4. The 91-W observation data processing program

The observation data processing program consists of the main program and the initial data making program. The followings are procedure of program operations.

4-1 The initial data making program

In this program, confirmation or input the initial data is required for the following 13 items.

(1) Directory of TEXT file (A:¥MSPSY¥TEXT¥)
(2) Directory of RD file (A:¥MSPSY¥RD¥)
(3) Number of observation point (1)
(4) Objective altitude (1500)
(5) Interval of the standard level 1 (50)
(6) Interval of the standard level 2 《in reserve》 (50)
(7) Time interval of calculation of wind vector 《wind observation point》 (10)
(8) Altitude above sea level
《In case altitude above the ground is used, this should be 0》 (0)
(9) Do you calculate the altitude to be above the sea level or the ground level?
《Sea=0, Ground=1》 (0)
(10) Altitude correction 《In case such as observation on the roof》 (0)
(11) Name of the observation point (initial data)

These data are in the file 94init.dat in A:¥MSPS. The data in ( ) are default.

4-2 Main program

The main program consists of the following 16 processing items.

(1) Package processing

The processing items necessary for the calculation of the standard level data appears one by one automatically. Also, the observation data obtained by the theodolite is taken in. After all of each processing is over, press return to go to the main menu.

(2) Reproduction of 0.5 second data

The program reads the 0.5 second data from the hard disk, and calculates temperature and humidity at the standard levels up to the specified objective altitude, and also makes the 5 m interval data for search of the significant levels and list them. The significant levels are defined as the top and the bottom of the inversion or isothermal layer of which thickness is more than 50 m, or inversion of which temperature difference is more than 0.4 ℃ regardless of its thickness.

(3) Reproduction of standard level data

The standard level data is written in hard disk after processing is finished. The data, namely temperature, humidity and pressure at the standard levels, and altitude, temperature, humidity and pressure at the significant levels, are read in the program.

(4) Correction of the initial data

This item is used for correction of date and time of the observation, location of release point, data of surface meteorology at the time of release. Also, it is available for confirmation of the sonde number and memo record.

(5) Temperature profile

Temperature profile is shown up to the specified altitude on the display. The 0.5 second sampling data, the standard level data and the significant level data are denoted by white points, green circle and red circle, respectively. Although correction of the standard level data on this screen that shows whole profile is also practicable, it is advisable to use the screen of split view of the profile (6) for correction.

(6) Temperature profile (split view)

The enlarged profiles of temperature and humidity are shown at the intervals of 350m on the display. Green circle, red circle and purple point denote data at the standard level, the significant level and every 0.5 second data, respectively. Figure on the left side of the red circle shows temperature at the significant level, one right side of green circle shows temperature at the standard level and next one shows temperature lapse rate(temperature gradient). All of these figures should be divided by 10 to obtain real temperature degree. To correct the data of standard level, input "1" , then input altitude to be corrected and move the circle with the arrow keys. If there is no necessity for correction, input "0" and then the screen proceeds to the next for correction of the data at the significant level. On this screen, lists of the significant level data (altitude and temperature) are shown. To eliminate a significant level, input the number of the data to be eliminated and next input "0". To correct the data, input the data number and "1", and then move the data point with the arrow keys. To add another significant level, input "−1" and approximate altitude. Some significant level data around the specified altitude are listed at the lower left corner of the screen. Select the appropriate altitude and input its data number. The data is registered as a significant level and its data is shown on the upper right side. But the red circle for the new significant level is not yet added on the profile at this time. If there is no significant level to be corrected, input "0" and then the screen proceed to the next. Reaching to the last screen including the specified objective altitude, the screen returns to the menu.

keys for correction

→ increase 0.1 ℃

← decrease 0.1 ℃

* return to the previous step

(7) List of data

Select one item to be shown from the following menu and input the number.

① Temperature and humidity data

② Data of the significant levels.

① shows the list of temperature, temperature lapse rate(temperature gradient) and humidity at the standard levels. If there is any temperature lapse rate greater than −1.1 ℃/100m, input the altitude of the data to be corrected then the same screen as (6), split view of the temperature profile appears on the display. The way of correction is similar to (6).

② shows the list of temperature, humidity and altitude of the significant levels. They are picked up automatically by computer, so that some of them might not be "significant" meteorologically. This screen is available for elimination of such an unnecessary significant level by input its data number. To correct the data, input the altitude of the data. Then the same screen as (6), split view of the temperature profile appears on the display. The way of correction is similar to (6).

(8) Write data on a floppy disk

Write the RD file on the directory specified at the initial. Contents of the file are date and time of balloon release, sonde number, check data before release, standard level data (temperature and humidity) and significant level data (altitude, temperature, humidity, pressure, every 10 seconds location data).

(9) Print out

Print out of the lists of the observed data. Temperature observation list includes standard level data (temperature, humidity and pressure), significant level data (altitude, temperature, humidity and pressure) and also sonde number and check data before release.

(10) Next data

Go to next data processing of another number of observation. The program returns to the initial after saving the processed data on the hard disk or a floppy disk.

(11) Return to system menu

Return to the system menu after saving the processed data on the hard disk or a floppy disk.

