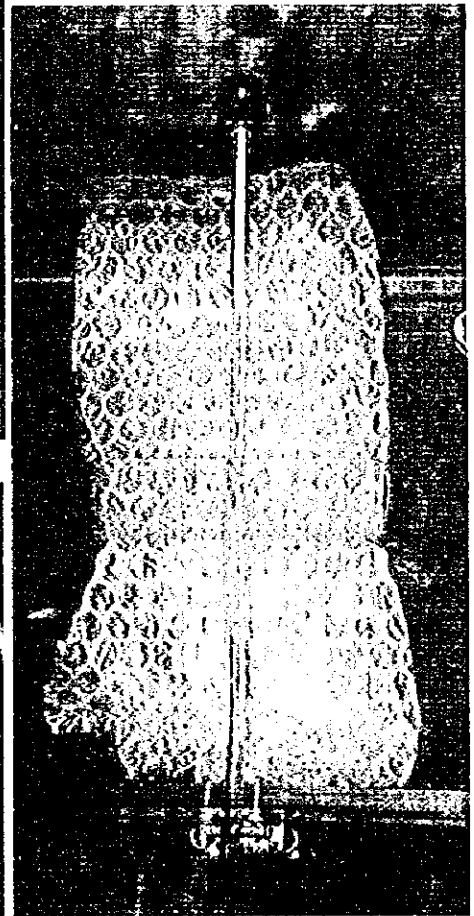
(3) Pictures of VOC sampling



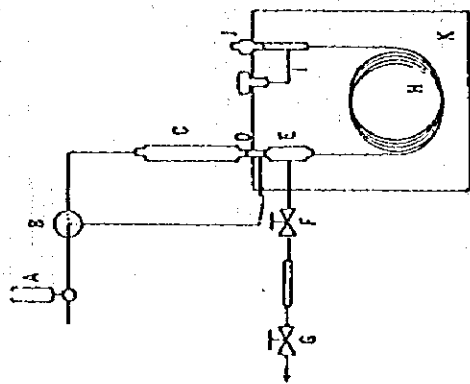
Sampling of VOC and HC



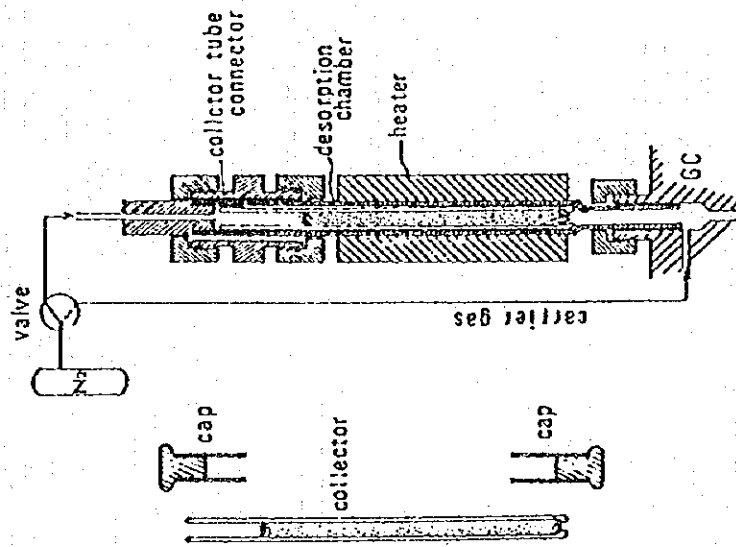
SIBATA Mini sampler



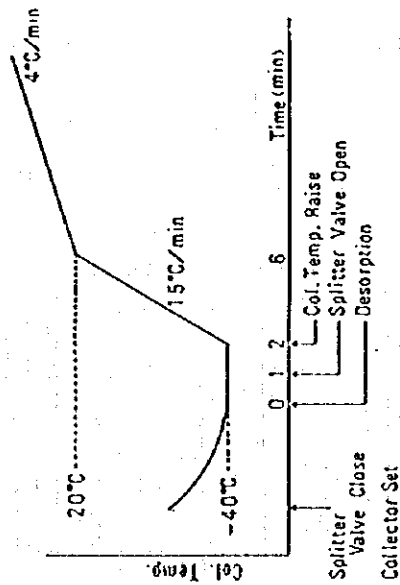
Tenax GC tube



a. Schematic view of Gas chromatograph
 A. Flow controller B. Three-way valve C. Desorption
 heater D. Injector E. Splitter F. Stop valve G. Needle
 valve H. Capillary column I. Make-up gas J. FID
 K. Oven

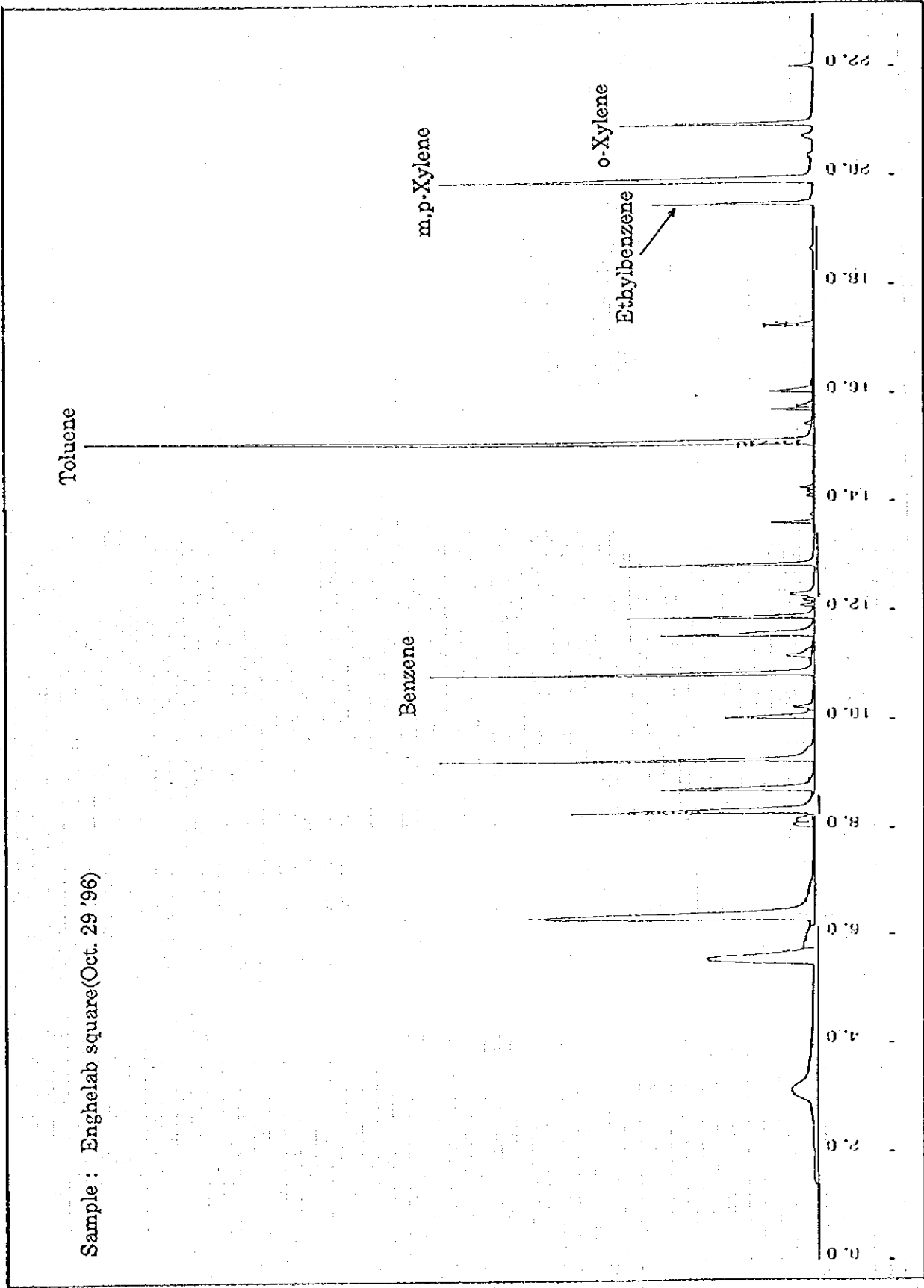


b. Collector tube and desorption chamber



c. Column oven temperature schedule
 and sequence of operation

Fig. 3.4.2-D2 Schematic diagram of VOC analyzing system

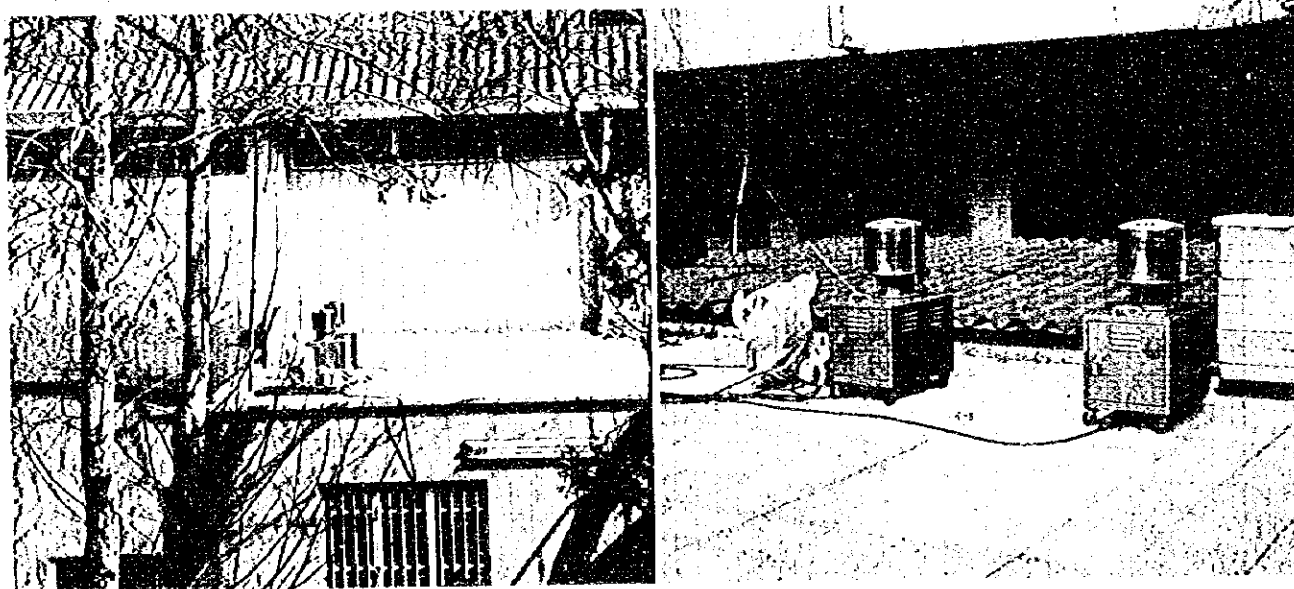


Sample : Enghelab square(Oct. 29 '96)