Appendix 5.2 Temperature and Wind Vertical Profile

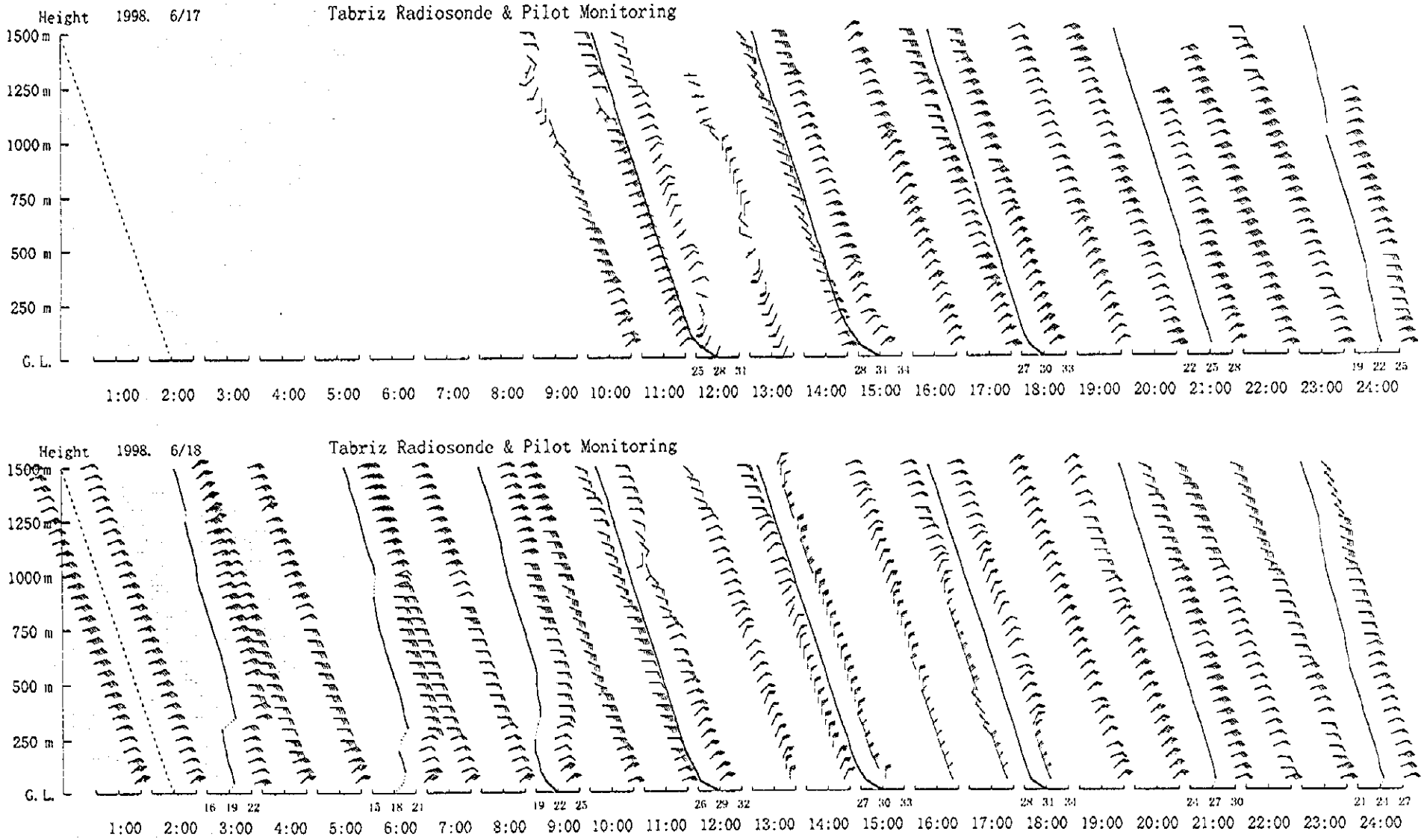


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

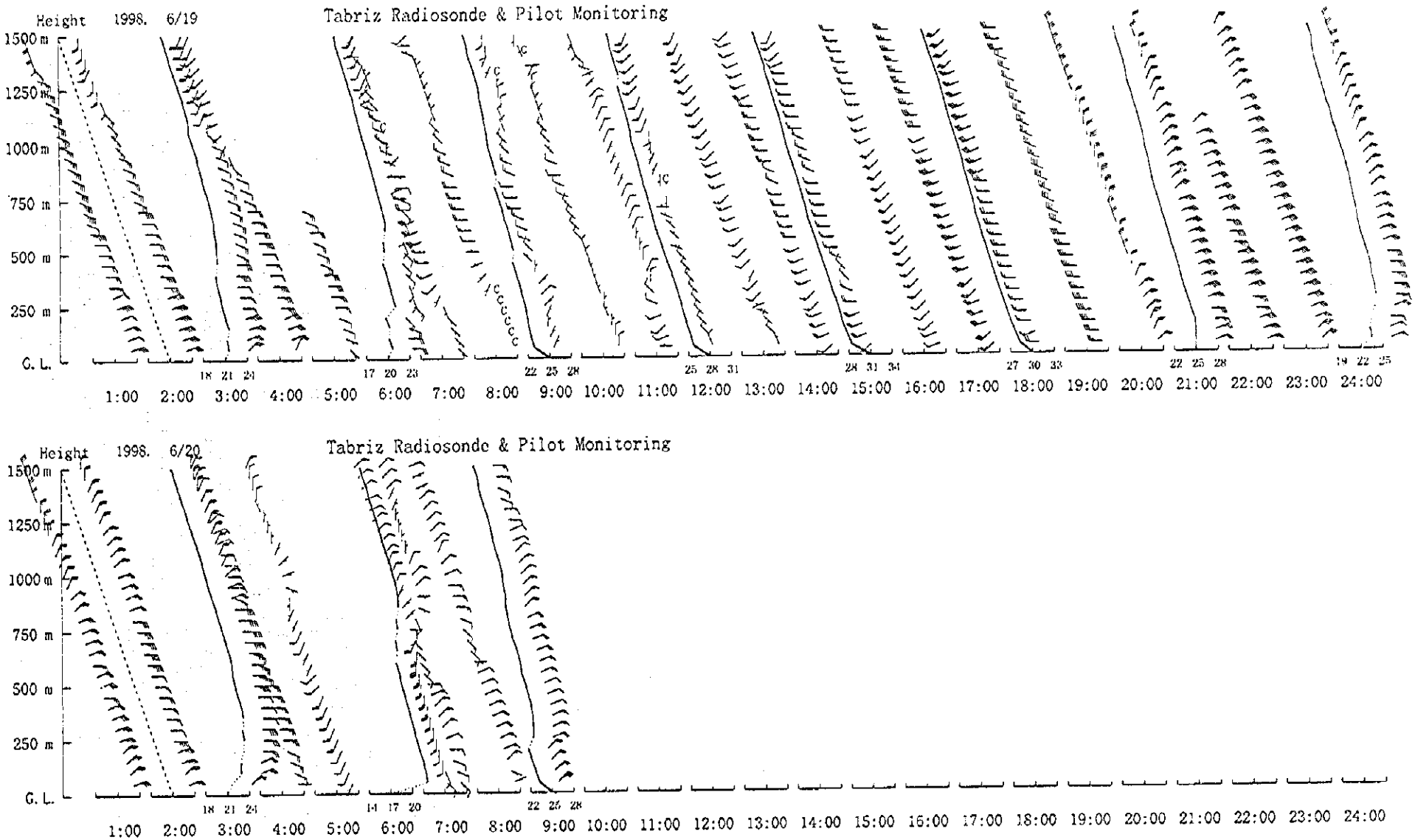


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

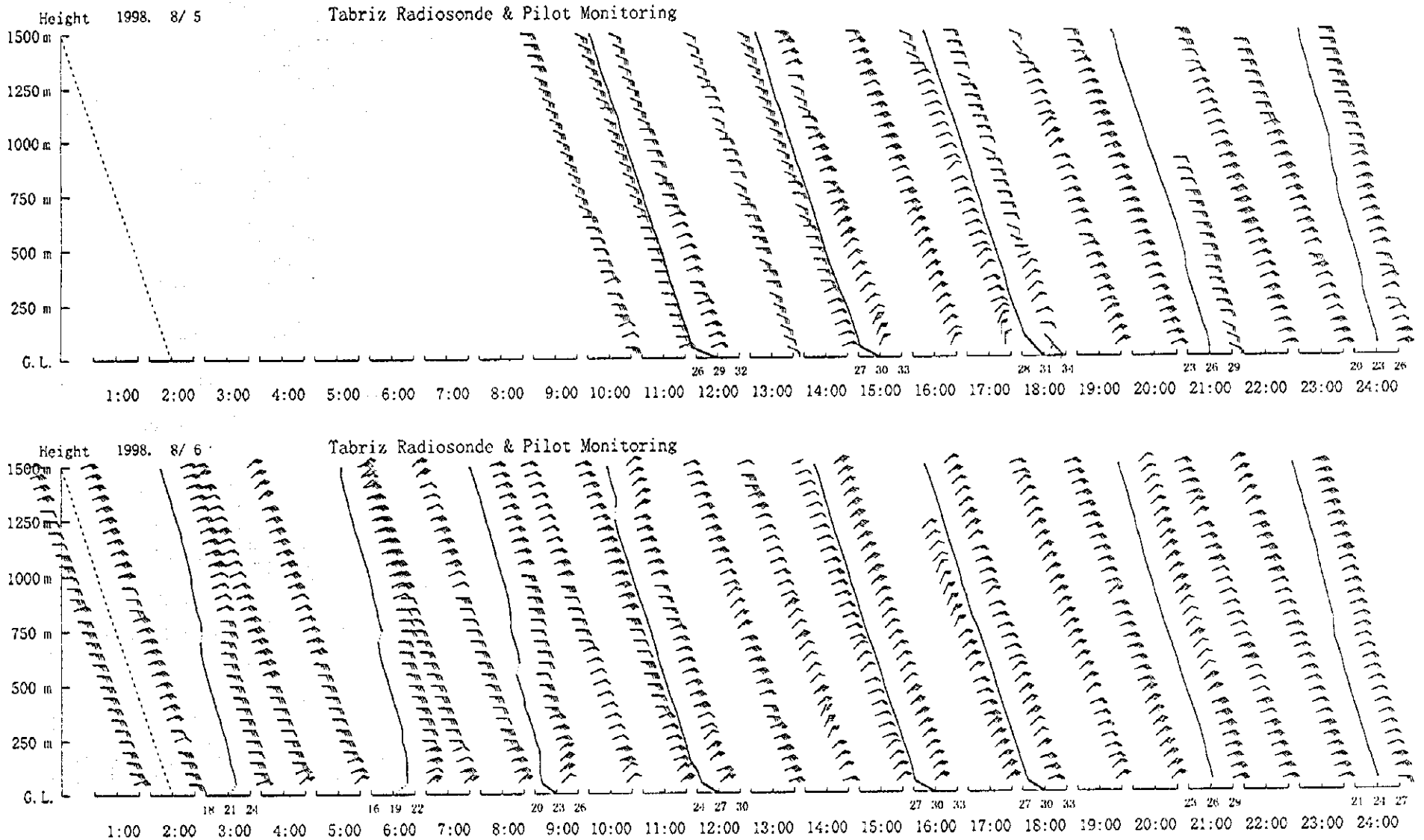


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

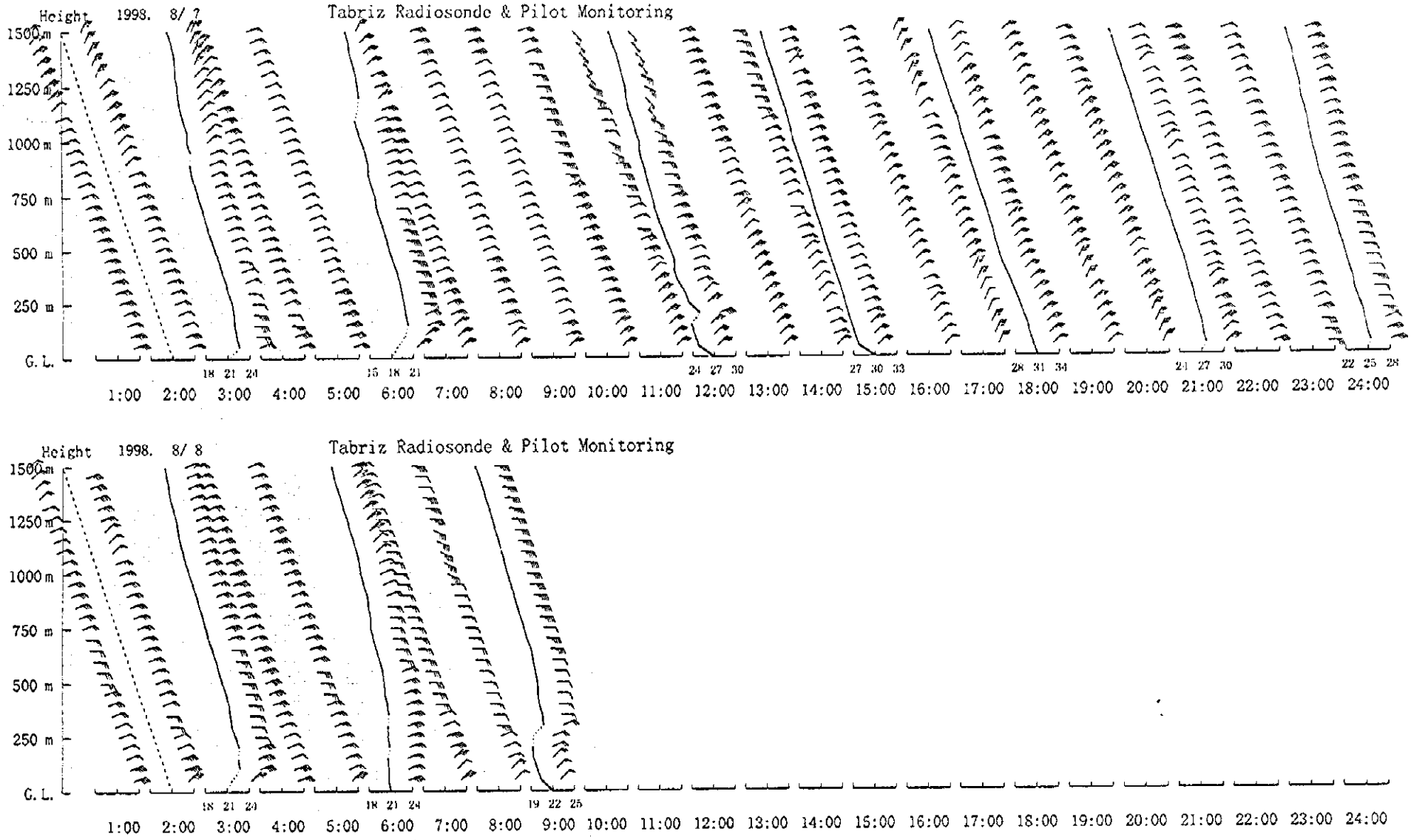


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

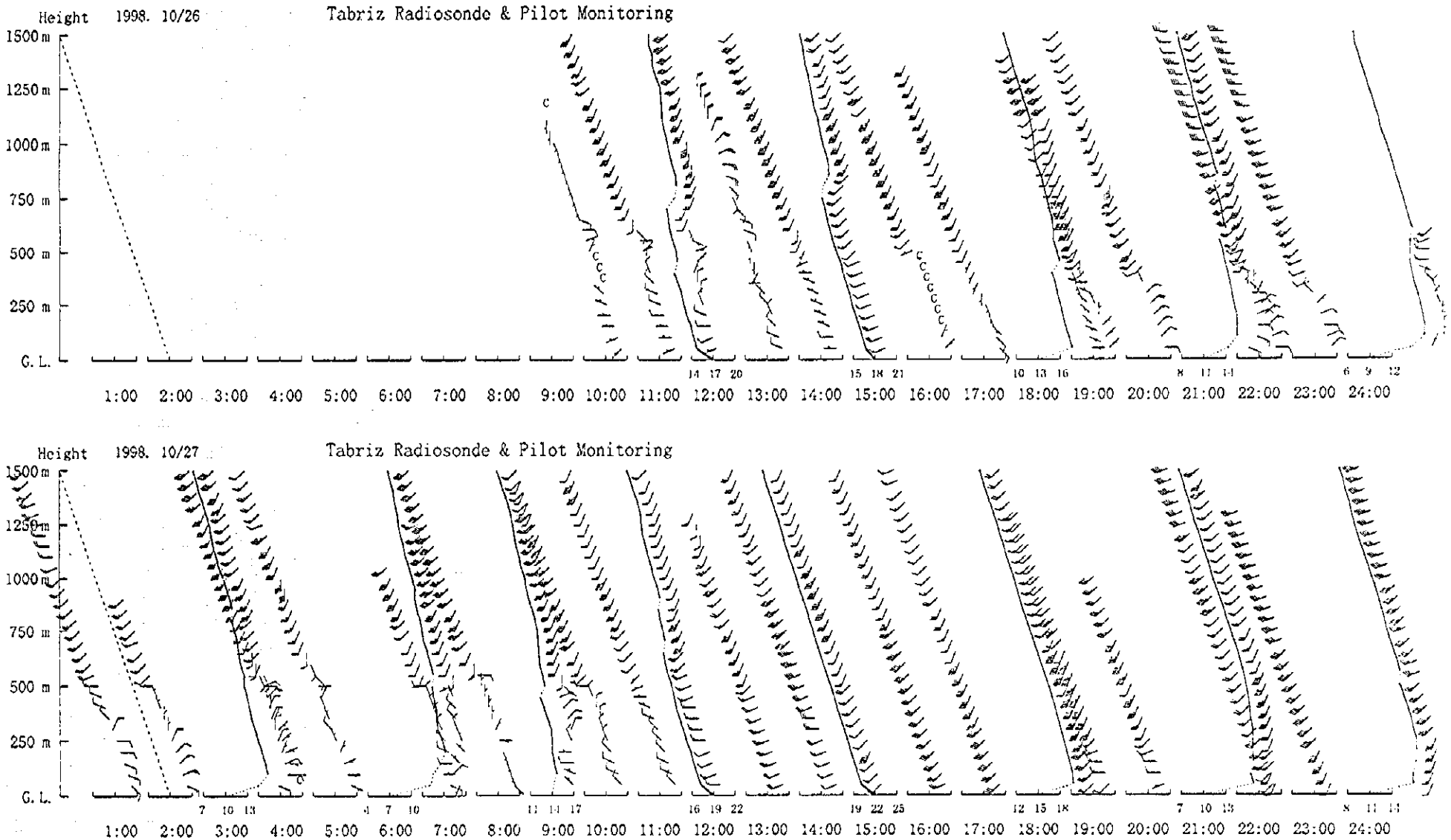


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