Fig. 3.4.2-D3 Example of Chromatogram of VOC analysis

Appendix 3.4.2-E Explanation of SPM sampling and analysis

(1) Picture of SPM sampling



(2) Specification and explanation of analyzer of SPM

① Specification of Ion chromatography (Japan)

Item	for analysis of Anion and SO ₂	for analysis of Cation
Equipment	Dionex DX-AQ	Dionex DX-AQ
Eluent	1.8mM Na ₂ CO ₃ /1.7mM NaHCO ₃	20mM Metasulfonic acid
Column	HPIC-AG4A-SC guard column HPIC-AS4A-SC separation column	HPIC-CG12 guard column HPIC-SC12 separation column
Flow rate	1.5mL/min	0.9mL/min
Suppressor	ASRS-1 Anion membrane suppressor	CSRS-1 Cation membrane suppressor
Detector	Electric conductivity	Electric conductivity

② Specification of Radio activation analysis (Japan)

a. Filter : Cerlose nitrate filter

b. Analytical item : Ai, Br, Ca, Cl, Cu, Mn, Ti, V (Short lifetime nuclide)

As, K, La, Na, Sb, Sm, W (Middle lifetime nuclide)

Ag, Ba, Ce, Co, Cr, Cs, Fe, Hf, Lu, Sc, Se, Th, Zn

(Long lifetime nuclide)

③ Specification of Fluorescent X-ray analysis (Japan)

a. Equipment :

Model 3070 Fluorescent X-ray analyzer, Rigaku Denki Co.

b. Analytical condition

Item	for Pb	for S
X-ray tube	Rh	Cr
Output	50kV, 50mA	45kV, 40mA
Analyzing crystal	LiF	Ge
Counter	Scintillation counter	Proportional counter (gas flow type)
Analytical line	L β	K α
Counting time	40 sec	40 sec

④ Explanation of Thermal carbon analyzer (Japan)

Analysis of carbons in SPM was carried out using Thermal Carbon Analyzer (TCA) of Saitama University by courtesy. The schematic diagram of TCA is shown in Fig 3.4.2-E1. TCA is the equipment using the difference of the vaporization temperature between C-org (organic carbon) and C-ele (elemental carbon). In the core of TCA, there are two stages of electric furnaces. The first one is controlled at 600°C and the second one is at 900°C. At first, the filter sample is kept in the first furnace (600°C), and C-org is vaporized at this stage. Then C-org is carried to the catalyst, and oxidized to CO₂ and H₂O. H₂O is removed by the drier, and CO₂ derived from C-org is analyzed by the NDIR detector. Next, the filter is moved to the second furnace (900°C). Here the C-ele is vaporized, and C-ele concentration is measured through the same steps with C-org.

⑤ Analytical equipment in Tehran used for the analysis of SPM

-Varian AA-5 Atomic absorption spectrophotometer with:

2a: Air-acetylene and N₂O-acetylene flame burners

c. Sample for irradiation

Two sets of 1/4 amount of each sampled filter enclosed in doubled plastic bags are prepared, i.e. one is for the analysis of short lifetime nuclide and the other one is for middle and long lifetime nuclide.

d. Irradiation of Neutron

- Short lifetime nuclide: 3 minutes of irradiation at $0.5 \times 10^{12} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ of neutron flux was done using RSR pore of the nuclear reactor TRIGA II of Rikkyou University.
- Middle and long lifetime nuclide: 6 hours of irradiation at $1.5 \times 10^{12} \cdot \text{cm}^{-2} \cdot \text{s}^{-1}$ of neutron flux was done using RSR pore of the nuclear reactor TRIGA II of Rikkyou University.

e. Measurement of γ -ray

- Short lifetime nuclide: γ -ray was measured for 300 seconds after 2~4 minutes of cooling from the time irradiation is finished.
- Middle and long lifetime nuclide: 1000 second γ -ray measurement for middle lifetime and 3000 second γ -ray measurement for long lifetime nuclide were done after several days and several weeks from the time irradiation is finished, respectively.
- Ge semiconductor detector was used for the measurement of γ -ray.

f. Standard sample :

The multi element filter on which diluted standard solution of each element was dropped and then dried was used for a standard.

g. Data processing :

The γ -ray spectrum obtained through the pulse height analysis was processed by the data analyzer.

h. Equipment :

Item	Equipment
Ge semiconductor detector	GEM-15190-PS , EG&G ORTEC Co. GEM-15200 , ORTEC Co.
Pulse height analyzer	MODEL-7800, SEIKO EG&G Co.
Data analyzer.	PC-9800RX , NEC Co.

**2b: GTA-63 graphite furnace atomizer
-ARL 8480 X-ray Fluorescence Spectrophotometer**

Thermal Carbon Analyzer (TCA)

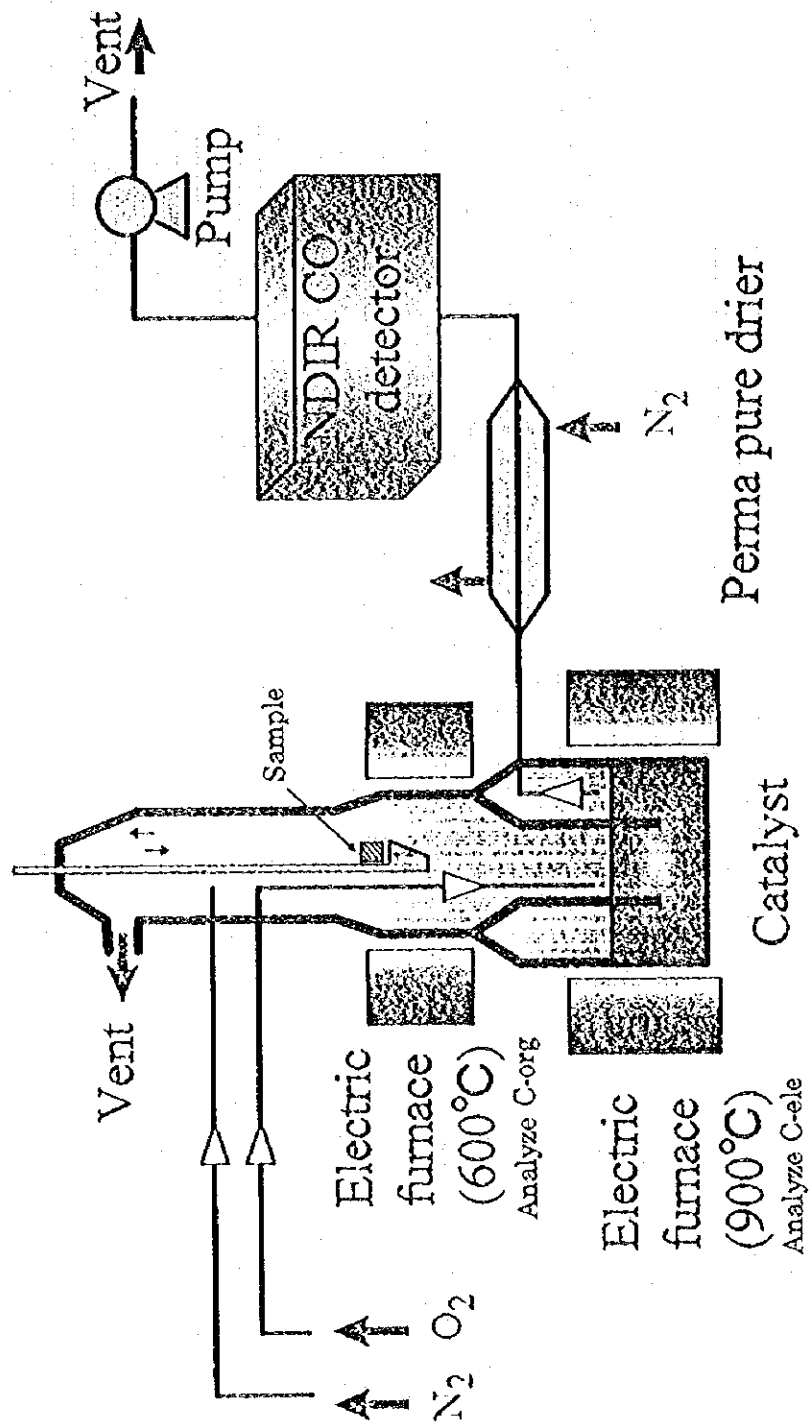


Fig. 3.4.2-E1 Schematic diagram of Thermal Carbon analyzer

Appendix 3.4.2-F

Table 3.4.2-F Schedule of Simplified / Additional measurements
Spring (May - June '97)

(a) Sampling date

Month Day Item	May							June
	25 Sun	26 Mon	27 Tue	28 Wed	29 Thu	30 Fri	31 Sat	1 Sun
CO		1		2		3		
HC		1		2		3		
NO _x	1 2 3 4 5 6 7							
SO ₂	1			2				

<Note> Run No.

(b) Sampling time and frequency

Item	Time of day																							
	0	...	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	...	24			
CO				□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□	□		
HC MOT			⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙		
HC 4points			⊙			⊙				⊙					⊙					⊙		⊙		
NO _x	24hr continuous sampling																							
SO ₂	72hr continuous sampling																							

<Notes>

- ; 1 hour Sampling
- ⊙ ; 10 minute Sampling
- HC MOT ; HC taken at MOT government office building

Appendix 4.2.3-A

Table 4.2.3-A1(1) CO Concentration (1)

Spring - Run 1
May 26 '97

Sampling time	CO Concentration (ppm)					
	Point=1	2	3	4	5	6
1 (05:00-06:00)	3.27	0.78	1.09	7.80	4.28	1.01
2 (06:00-07:00)	6.92	3.25	2.28	9.45	10.49	2.82
3 (07:00-08:00)	9.79	5.60	5.08	12.76	17.53	4.67
4 (08:00-09:00)	11.53	6.45	5.37	10.54	11.45	2.84
5 (09:00-10:00)	5.86	6.02	*	8.80	5.02	2.42
6 (10:00-11:00)	2.04	3.63	2.83	4.39	1.92	2.17 *
7 (11:00-12:00)	1.29	3.68	2.01	4.71	2.31	2.55
8 (12:00-13:00)	0.72	2.70	1.92	5.76	2.38	2.11
9 (13:00-14:00)	0.71	2.08	1.94	5.26	2.25	1.38
10 (14:00-15:00)	0.58	1.87	1.63	6.44	2.05	1.31
11 (15:00-16:00)	0.73	1.61	1.85	8.26	1.60	1.40
12 (16:00-17:00)	0.92	1.65	1.62	4.35	2.61	1.60
13 (17:00-18:00)	1.36	1.76	1.94	6.09	1.94	2.05
14 (18:00-19:00)	1.50	2.00	2.26	5.83	2.42	2.07
15 (19:00-20:00)	2.44	1.63	2.95	6.48	3.15	2.51
16 (20:00-21:00)	3.13 *	2.66	3.66	8.99	3.61	2.56