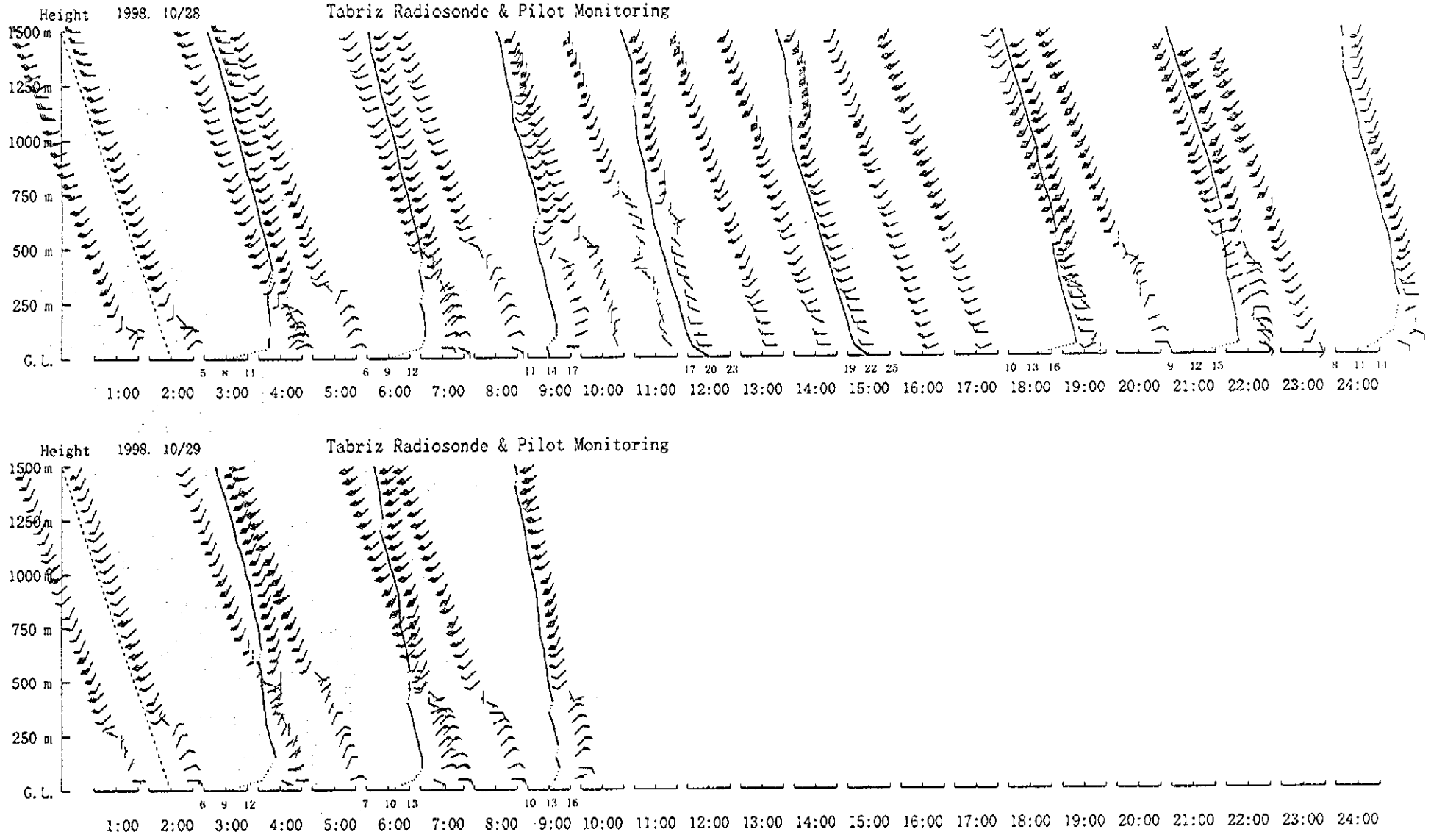


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

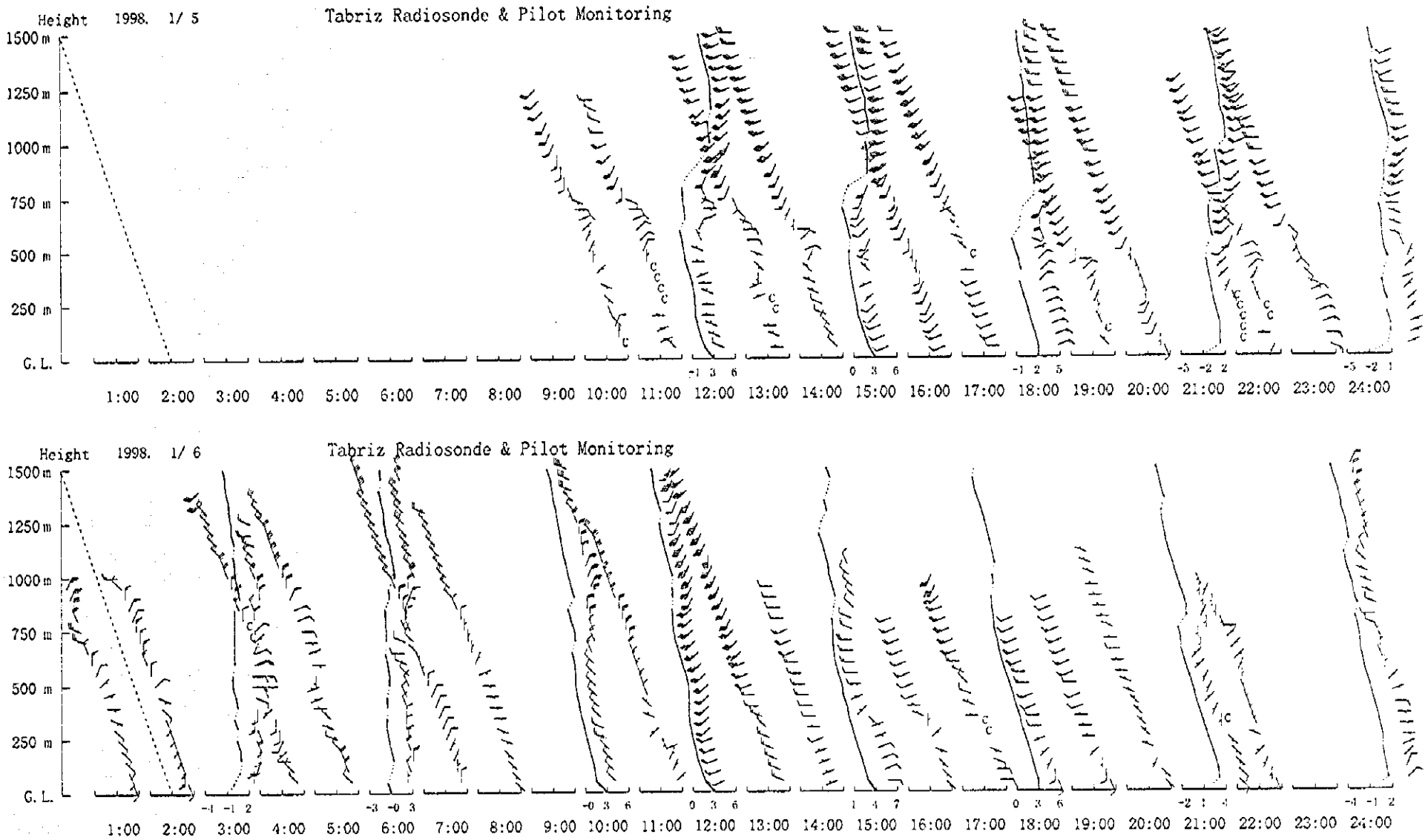


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

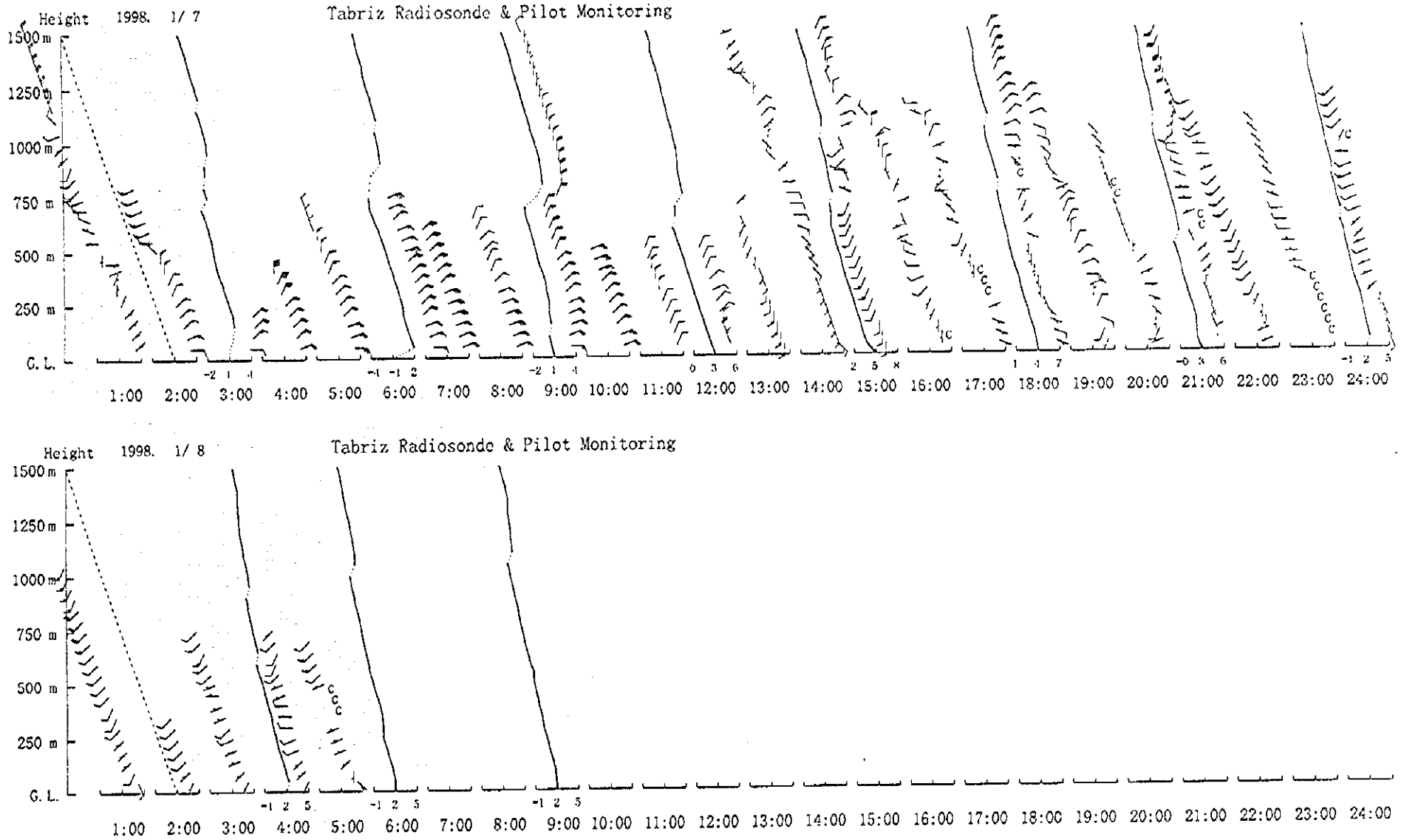
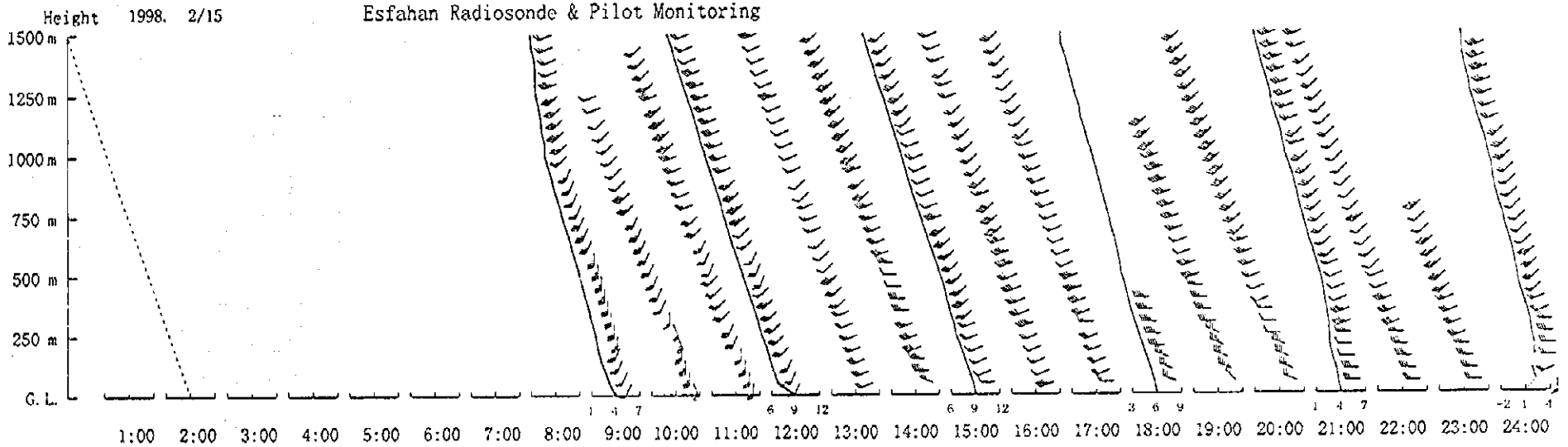


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate



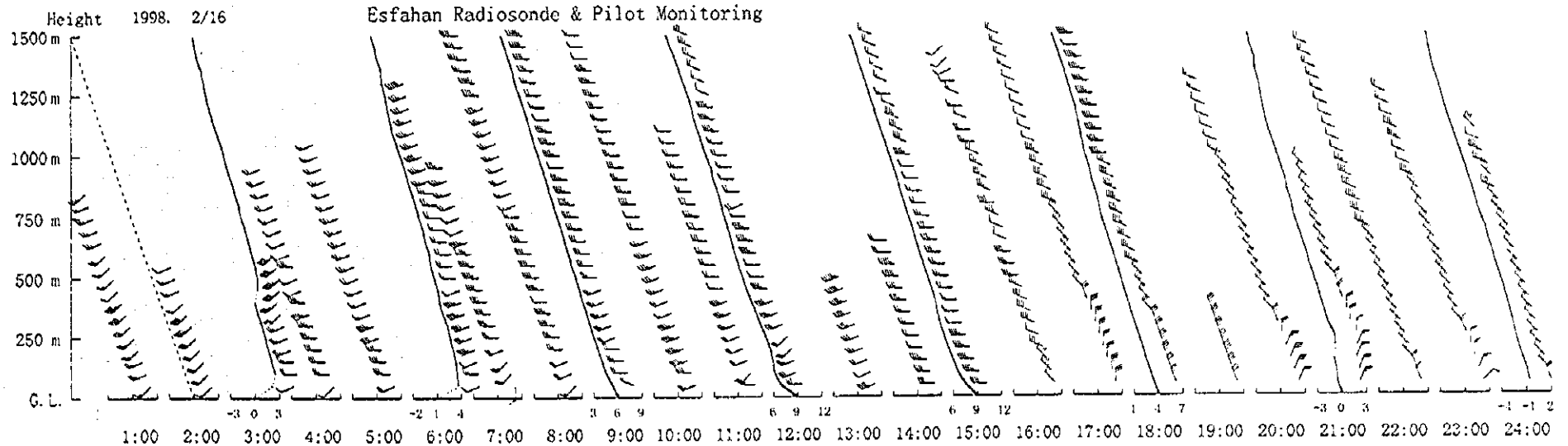


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

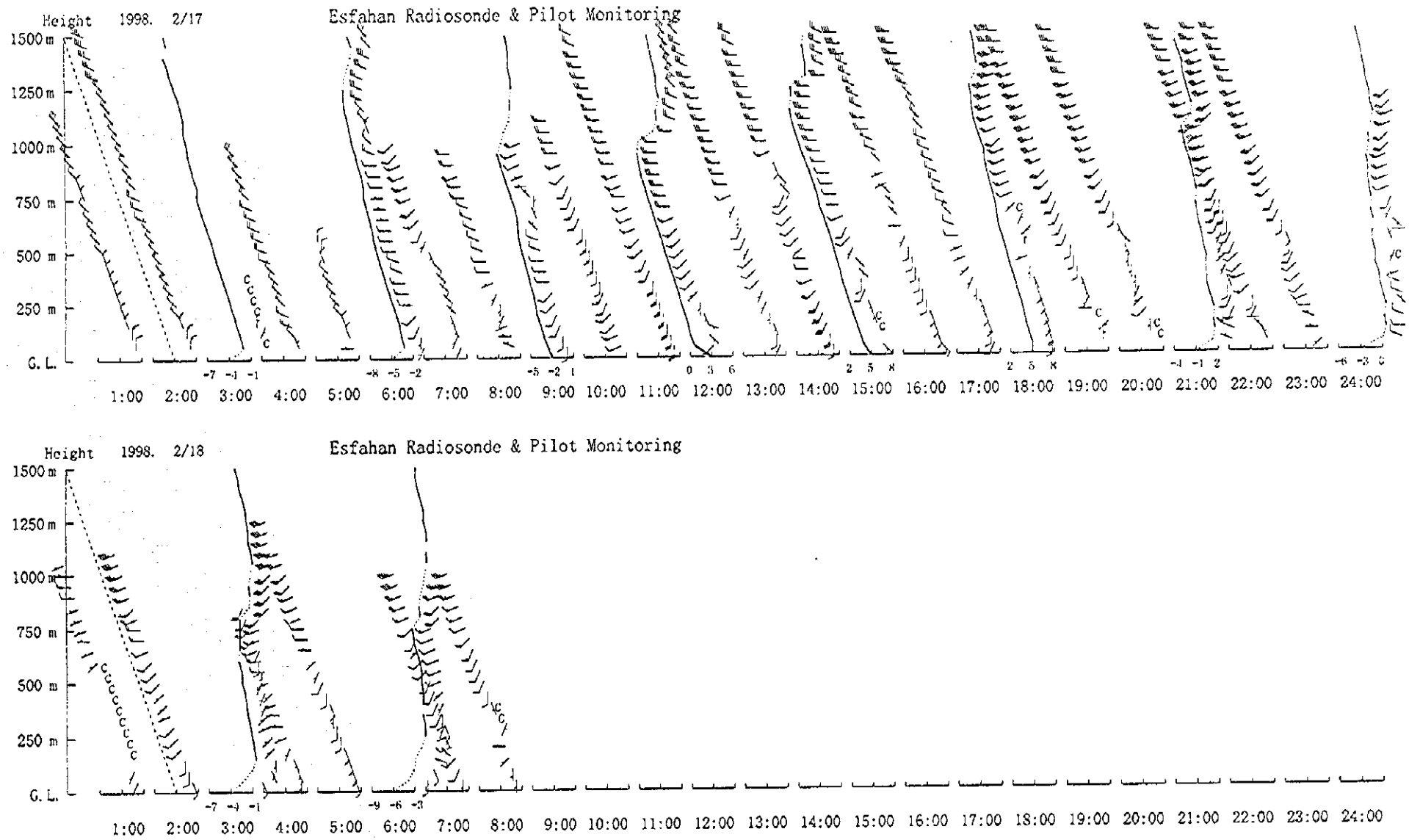


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

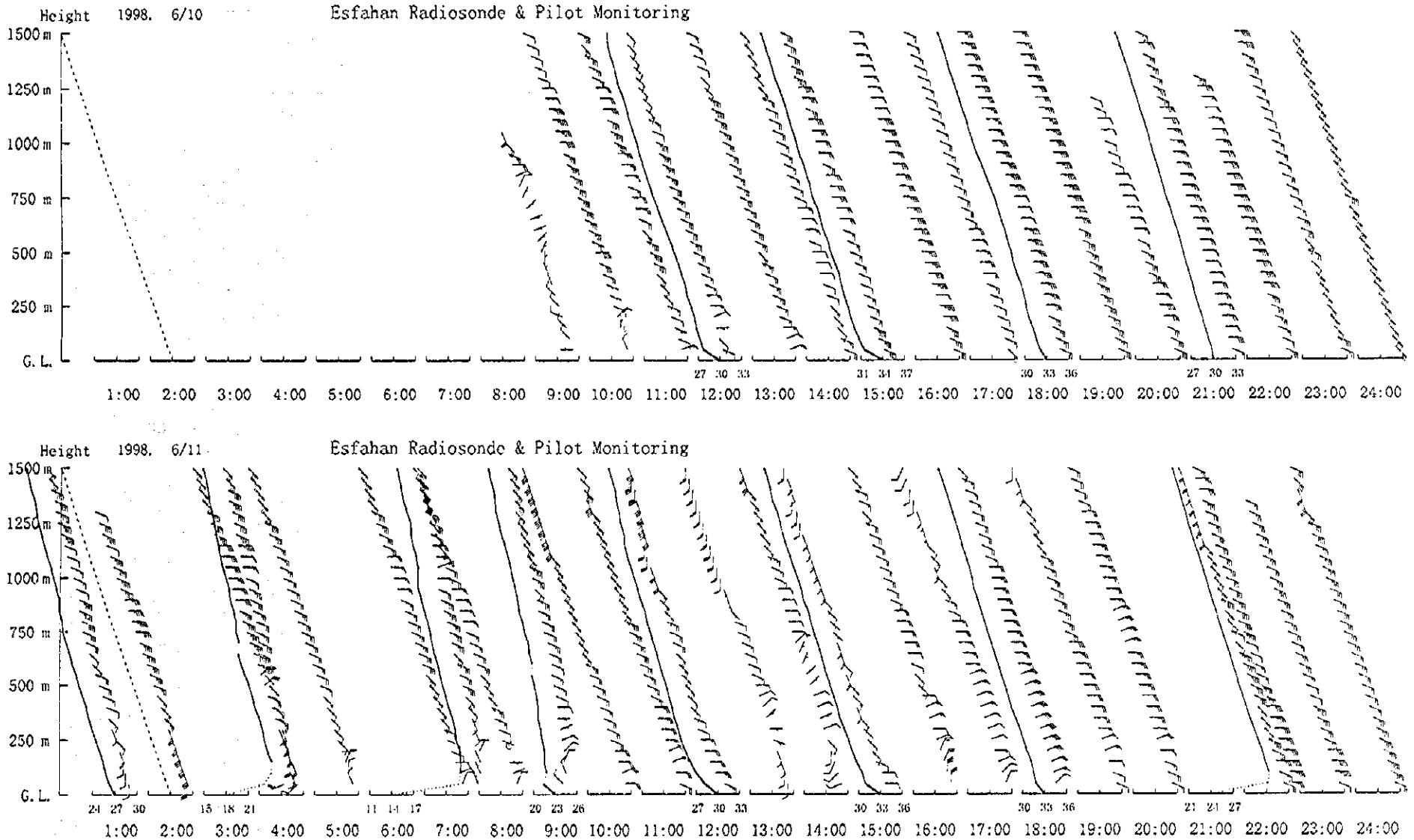


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

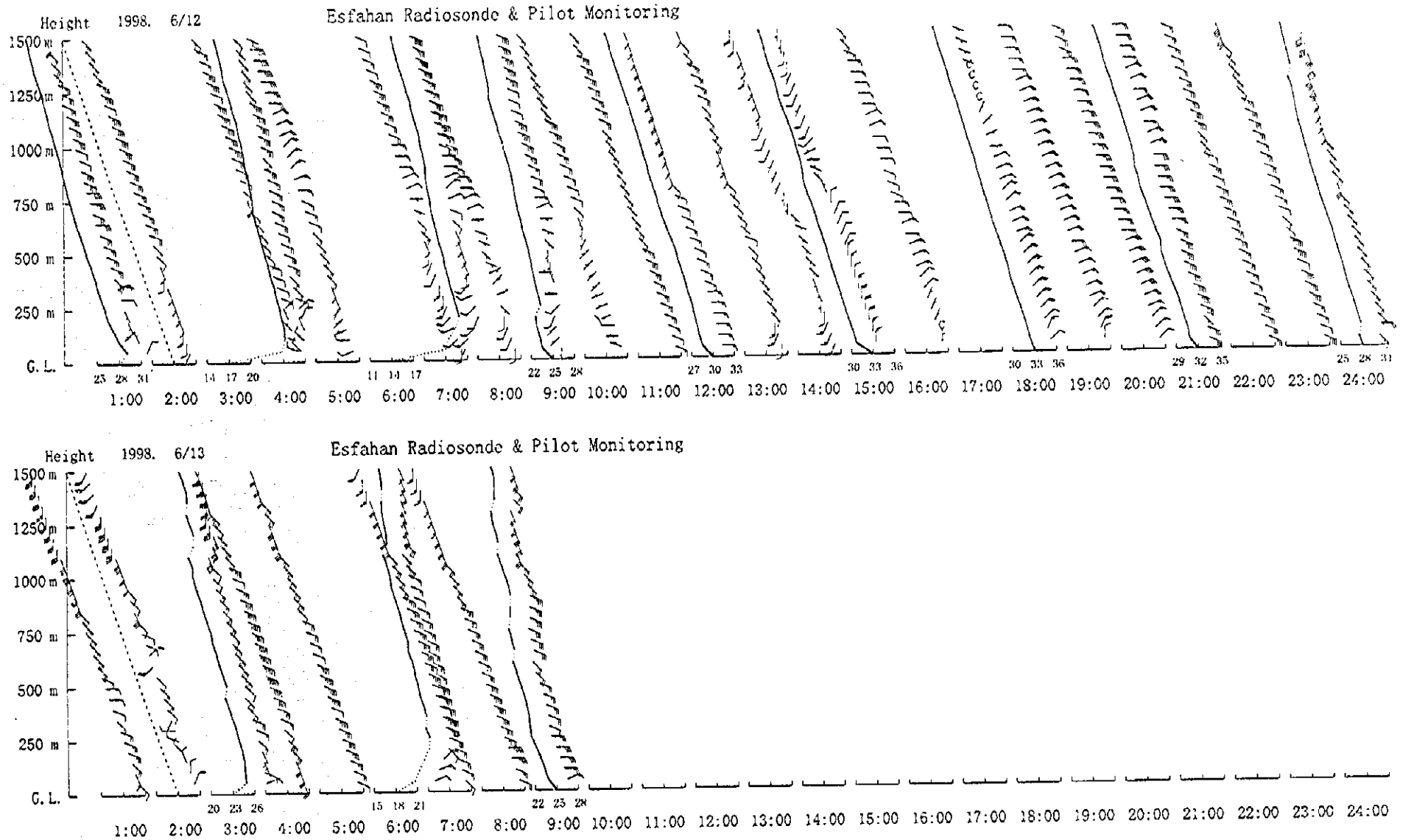
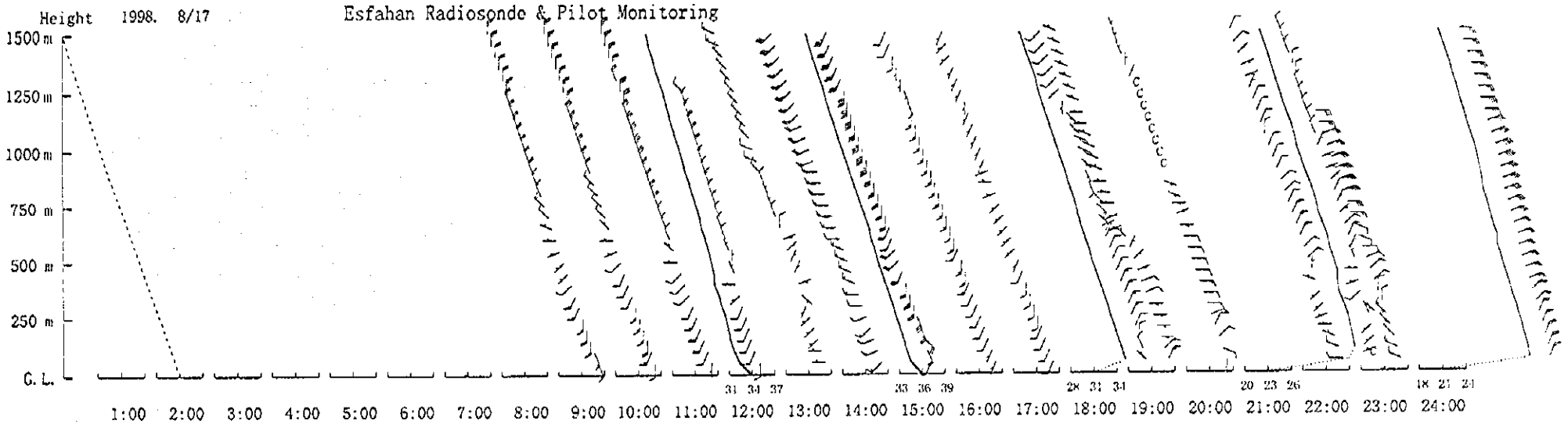