Sampling time	CO Concentration (ppm)					
	Point=7	8	9	10	11	12
1 (05:00-06:00)	7.52 *	1.07	0.58 *	3.10 *	4.31 *	1.50
2 (06:00-07:00)	11.33	2.37	0.32	3.68	5.69	1.25
3 (07:00-08:00)	6.89	4.24	0.89	4.99	10.19	1.21
4 (08:00-09:00)	5.27	5.57	0.97	4.14	5.98	3.09
5 (09:00-10:00)	2.94	3.12	0.76	3.73	3.98	1.86
6 (10:00-11:00)	1.25	2.42	2.02	2.39	2.79	1.75
7 (11:00-12:00)	0.95	2.07	0.78	2.50	2.05	1.16
8 (12:00-13:00)	0.94	1.94	0.61 *	3.47	2.66	1.00
9 (13:00-14:00)	0.94 *	2.59	0.41 *	3.49	2.38	1.09
10 (14:00-15:00)	0.99	2.98	0.24	1.90	2.40	1.27
11 (15:00-16:00)	1.34	2.75	0.35	2.03	2.66	1.20
12 (16:00-17:00)	1.16	1.85	0.29	1.93 *	2.59	1.18
13 (17:00-18:00)	1.17 *	1.45	0.54	2.12	2.94	1.41
14 (18:00-19:00)	1.15	1.14	0.61	2.32	2.70	1.80
15 (19:00-20:00)	1.71	1.25	0.75	2.55	3.69	2.15
16 (20:00-21:00)	2.19	1.69	0.74	3.55	4.35	2.76

Sampling time	CO Concentration (ppm)					
	Point=131	132	133	134	135	136
1 (05:00-06:00)	2.15 *	2.04	1.91	1.81		
2 (06:00-07:00)	6.03	2.52	3.94	3.14	2.50	2.20
3 (07:00-08:00)	7.38	6.92	6.33	5.74	4.94	4.76
4 (08:00-09:00)	6.70	6.92	6.85	6.88	6.58	6.73
5 (09:00-10:00)	4.73	4.32	4.58	5.34	6.20	5.48
6 (10:00-11:00)	1.72	1.04	1.24	1.23	2.45	2.54
7 (11:00-12:00)	1.73	1.12	1.27	1.22	2.20	1.95
8 (12:00-13:00)	2.44	1.18	1.32	1.14	1.98	1.63
9 (13:00-14:00)	4.41	1.31	0.90	1.08	1.61	1.48
10 (14:00-15:00)	*	1.14	0.95	0.83	1.43	1.14
11 (15:00-16:00)	2.26	0.84	0.77	1.31	1.50	1.69
12 (16:00-17:00)	2.27	1.00	0.87	1.66	1.13	1.02
13 (17:00-18:00)	2.49	1.27	1.26	1.85	1.42	1.16
14 (18:00-19:00)	1.84	1.39	1.46	1.81	1.33	1.05
15 (19:00-20:00)	2.45	2.04	2.12	2.56	1.83	1.79
16 (20:00-21:00)	2.74	2.60	2.66	3.26	2.52	2.30

(Notes) - ; Missed data. * ; Data which includes some error

Table 4.2.3-A1(2) CO Concentration (2)

Spring - Run 2
May 28 '97

Sampling time	CO Concentration (ppm)					
	Point=1	2	3	4	5	6
1 (05:00-06:00)	1.01	0.88	1.09	1.60	1.53	0.75
2 (06:00-07:00)	3.65	2.28	1.55	3.43	2.87 *	1.92
3 (07:00-08:00)	9.55	5.48	4.40	7.95	6.45	3.65
4 (08:00-09:00)	11.63	6.60	4.05	8.47	8.89	3.63
5 (09:00-10:00)	10.15	2.21	1.94	5.26	5.25	1.91
6 (10:00-11:00)	3.06	2.02	1.47	4.95	4.12	2.31
7 (11:00-12:00)	3.77	2.73	3.84	6.32	3.46	2.80
8 (12:00-13:00)	1.91	1.95	2.94	5.78	3.36	2.33
9 (13:00-14:00)	1.01	1.50	2.06	6.85	3.54	1.54
10 (14:00-15:00)	1.24	1.36	1.85	5.34	2.35	2.07
11 (15:00-16:00)	1.76	0.98	1.56	3.64	1.72	1.31
12 (16:00-17:00)	1.91	*	1.94	4.51	2.40	1.62
13 (17:00-18:00)	2.24	1.95	2.72	6.15	3.12	2.92
14 (18:00-19:00)	1.49	2.11	3.45	7.33	4.17	4.15
15 (19:00-20:00)	3.33	3.00	5.63	9.66	4.67	2.42
16 (20:00-21:00)	2.48	6.83	8.23	8.66	5.08	2.07

Sampling time	CO Concentration (ppm)					
	Point=7	8	9	10	11	12
1 (05:00-06:00)	0.71	1.24	1.19	1.79	1.48	0.88
2 (06:00-07:00)	1.74	2.97	1.14	2.76	4.94 *	0.91
3 (07:00-08:00)	4.05 *	6.87	3.10	6.04	8.62	2.49
4 (08:00-09:00)	6.85	6.77	1.95	5.37	8.81	1.97
5 (09:00-10:00)	4.19	3.21	1.43 *	2.92	2.99	4.76
6 (10:00-11:00)	2.01	1.93	1.45	2.66	2.97	1.18
7 (11:00-12:00)	1.18	1.38	1.62	2.04	2.34	0.99
8 (12:00-13:00)	0.85	2.35	1.44	1.77	2.23	1.01
9 (13:00-14:00)	0.31	2.73	1.07	1.48	2.45	0.74
10 (14:00-15:00)	0.65	3.58	0.90	1.73	1.86	11.52
11 (15:00-16:00)	0.55	3.71	0.82	2.65	1.55	0.95
12 (16:00-17:00)	0.54	2.41	2.37 *	1.84	1.95	0.77
13 (17:00-18:00)	0.25 *	1.40	0.34	2.73	2.41	0.57
14 (18:00-19:00)	0.29	0.94	0.37	1.54	3.54	0.35
15 (19:00-20:00)	1.45	1.14	0.32	2.87	4.94	1.37
16 (20:00-21:00)	1.27	1.20	0.60	3.02	3.17	0.68

Sampling time	CO Concentration (ppm)					
	Point=131	132	133	134	135	136
1 (05:00-06:00)	0.43	0.39	0.33	0.38	1.04	1.08
2 (06:00-07:00)	1.35	1.13	1.16	1.24	2.31	1.09
3 (07:00-08:00)	2.91	2.55	2.62	2.56	2.88	2.37
4 (08:00-09:00)	6.66	6.50	2.98	5.36	3.19	3.01
5 (09:00-10:00)	4.99	4.85	4.98	4.75	3.36	2.65
6 (10:00-11:00)	1.75	1.87	2.06	2.12	3.13	2.60
7 (11:00-12:00)	2.69	1.19	1.32	1.39	2.00	1.80
8 (12:00-13:00)	1.66	1.40	1.36	1.05	1.95	1.72
9 (13:00-14:00)	2.66	0.97	0.87	0.96	1.44	1.46
10 (14:00-15:00)	2.81	0.88	1.77	0.82	1.46	1.57
11 (15:00-16:00)	3.11	0.86	1.11	1.10	1.25	1.45
12 (16:00-17:00)	2.13	1.00	1.22	1.24	1.27	1.36
13 (17:00-18:00)	1.66	0.80	1.02	1.05	1.05	1.05
14 (18:00-19:00)	3.14	1.51	1.25	1.23	1.05	1.30
15 (19:00-20:00)	3.94	2.88	2.59	2.65	2.08	1.85
16 (20:00-21:00)	2.28	2.08	2.26	2.17	2.74	1.95

(Notes) - ; Missed data. * ; Data which includes some error

Table 4.2.3-A1(3) CO Concentration (3)

Spring - Run 3
May 30 '97

Sampling time	CO Concentration (ppm)					
	Point=1	2	3	4	5	6
1 (05:00-06:00)	0.61	0.45	0.54	2.76	2.67	0.95
2 (06:00-07:00)	1.49	1.21	1.03	3.34	3.72	0.99
3 (07:00-08:00)	2.03	2.38	2.33	4.42	4.03	2.35
4 (08:00-09:00)	2.24	1.76	1.24	2.14	3.91	1.58
5 (09:00-10:00)	3.35	1.65	1.13	3.34	2.25	1.41
6 (10:00-11:00)	1.17	2.00	1.43	4.12	3.06	2.69
7 (11:00-12:00)	0.71	2.44	1.85	8.09	1.78	1.65
8 (12:00-13:00)	0.74	1.88	1.82	3.45	2.13	1.63
9 (13:00-14:00)	0.38	1.18	1.67	2.66	2.35	2.12
10 (14:00-15:00)	0.29	0.97	1.52	2.55	1.18	1.62
11 (15:00-16:00)	0.54	1.18	0.91	2.80	0.98	1.36
12 (16:00-17:00)	1.49	0.54	0.48	3.05	1.44	1.30
13 (17:00-18:00)	2.74	0.97	0.32	2.92	1.92	1.40
14 (18:00-19:00)	5.08	2.02	0.67	3.07	3.57	2.83
15 (19:00-20:00)	5.18	2.65	1.61	4.23	3.22	1.77
16 (20:00-21:00)	5.95	1.81	1.42	3.93	3.17	2.02

Sampling time	CO Concentration (ppm)					
	Point=7	8	9	10	11	12
1 (05:00-06:00)	1.18	1.00	0.76	0.46	0.38	0.42
2 (06:00-07:00)	1.47	1.94	1.27	0.59	0.53	0.43
3 (07:00-08:00)	1.31	2.92	1.52	0.88	0.68	0.86
4 (08:00-09:00)	1.45	2.97	1.87	0.89	1.20	1.02
5 (09:00-10:00)	0.91	2.54	1.60	0.56	2.08 *	0.79
6 (10:00-11:00)	1.03	2.05	1.14	0.83	2.19	1.08
7 (11:00-12:00)	1.02	1.73	1.04	1.83	2.44	1.00
8 (12:00-13:00)	0.93	2.52	1.21	2.06	2.84	0.98
9 (13:00-14:00)	1.02	2.06	2.12	2.52	2.35	1.44
10 (14:00-15:00)	1.17	1.68	3.95	2.45	2.53	1.63
11 (15:00-16:00)	1.01	1.58	2.20	0.98	2.46	1.16
12 (16:00-17:00)	1.37	1.29	1.40	1.30	1.97	- *
13 (17:00-18:00)	1.32	2.53	1.45	1.36	1.91	0.56
14 (18:00-19:00)	1.75	3.46	1.37	1.72	1.83	0.58
15 (19:00-20:00)	2.07	3.20	1.50	2.38	1.75	0.46
16 (20:00-21:00)	2.54	3.32	1.92	2.14	1.73	- *