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate



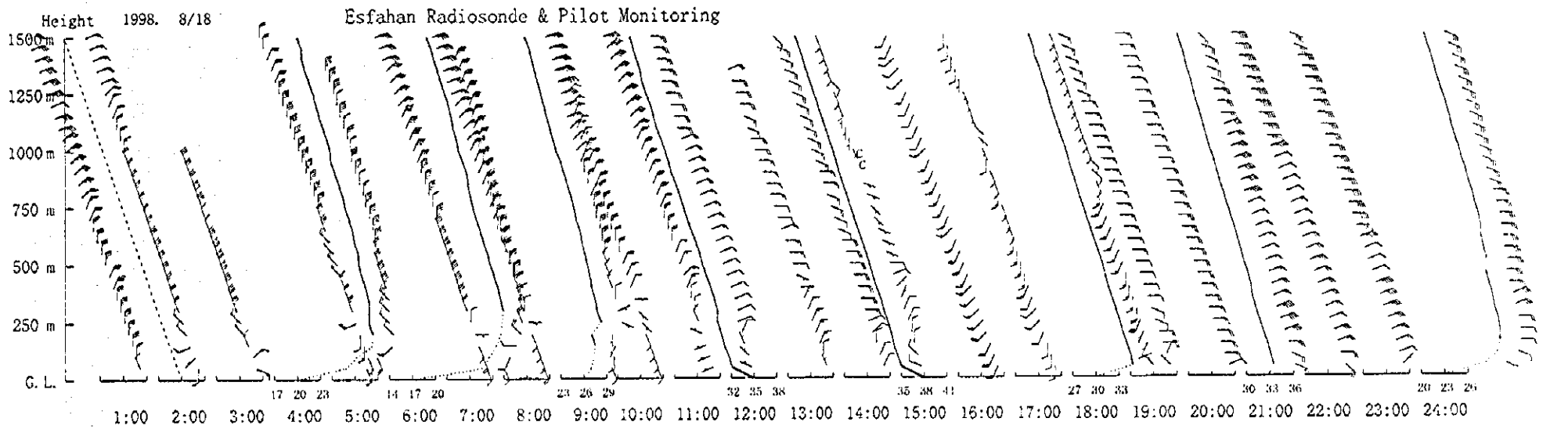


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

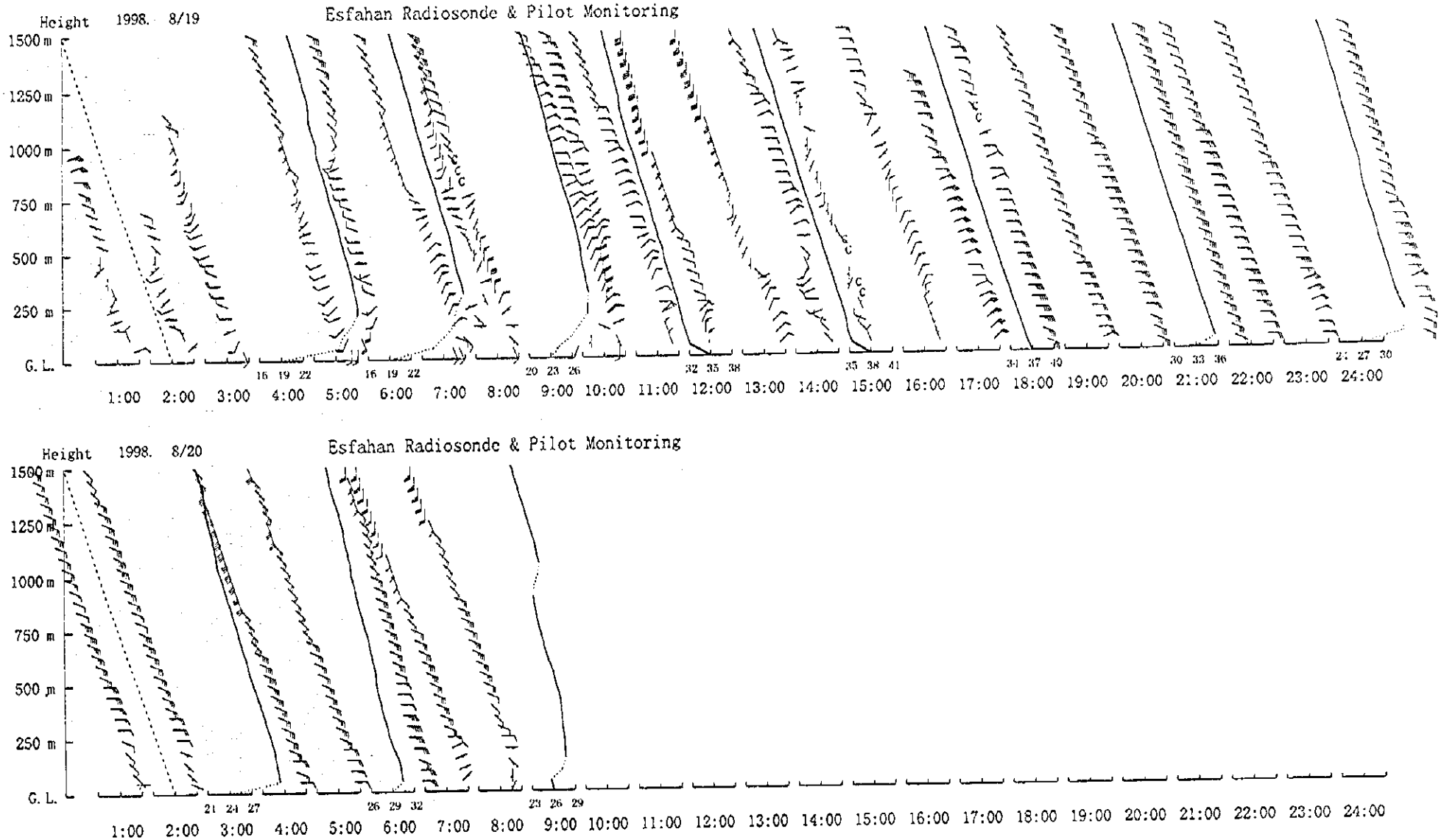


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

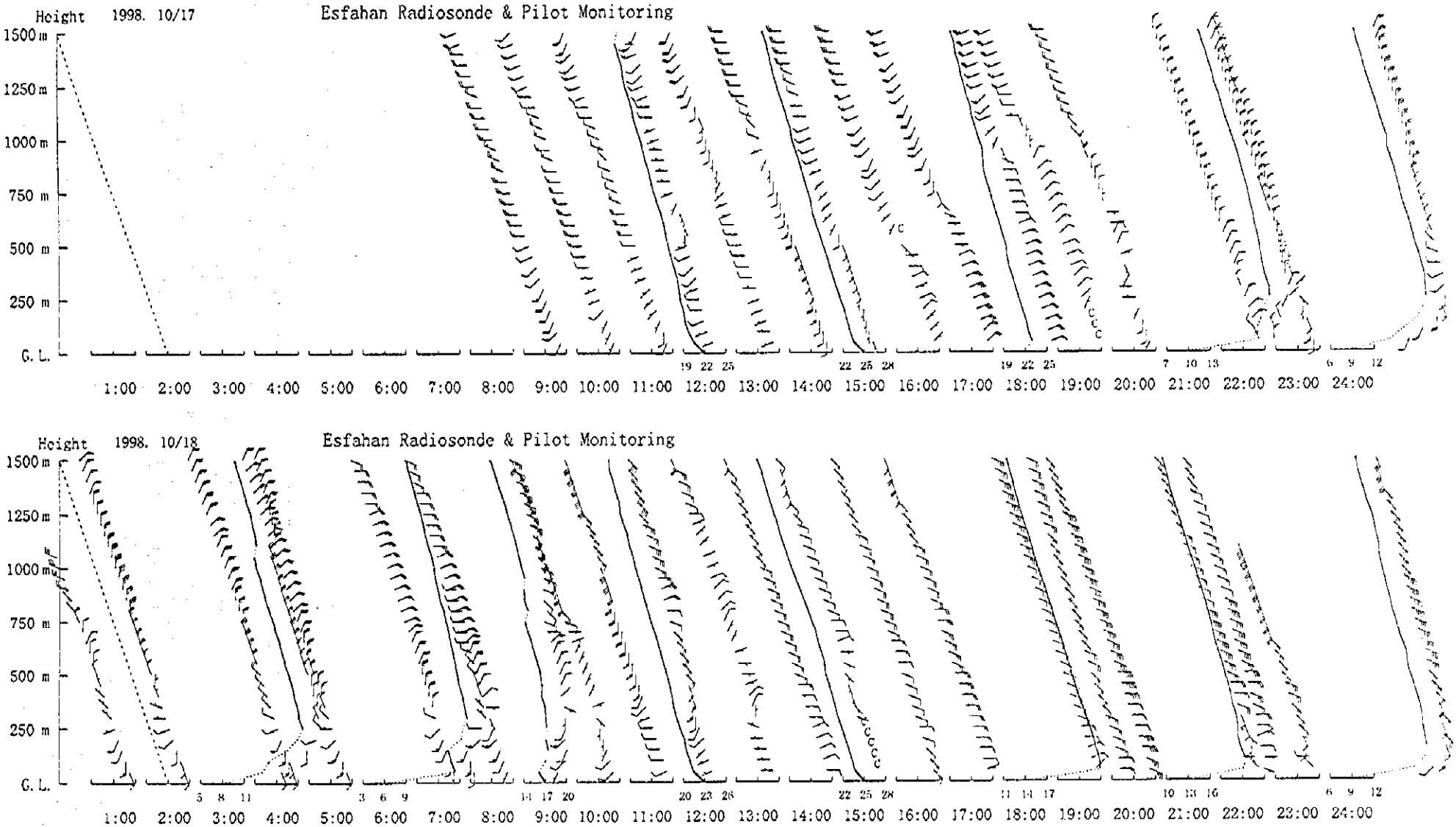


Fig. Temperature and Wind Vertical Profile in Iran ---- Dry Lapse Rate

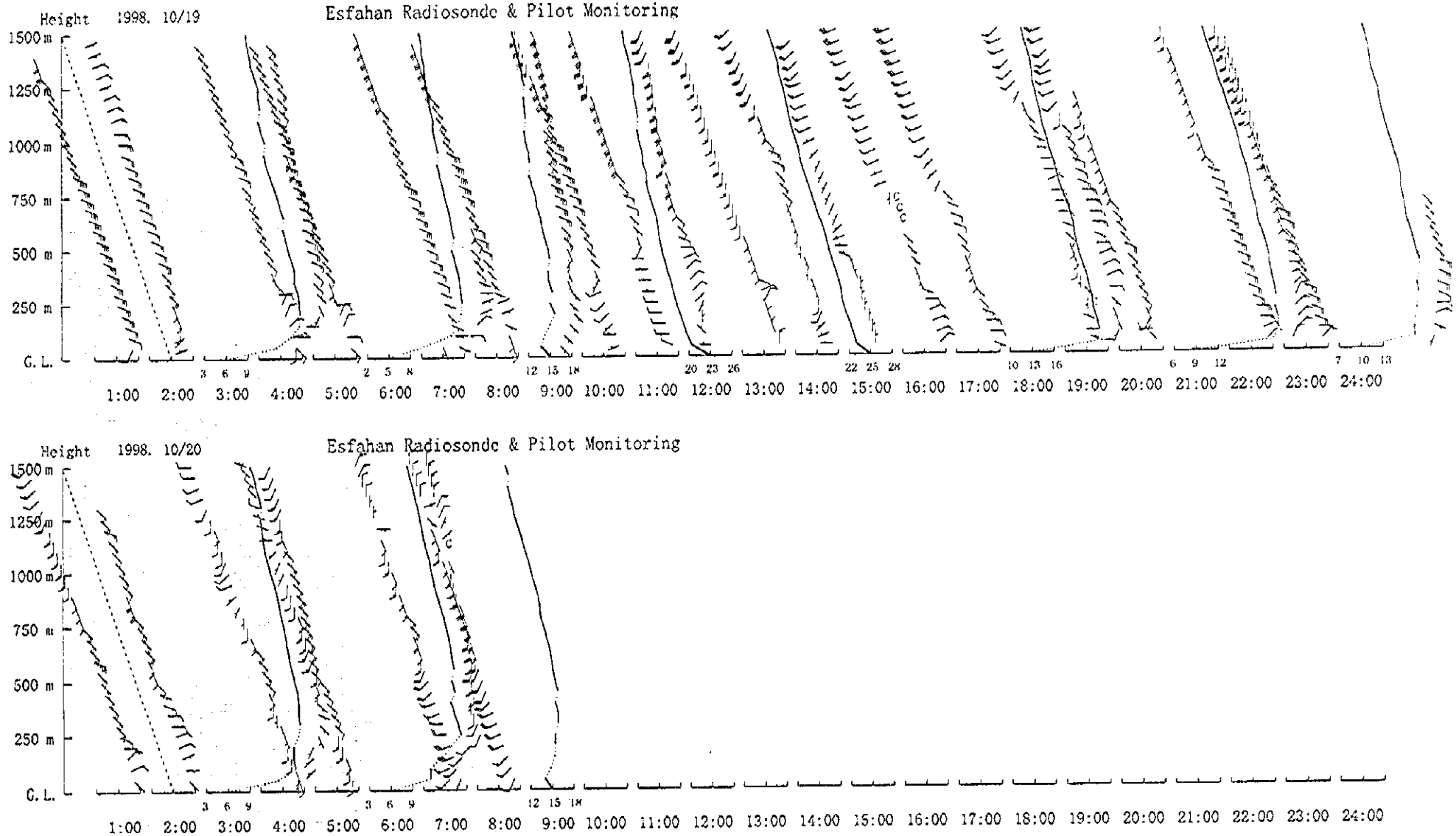


Fig. Temperature and Wind Vertical Profile in Iran .... Dry Lapse Rate

Appendix 6-1 Various Laboratory Work at Power Plant

Operational Notes for Low-volume Sampler (LV)

1. Tools Required

1) Metler Balance 2) Desiccator 3) Silica gel 4) Pincette 5) 6) Stopwatch 7) Hard Case for keeping the Filter collected

2. Lab. Preparation

2-1 Keep 10 pieces of Collecting Filter in Desiccator for 24 hours.

2-2 Weigh each piece of the Filer by the Melter balance.

2-3 Put the piece of the Filter in a plastic bag, and record its weight and serial number on the bag.

3. Field Work Preparation

3-1 Clean up coarse particles at the bottom of Cyclone of LV.

3-2 Remove the cover of LV and set the Collecting Filter on the Filter Holder as shown in the picture below.

3-3 Record the weight and number of the Filter in the Field Report.

3-4 Set the cover of LV and supply it with electricity.

3-5 Record the indicator of Integrating Flow Meter in the Field Report.

3-6 Start up the Pump and record the starting time, date, month, and year on the left part of the second row of the Field Report.

3-7 Adjust the Needle Valve to make air flow rate to be 20 liters per 60 seconds.