Sampling time	CO Concentration (ppm)					
	Point=131	132	133	134	135	136
1 (05:00-06:00)	0.28	0.20	0.27	0.28	0.44	0.24
2 (06:00-07:00)	0.83	0.63	0.70	0.58	0.51	0.53
3 (07:00-08:00)	1.27	0.84	1.18	1.33	1.31	1.12
4 (08:00-09:00)	1.00	1.20	0.93	1.13	0.81	0.87
5 (09:00-10:00)	1.18	0.92	1.16	1.24	0.77	0.89
6 (10:00-11:00)	1.23	0.74	1.03	1.11	1.48	1.33
7 (11:00-12:00)	1.40	0.97	1.21	1.33	1.90	1.92
8 (12:00-13:00)	1.88	1.39	1.78	1.39	2.00	2.00
9 (13:00-14:00)	2.90	1.14	1.94	1.32	2.38	2.44
10 (14:00-15:00)	2.72	0.66	1.67	1.02	2.34	2.07
11 (15:00-16:00)	2.39	0.37	1.47	1.17	2.26	1.78
12 (16:00-17:00)	2.13	0.76	1.45	1.58	2.01	1.70
13 (17:00-18:00)	1.46	1.09	1.14	1.23	1.96	1.09
14 (18:00-19:00)	1.60	1.07	1.05	1.40	1.14	0.94
15 (19:00-20:00)	1.64	1.74	1.75	1.82	1.45	1.46
16 (20:00-21:00)	2.52	2.54	2.23	2.35	2.82	1.92

(Notes) - ; Missed data. * ; Data which includes some error

Table 4.2.3-A1(4) CO Concentration (4)

Spring Run 1-3

3 days average (May 26,28,30 '97)

Sampling time	CO Concentration(ppm)					
	Point=1	2	3	4	5	6
1 (05:00-06:00)	1.63	0.70	0.91	4.05	2.83	0.90
2 (06:00-07:00)	4.02	2.25	1.62	5.41	5.69 *	1.91
3 (07:00-08:00)	7.12	4.49	3.94	8.38	9.34	3.56
4 (08:00-09:00)	8.47	4.94	3.55	7.05	8.08	2.68
5 (09:00-10:00)	6.45	3.29	1.54 *	5.80	4.17	1.91
6 (10:00-11:00)	2.09	2.55	1.91	4.49	3.03	2.36 *
7 (11:00-12:00)	1.92	2.95	2.57	6.37	2.52	2.33
8 (12:00-13:00)	1.12	2.18	2.23	5.00	2.62	2.02
9 (13:00-14:00)	0.70	1.59	1.89	4.92	2.71	1.68
10 (14:00-15:00)	0.70	1.40	1.67	4.78	1.86	1.67
11 (15:00-16:00)	1.01	1.26	1.44	4.90 *	1.43	1.36
12 (16:00-17:00)	1.44	1.10 *	1.31	3.97	2.15	1.51
13 (17:00-18:00)	2.11	1.56	1.66	5.05	2.33	2.12
14 (18:00-19:00)	2.69	2.04	2.13	5.41	3.39	3.02
15 (19:00-20:00)	3.65	2.43	3.40	6.79	3.68	2.23
16 (20:00-21:00)	3.85 *	3.77	4.44	7.19	3.95	2.22

Sampling time	CO Concentration(ppm)					
	Point=7	8	9	10	11	12
1 (05:00-06:00)	3.14 *	1.10	0.84 *	1.78 *	2.06 *	0.93
2 (06:00-07:00)	4.85	2.43	0.91	2.34	3.72 *	0.86
3 (07:00-08:00)	4.08 *	4.68	1.84	3.97	6.50	1.52
4 (08:00-09:00)	4.52	5.10	1.60	3.47	5.33	2.03
5 (09:00-10:00)	2.68	2.96	1.26 *	2.40	3.02 *	2.47
6 (10:00-11:00)	1.43	2.13	1.54	1.96	2.65	1.34
7 (11:00-12:00)	1.05	1.73	1.15	2.12	2.28	1.05
8 (12:00-13:00)	0.91	2.27	1.09	2.43	2.58	1.00
9 (13:00-14:00)	0.76 *	2.46	1.20	2.50	2.39	1.09
10 (14:00-15:00)	0.94	2.75	1.70	2.03	2.26	4.81
11 (15:00-16:00)	0.97	2.68	1.12	1.89	2.22	1.10
12 (16:00-17:00)	1.02	1.85	1.35 *	1.69 *	2.17	0.98 *
13 (17:00-18:00)	0.91 *	1.79	0.78	2.07	2.42	0.85
14 (18:00-19:00)	1.06	1.85	0.78	1.86	2.69	0.91
15 (19:00-20:00)	1.74	1.86	0.86	2.60	3.46	1.33
16 (20:00-21:00)	2.00	2.07	1.05	2.90	3.08	1.72 *

Sampling time	CO Concentration(ppm)					
	Point=131	132	133	134	135	136
1 (05:00-06:00)	0.95 *	0.88	0.84	0.82	0.74 *	0.66
2 (06:00-07:00)	2.74	1.43	1.93	1.65	1.77	1.27
3 (07:00-08:00)	3.85	3.44	3.38	3.21	3.04	2.76
4 (08:00-09:00)	4.79	4.87	3.59	4.46	3.53	3.54
5 (09:00-10:00)	3.63	3.36	3.57	3.78	3.11	3.01
6 (10:00-11:00)	1.57	1.22	1.44	1.49	2.35	2.16
7 (11:00-12:00)	1.94	1.09	1.27	1.31	2.03	1.89
8 (12:00-13:00)	1.99 *	1.32	1.49	1.19	1.98 *	1.78
9 (13:00-14:00)	3.32	1.14	1.24	1.12	1.81	1.79
10 (14:00-15:00)	2.77 *	0.89	1.46	0.89	1.74	1.59
11 (15:00-16:00)	2.59	0.69	1.12	1.19	1.67	1.64
12 (16:00-17:00)	2.18	0.92	1.18	1.49	1.47	1.36
13 (17:00-18:00)	1.87	1.05	1.14	1.38	1.48	1.10
14 (18:00-19:00)	2.19	1.32	1.25	1.48	1.17	1.10
15 (19:00-20:00)	2.68	2.22	2.15	2.34	1.79	1.70
16 (20:00-21:00)	2.51	2.41	2.38	2.59	2.69	2.06

(Notes) - ; Missed data. * ; Data which includes some error

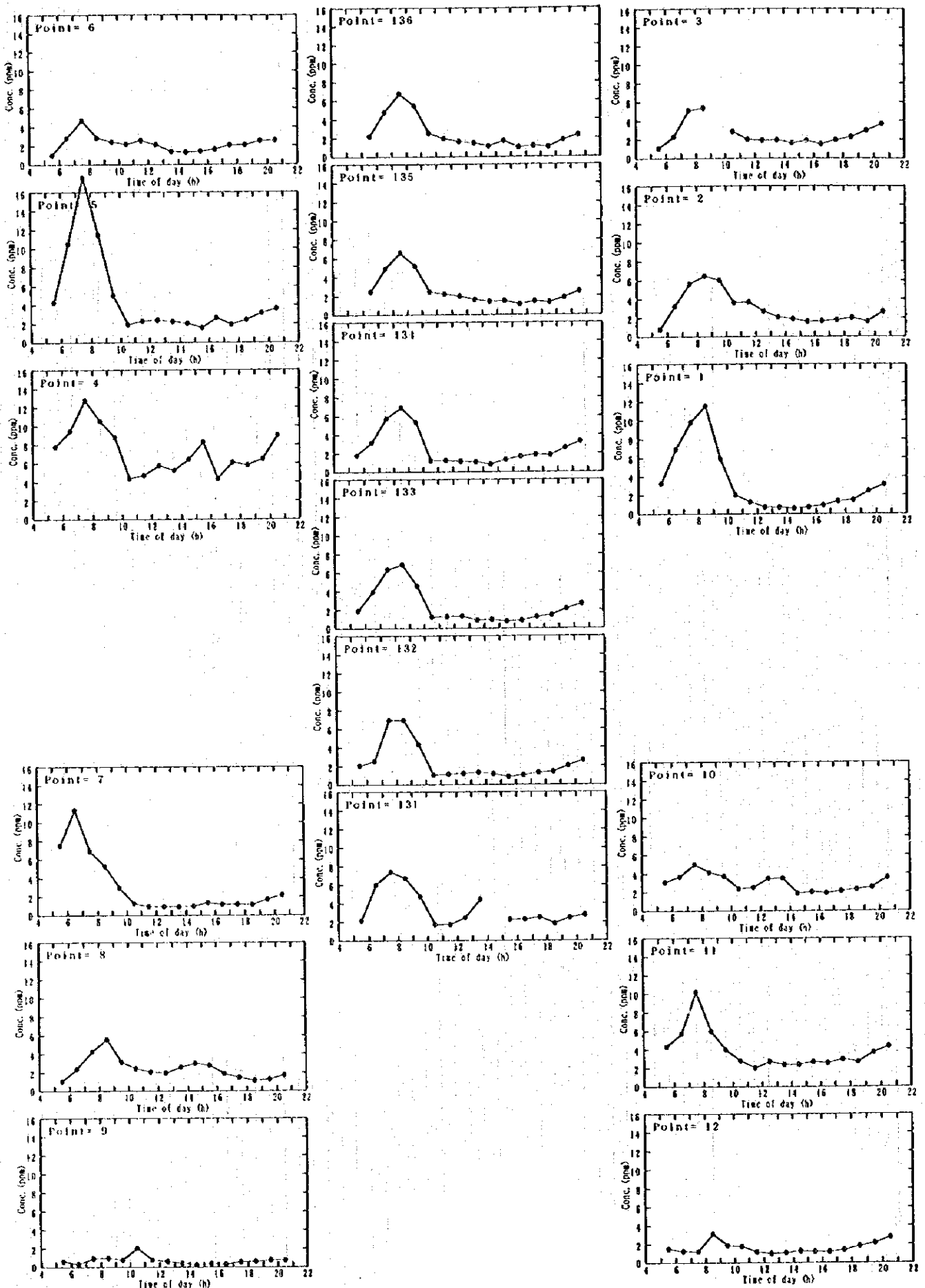


Fig. 4.2.3-A1(1)

Diurnal variation of CO concentration (I)

Spring - Run 1 May 26 '97

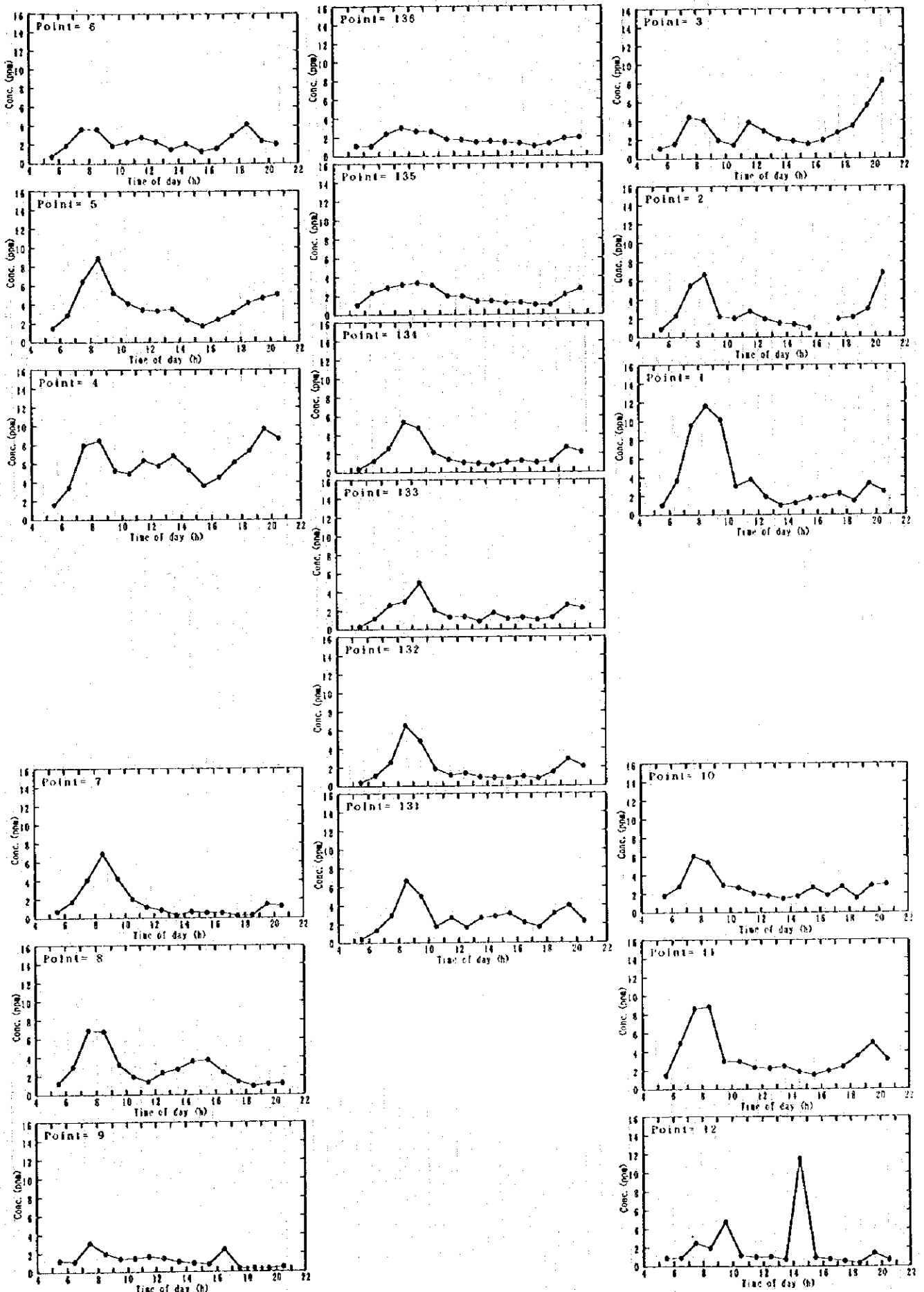


Fig. 4.2.3-A1(2)

Diurnal variation of CO concentration (2)

Spring - Run 2 May 28 '97

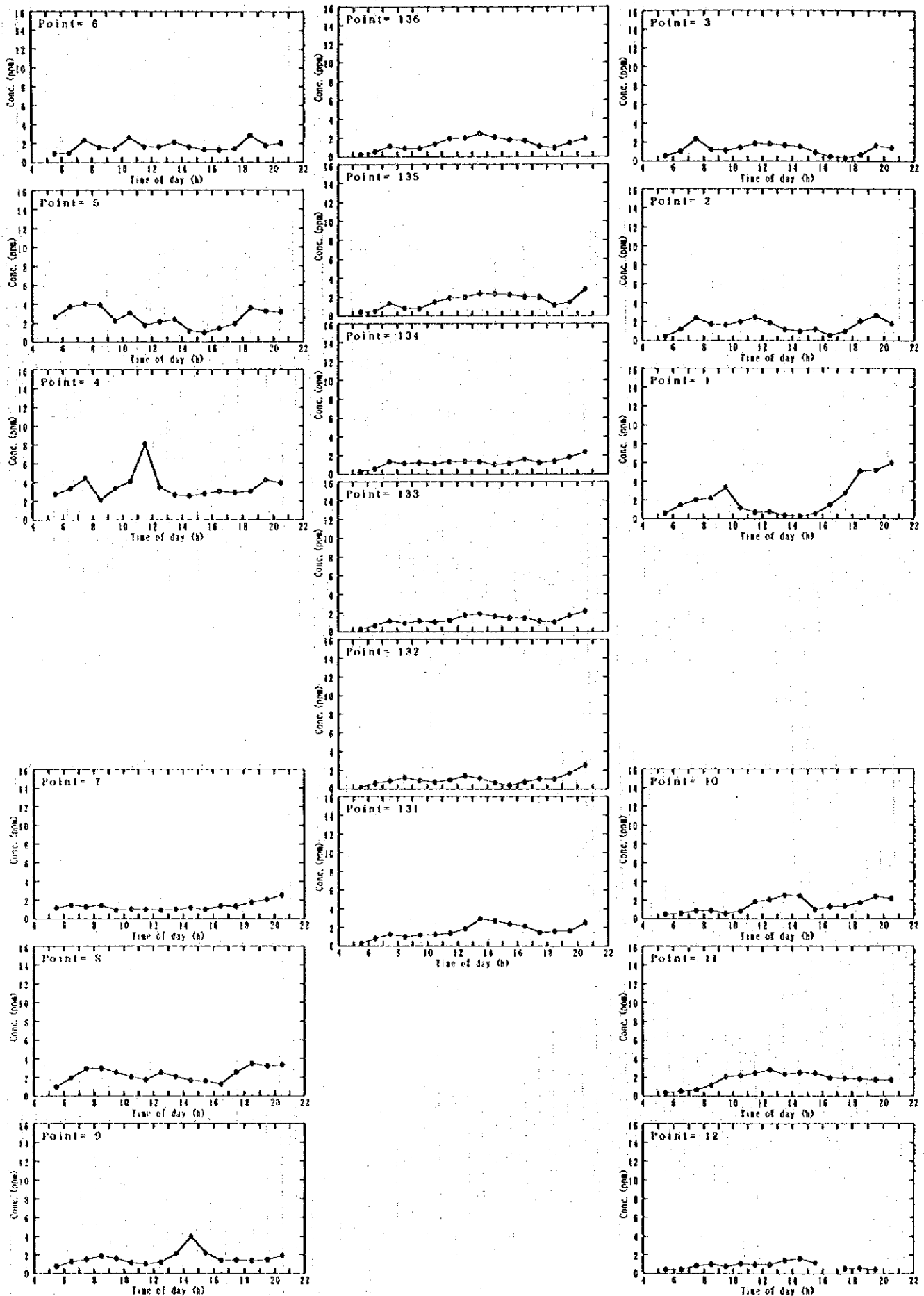


Fig. 4. 2. 3-A1(3)

Diurnal variation of CO concentration (3)

Spring - Run 3 May 30 '97

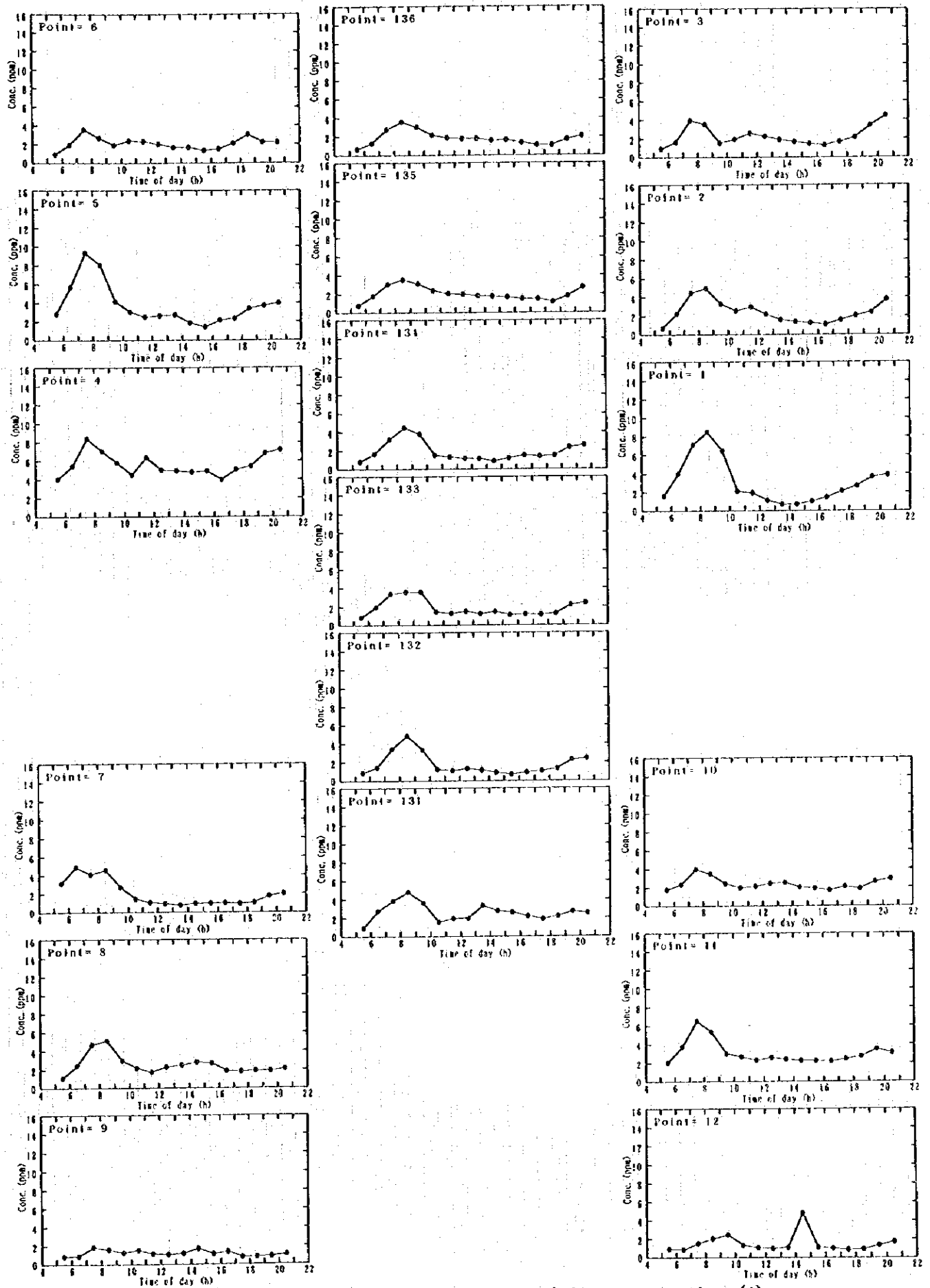


Fig. 4.2.3-A1(4) Diurnal variation of CO concentration (4)
Spring Run1-Run 3 May 26, 28, 30 (3 days average)