3-8 Choose one of the Collecting Filter for Blank and record the number in the Field Report (Blank shall be the one of the pieces. Keep it inside of the Lab.).

4. Field Work Maintenance (should be done every 5 to 7 days)

4-1 Record the date and the current value of Integrating Flow Meter in the Field Report.

4-2 Check the time of air suction of 20 liter roughly and adjust the Needle Valve the air flow to be within 58 to 62 seconds.

4-3 Check the bottom of Cyclone. Clean it up if you find dust accumulation.

5. Withdrawal

5-1 Record the time, date and the current value of the Integrating Flow Meter in the Field Report when you stop the pump.

5-2 Calculate total of the flow volume from the records of the starting and ending value.

5-3 Withdraw the Collecting Filter and Blank ones and keep these in each plastic bag.

5-4 Check the color of spot on the filter and make comments for the color in the specified column of the Field Report, if you find anything unusual.

6. After Sampling

6-1 Keep all of the Collecting Filters in the Desiccator for 24hours in order to make the Filters dried.

6-2 Weigh each Collecting Filter by the Metler Balance.

6-3 Record the each weight in the Field Report.

6-4 Calculate the weight of SPM by deducting the weight of the filter before sampling from the one after sampling.

6-5 Calculate the change in the weight of Blank Filter by deducting the weight of the filter before sampling from the one after sampling.

6-6 Correct the actual weight of SPM by considering the change of the Blank Filter weight.