Table 4.2.3-A2 Average CO concentration of surface measurement points

Spring(third measurement work)

Sampling time	CO concentration (ppb)			
	May 26 Mon	May 28 Wed	May 30 Fri	Average
1 (05:00-06:00)	2.95	1.12	0.95	1.67
2 (06:00-07:00)	4.80	2.41	1.43	2.88
3 (07:00-08:00)	6.98	5.48	2.04	4.83
4 (08:00-09:00)	6.16	6.27	1.81	4.75
5 (09:00-10:00)	4.07	3.93	1.73	3.24
6 (10:00-11:00)	2.36	2.46	1.80	2.21
7 (11:00-12:00)	2.09	2.59	2.04	2.24
8 (12:00-13:00)	2.11	2.26	1.81	2.06
9 (13:00-14:00)	1.99	2.02	1.77	1.93
10 (14:00-15:00)	1.91	2.72	1.71	2.11
11 (15:00-16:00)	2.05	1.70	1.35	1.70
12 (16:00-17:00)	1.74	1.94	1.37	1.68
13 (17:00-18:00)	2.00	2.12	1.58	1.90
14 (18:00-19:00)	2.09	2.40	2.23	2.24
15 (19:00-20:00)	2.56	3.36	2.44	2.79
16 (20:00-21:00)	3.27	3.48	2.71	3.15
Average	3.07	2.89	1.80	2.59

(Note) Each data is average value of surface measurement points.
(Total 13 points; 1-12 and 132)

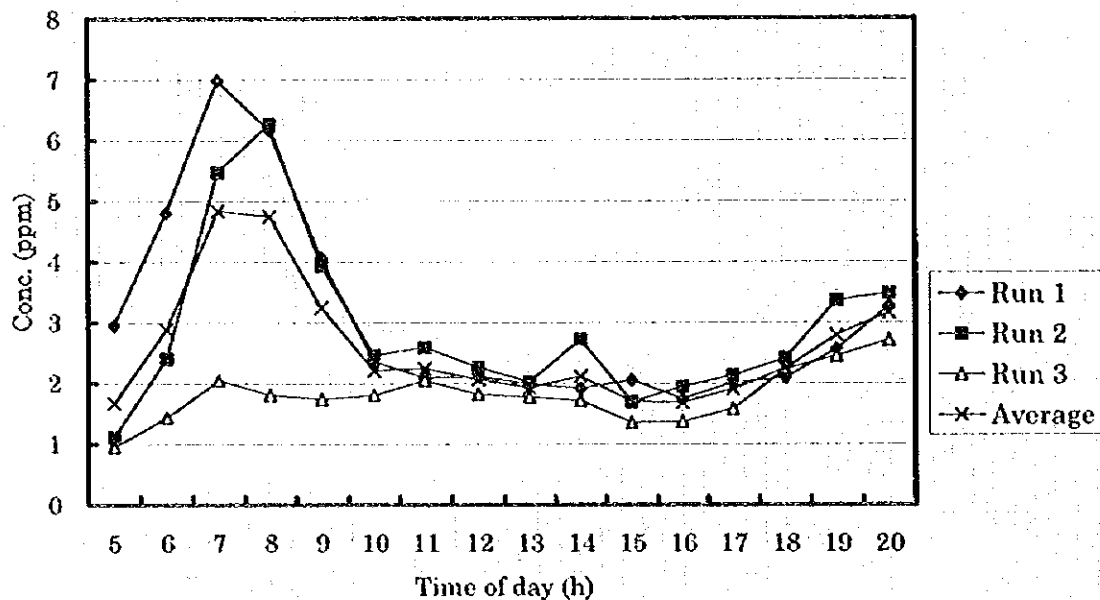


Fig 4.2.3-A2 Diurnal variation of average CO concentration

Appendix 4.2.3-B

Table 4.2.3-B(1) HC Concentration (1)

Spring - Run 1
May 26 '97

Sampling time	HC Concentration (ppmC)														
	Point=3			Point=6			Point=8			Point=10			Point=132		
	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC
1 (05:00-05:10)	2.24 *	0.95 *	3.19 *	1.79	0.62	2.41	1.92	1.96	3.88	3.93 *	2.59 *	6.52 *	3.38	4.85	8.23
2 (06:00-06:10)													4.12	4.08	8.20
3 (07:00-07:10)													2.96	3.55	6.51
4 (08:00-08:10)	2.06	2.12	4.18	1.69	1.03	2.72	2.73	2.88	5.61	3.14 *	2.95 *	6.08 *	2.53	3.17	5.71
5 (09:00-09:10)													2.98	3.90	6.88
6 (10:00-10:10)													1.72	0.65	2.37
7 (11:00-11:10)	1.67	1.07	2.74	1.72	0.45	2.17	1.75	0.96	2.71	1.84	0.89	2.73	1.71	0.91	2.62
8 (12:00-12:10)													1.68	0.53	2.21
9 (13:00-13:10)													1.70	0.60	2.30
10 (14:00-14:10)													1.71	0.53	2.24
11 (15:00-15:10)													1.67	0.49	2.17
12 (16:00-16:10)	1.74	0.77	2.51	1.68	0.64	2.32	1.76	0.70	2.47	1.85	1.05	2.89	1.70	0.71	2.41
13 (17:00-17:10)													1.68	0.56	2.24
14 (18:00-18:10)	1.84	0.87	2.71	1.62	0.53	2.15	1.76	0.81	2.57	1.88	1.17	3.05	1.77	0.67	2.43
15 (19:00-19:10)													1.81	1.08	2.89
16 (20:00-20:10)	1.90	1.48	3.38	1.74	0.77	2.50	1.75	0.77	2.52	1.89	1.08	2.97	1.84	1.34	3.18

Spring - Run 2
May 28 '97

Sampling time	HC Concentration (ppmC)														
	Point=3			Point=6			Point=8			Point=10			Point=132		
	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC
1 (05:00-05:10)	2.00	0.62	2.63	1.77	0.84	2.61	2.17	0.84	3.01	2.43	0.84	3.27	2.25 *	1.84 *	4.10 *
2 (06:00-06:10)													2.13	1.06	3.19
3 (07:00-07:10)													2.28	1.53	3.82
4 (08:00-08:10)	2.01	1.85	3.86	1.99	1.32	3.32	2.28	3.96	6.81	2.54	1.44	3.98	2.24	2.48	4.72
5 (09:00-09:10)													2.13	3.68	5.81
6 (10:00-10:10)													1.83	1.10	2.92
7 (11:00-11:10)	1.84	1.21	3.05	1.86	1.85	3.73	1.93	0.51	2.45	2.19	1.08	3.27	2.11	0.99	3.10
8 (12:00-12:10)													1.74	0.54	2.28
9 (13:00-13:10)													1.70	0.44	2.14
10 (14:00-14:10)													1.69	0.22	1.90
11 (15:00-15:10)													1.75	1.17	2.93
12 (16:00-16:10)	1.77	0.89	2.65	1.70	0.32	2.02	1.82	0.76	2.58	2.07	0.61	2.68	1.78	1.00	2.78
13 (17:00-17:10)													1.72	0.67	2.59
14 (18:00-18:10)	1.98	1.41	3.38	1.78	0.96	2.74	1.76	0.94	2.71	1.87	0.74	2.61	1.70	0.60	2.30
15 (19:00-19:10)													1.83	1.67	3.50
16 (20:00-20:10)	2.12	2.21	4.33	1.72	0.86	2.53	1.74	1.05	2.79	1.98	1.78	3.76	1.72	1.30	3.02

(Notes) * : Missed data. * : data which includes some error.

Table 4.2.3-B(2) HC Concentration (2)

Spring - Run 3
May 30 '97

Sampling time	HC Concentration (ppmC)														
	Point=3			Point=6			Point=8			Point=10			Point=132		
	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC
1 (05:00-05:10)	1.80	0.38	2.19	1.74	0.70	2.44	2.01	0.86	2.88	1.98	0.42	2.42	2.13	0.80	2.93
2 (06:00-06:10)													2.09	1.85	3.95
3 (07:00-07:10)													2.22	1.44	3.65
4 (08:00-08:10)	1.88	0.68	2.57	1.72	0.73	2.45	1.99	1.20	3.19	1.90	0.49	2.40	2.12	1.62	3.75
5 (09:00-09:10)													1.99	0.83	2.82
6 (10:00-10:10)													1.68	0.27	1.95
7 (11:00-11:10)	1.76	0.78	2.54	1.73	0.51	2.24	1.82	0.52	2.35	1.87	0.56	2.43	1.75	0.37	2.11
8 (12:00-12:10)													1.82	0.54	2.36
9 (13:00-13:10)													1.75	0.45	2.21
10 (14:00-14:10)													1.72	0.22	1.94
11 (15:00-15:10)													1.63	0.10	1.75
12 (16:00-16:10)	1.65	0.30	1.96	1.67	0.25	1.92	1.71	0.52	2.24	1.76	0.38	2.14	1.65	0.53	2.18
13 (17:00-17:10)													1.85	0.58	2.44
14 (18:00-18:10)	1.67	0.45	2.12	1.71	0.58	2.29	1.79	0.97	2.76	1.91	0.54	2.45	1.92	0.61	2.54
15 (19:00-19:10)													1.95	0.73	2.68
16 (20:00-20:10)	1.81	1.06	2.87	1.72	0.57	2.30	1.86	1.42	3.28	1.90	0.99	2.89	1.96	0.96	2.92

Spring Run 1-3

3 days average (May 26,28,30 '97)

Sampling time	HC Concentration (ppmC)														
	Point=3			Point=6			Point=8			Point=10			Point=132		
	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC	CH ₄	NMHC	THC
1 (05:00-05:10)	2.01 *	0.65 *	2.67 *	1.77	0.72	2.49	2.03	1.22	3.26	2.78 *	1.28 *	4.07 *	2.59 *	2.50 *	5.09 *
2 (06:00-06:10)													2.78	2.33	5.11
3 (07:00-07:10)													2.49	2.17	4.66
4 (08:00-08:10)	1.98	1.55	3.54	1.80	1.03	2.83	2.33	2.68	5.04	2.53 *	1.63 *	4.16 *	2.30	2.42	4.73
5 (09:00-09:10)													2.97	2.80	5.17
6 (10:00-10:10)													1.74	0.67	2.41
7 (11:00-11:10)	1.76	1.02	2.78	1.77	0.94	2.71	1.83	0.66	2.50	1.97	0.84	2.81	1.86	0.76	2.61
8 (12:00-12:10)													1.75	0.54	2.28
9 (13:00-13:10)													1.72	0.50	2.22
10 (14:00-14:10)													1.70	0.32	2.03
11 (15:00-15:10)													1.68	0.09	2.28
12 (16:00-16:10)	1.72	0.65	2.37	1.68	0.40	2.09	1.76	0.66	2.43	1.89	0.68	2.57	1.71	0.75	2.46
13 (17:00-17:10)													1.75	0.60	2.36
14 (18:00-18:10)	1.83	0.91	2.74	1.70	0.69	2.39	1.77	0.91	2.68	1.89	0.82	2.70	1.80	0.63	2.42
15 (19:00-19:10)													1.86	1.16	3.02
16 (20:00-20:10)	1.94	1.58	3.53	1.73	0.73	2.46	1.78	1.08	2.86	1.92	1.28	3.21	1.84	1.20	3.04

(Notes) * - Missed data. * - data which includes some error.

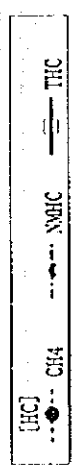
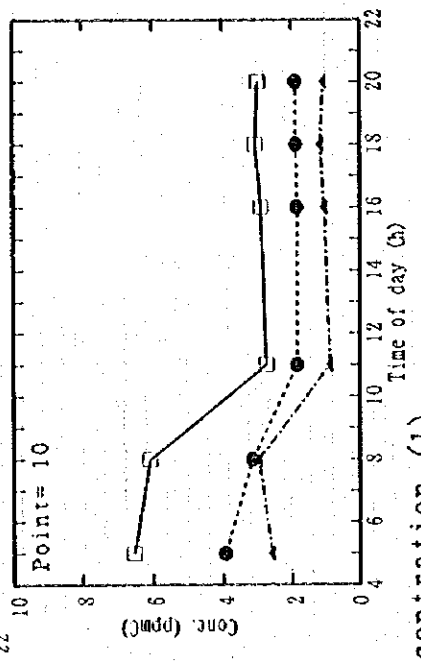
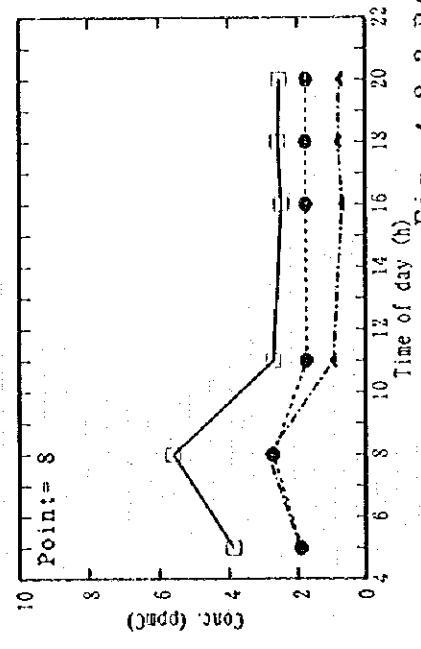
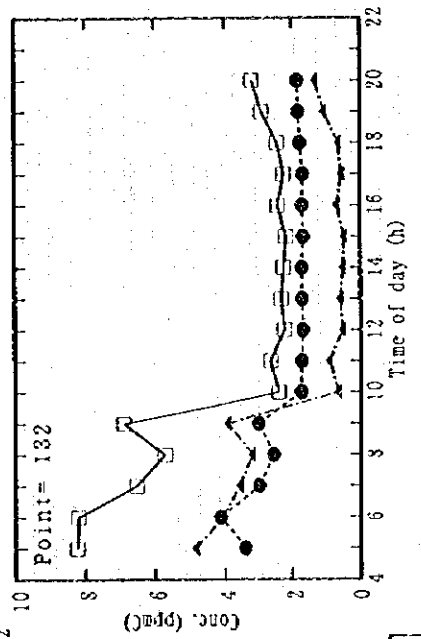
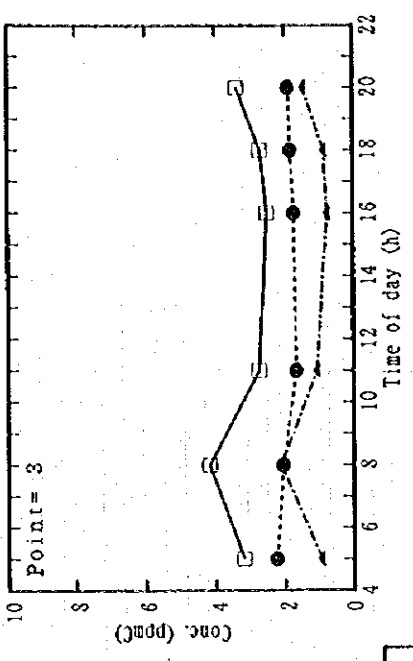
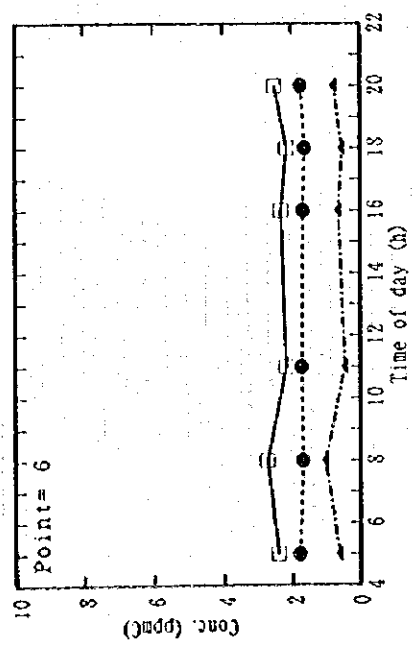


Fig. 4.2.3-B(1) Diurnal variation of HC concentration (1)
 Spring - Run 1 May 26 '97

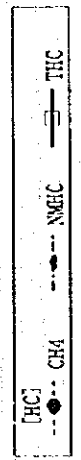
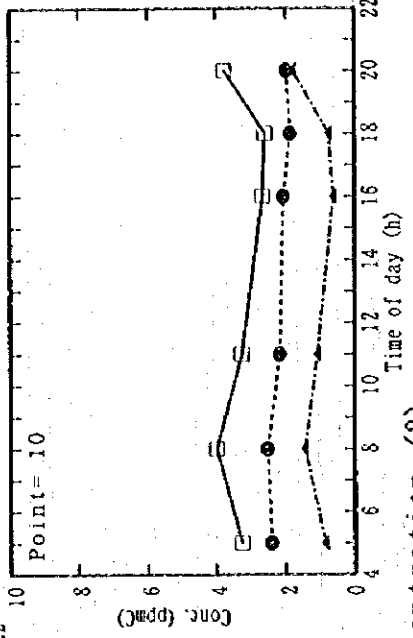
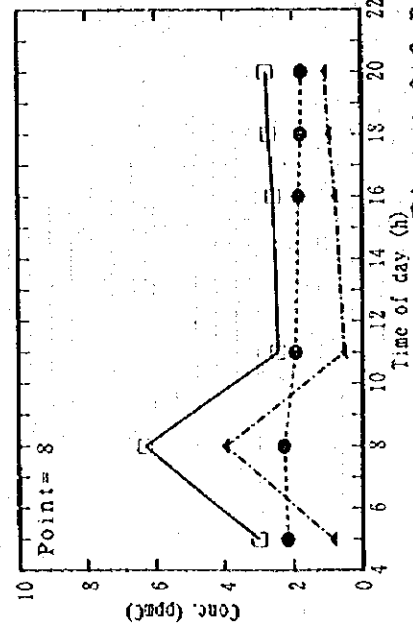
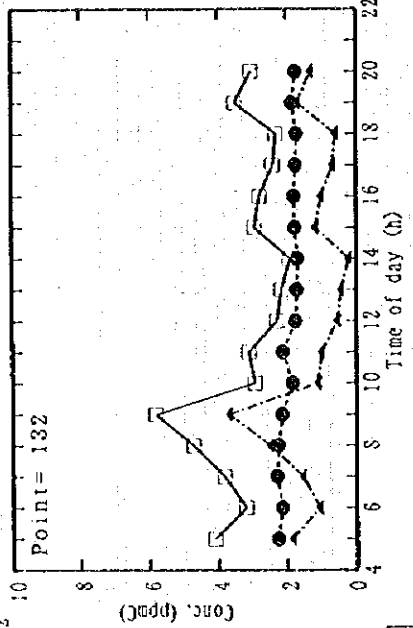
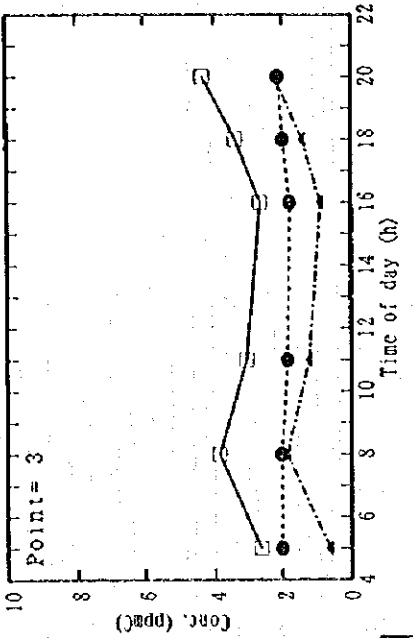
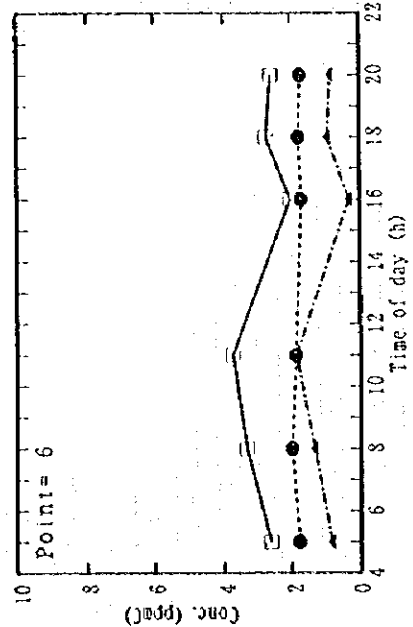


Fig. 4. 2. 3-B(2) Diurnal variation of HC concentration (2)

Spring - Run 2 May 28 '97

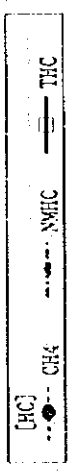
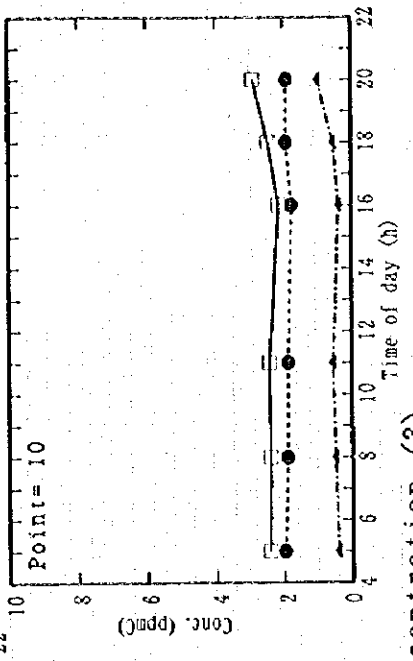
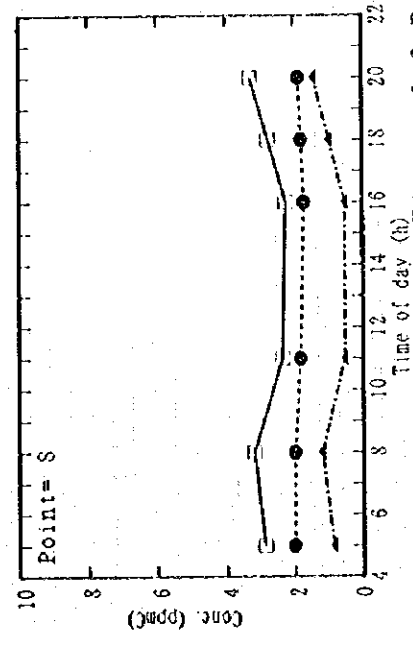
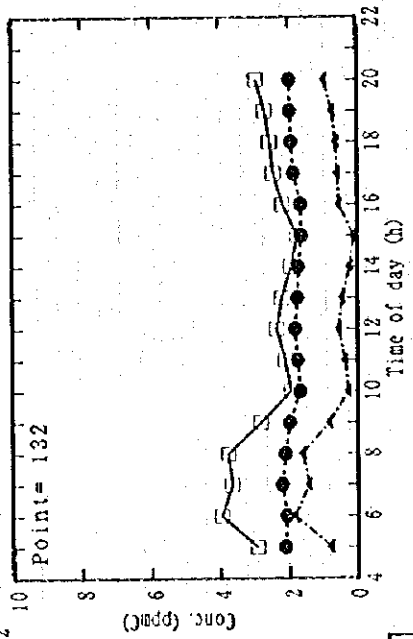
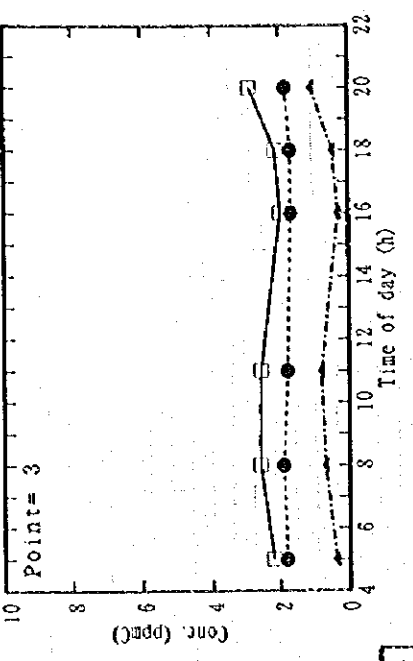
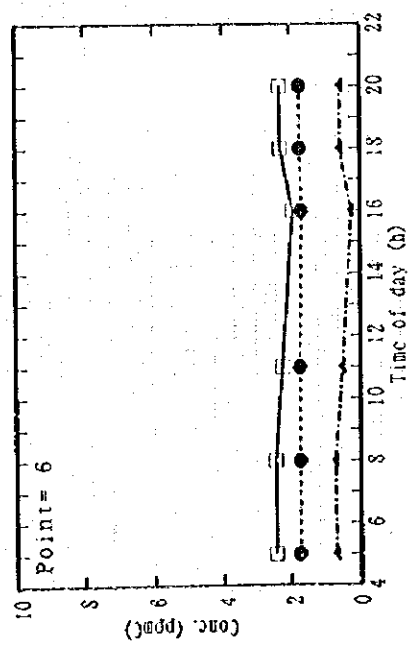


Fig. 4. 2. 3-B(3) Diurnal variation of HC concentration (3)
 Spring - Run 3 May 30 '97

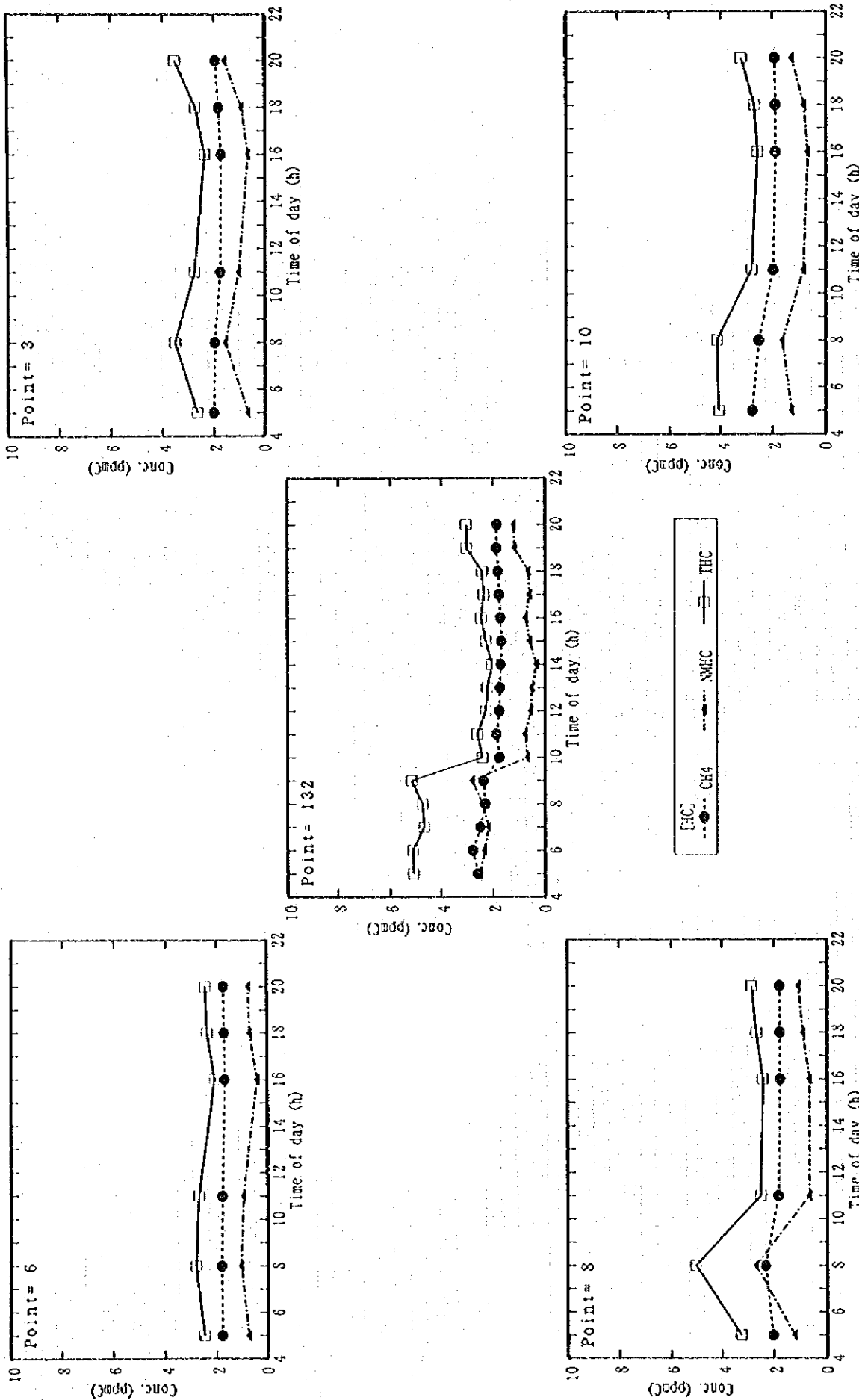


Fig. 4. 2. 3-B(4) Diurnal variation of HC concentration (4)
 Spring Run1-Run3 May 26, 28, 30 (3 days average)

Appendix 4.2.3-C

Table 4.2.3- C NO₂ Concentration using passive sampler

Spring (Third measurement work)

unit=ppb

Point No.	1 day sampling data							Average
	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 1-7
	(5/25-5/26) Sun-Mon	(5/26-5/27) Mon-Tue	(5/27-5/28) Tue-Wed	(5/28-5/29) Wed-Thu	(5/29-5/30) Thu-Fri	(5/30-5/31) Fri-Sat	(5/31-6/1) Sat-Sun	(5/25-6/1)
1	54	42	44	38	26	42	49	42
2	49	39	46	36	26	33	39	38
3	60	53	50	44	33	34	43	45
4	67	15	57	55	44	47	51	48
5	59	47	55	54	38	47	48	50
6	38	78	40	38	28	34	48	44
7	69	89	53	48	30	34	47	53
8	43	42	47	45	32	54	41	44
9	42	31	33	35	28	22	37	33
10	55	44	37	30	37	24	36	38
11	74	78	52	43	33	26	45	50
12	45	37	26	25	18	15	24	27
13	55	41	51	32	23	27	44	39
14	55	40	50	40	27	51	37	43
15	52	41	37	31	30	31	38	37
16	54	49	54	45	39	42	48	47
17	64	65	58	48	33	47	54	53
18	68	68	83	68	56	72	70	69
19	50	39	41	59	24	32	31	40
20	20	25	28	24	21	23	23	24
21	55	47	52	47	33	38	42	45
22	27	33	38	42	24	30	36	33
23	38	30	39	62	29	29	33	37
24	56	50	58	49	33	41	50	48
25	20	19	26	33	25	27	27	25
26	13	15	26	22	21	25	24	21
27	21	26	40	36	28	27	33	30
28	37	37	31	37	19	25	33	31
29	28	21	16	18	16	16	20	19
30	34	28	34	39	22	32	23	30
31								
Average	47	42	43	41	29	34	39	39

(Note) ; Missed data