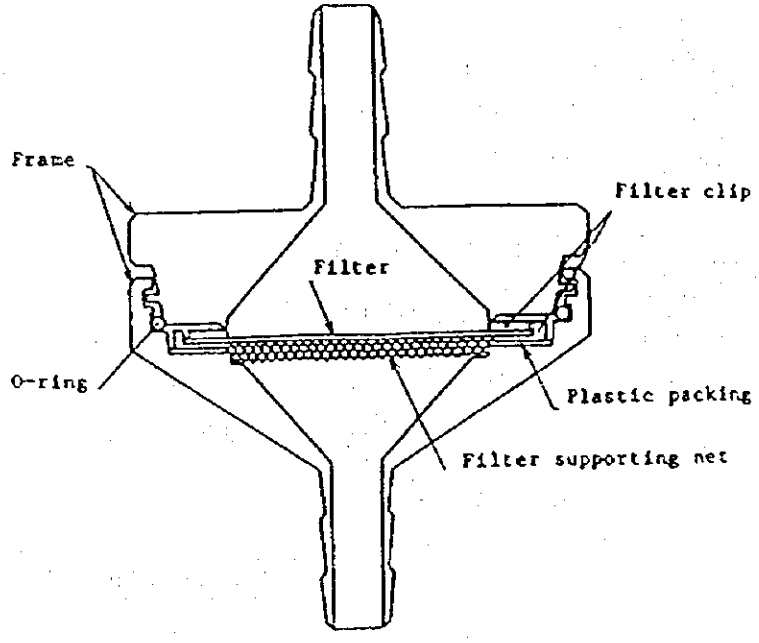
6-7 Record these results in the Field Report.

7. Safe Keeping

7-1 Keep the Collecting Filters in the hard case and keep these in the cool and dark place.

7-2 Send or carry these samples along with the Field Report to MOE.

Note: Never fold the Filter. It is very fragile.



Construction of Filter Folder

Operation Procedure of Deposit Gauge Sampling

1. Tools Required

1) 500ml of Pure Water, 2) 30cm Length of Blush, 3) Paper towel, 4) Spatula coated with Silicon or equivalent, 5) Poly-ethylene Bottle

2. Field Work Preparation

2-1 Wash a Funnel and a Receiver of a deposit gauge with Pure Water.

2-2 Wipe the Funnel with Paper towel.

2-3 Set the Deposit Gauge as shown in the picture below.

2-4 Record the starting time, date, month, and year in the Field Report.

3. Field Maintenance (should be carried out every 5 to 7 days)

3-1 Record the date.

3-2 Make comments on the unusual surround circumstance of the Field.

3-3 Check the exterior (outlook-appearance) of the Sampler.

4. Withdrawal

4-1 Take out leaves, insects, and other alien substances on the Funnel and inside of a Receiver.

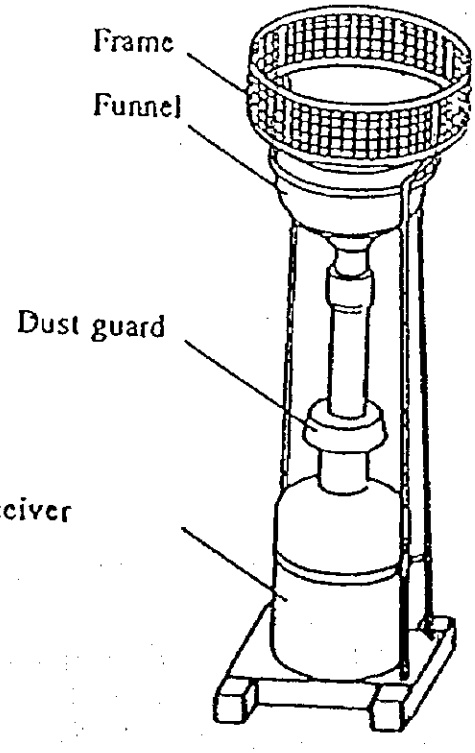
4-2 Wash the Funnel using a Spatula with 500ml of Pure Water. The wash water should be saved in the Receiver with the samples.

4-3 Withdraw the Receiver and put the cap on it.

5. Safe Keeping

5-1 Keep the samples in the cool and dark place.

5-2 Send or carry those samples with the Field Reports to MOE, or reduce the sample volume as described in the next page.



Laboratory Procedure to Reduce Sample Volume of Soluble Settled Dust for Shipment

1. Tools Required

1) 2 liter capped plastic bottles, 2) chemical grade filter papers, 3) plastic bags with fastener

2. Procedures

2-1 Measure and record the contents (in the order of a deci-liter) in a Receiver, and filter it with a filter paper of known weight.

2-2 The filter with deposit shall be dried, and weighed. Record the weight of the dried deposit. Put the dried filter with deposit in a sealed plastic bag.

2-3 If the solution is more than 2 liters, collect 2 liters from the solution into a plastic bottle with a cap.

2-4 Send the filter and the 2 liter solution to MOE with the Field Report.

Operation Procedure of Passive Sampler

1. Tools Required 1) Shovel

2. Field Work Preparation

2-1 Put one kind of Collecting Filter in one Passive Sampler Case as shown below. The other kind of the Filter should be put in the other Sampler Case and clip the both cases. One is for SO2 and NO2, the other one is for NOx.

2-2 In order to distinguish between cases, mark serial number on the cases, and (SO_2 and NO_2) or (NOx).

2-3 Dig a hole about 50 cm depth and set a pole, if there is nothing to hang a sampler.

2-4 Set a Shelter and Sampler as shown below.

2-5 Record on the log sheet the number, (SO_2 and NO_2) or (NOx) on the plastic bag of the case, and starting time, date, month, and year.

2-6 Make comments on the unusual surround circumstances on the log sheet.

3. Withdrawal

3-1 Record on the log sheet and the bag the time when it is finished.

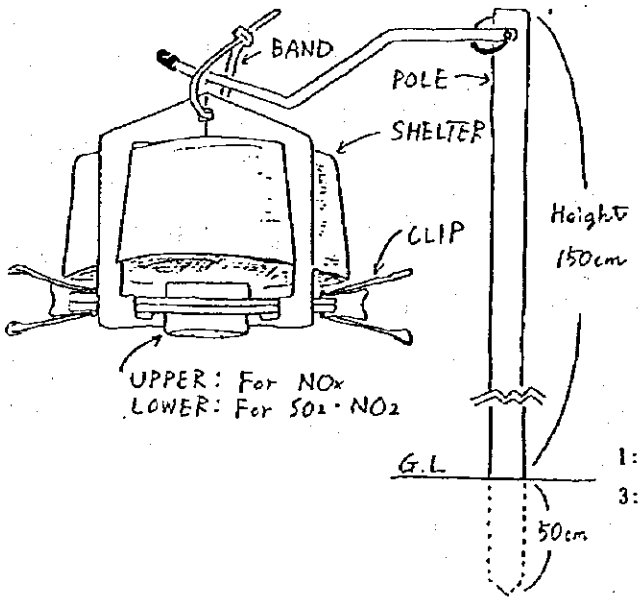
3-2 Make comments on the unusual surround circumstances on the Field Report (log sheet).

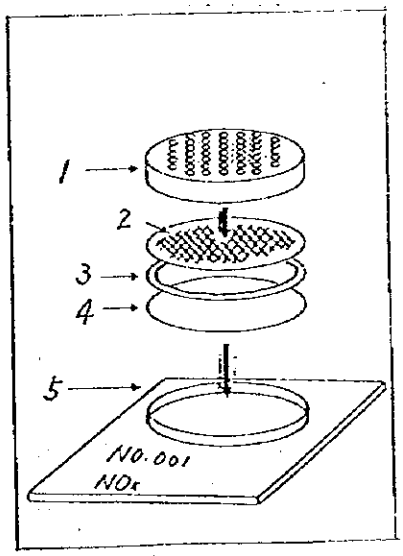
3-3 Withdraw the cases with samplers and put these in the bag.

4. Safe Keeping

4-1 Keep the samples in the cool and dark place.

4-2 Send or carry those samples with the Field Report to MOE.





1:Diffusion Plate 2:Metal mesh-sheet
3:O-ring 4:Collecting filter 5:Case

Appendix 6-2

Data Collection Procedure for Air Monitoring Stations (6 stations) and Meteorological Observation Stations (2 stations)

1. Down Loading of Logged Data to Hard Disk (HDD) of Computer in Station

Person in charge : Experts of each Power Plant
Time : Once a week
Action : **Data has to be transferred to HDD from a logger.**

2. Collection and Dispatch of Floppy Disks and Charts

Person in charge : Experts of each Power Plant
Time : After the time of maintenance at the beginning of every month, **data has to be transferred to floppy disks once a month.**
Action : a. **Copy** the data from HDD at each station to floppy disks in Text file, by choosing EXPORT from the File Pulldown Menu of the computer. **Collect** the disks afterward.
b. **Collect** charts.
c. **Send** the collected floppy disks and the charts to **MOE.**

3. Data Screening

Person in charge : Counterparts of MOE
Time : On or around 10th of every month
Action : a. Load the data from floppy disks to DRAPS system.
b. Print out data from the collected floppy disks from each station.
c. Check and verify the data with the charts; reasons of no measurement, agreement of times on charts and floppy data, time of changes from/to DST to/from the Standard, etc.
d. Verify extraordinary data as the data collected at the time of no measurement or else and delete the data from the floppy disks. This is **Screening.**
e. All the collected data from 8 stations are to be put together or compile one or two floppy disks.
f. Print out the data from the above mentioned floppy disk after the screening.
g. **Copy** the floppy disks to fresh ones.

4. Dispatch for Screened Floppy Disks and Data to JICA

Persons in charge : Counterparts of MOE
Time : On or around 15th of every month
Action : Dispatch the copied floppy disks to the **JICA Team.**

Maintenance & Check Lists for Automatic Ambient Air Measuring Instrumennt

Place: Name of Monitoring Station:

Month:	Date:				
The body of Instrument	Replacement of Filter				
	Check of Sucked Flow Volume				
	Others				
Standard Gas	Remaining Gas Pressure				
Gas Generator	Replacement of Silica gel				
Logger	Record Logged data into Floppy Disk				
	Others				
Recorder	Check of Date and Time				
	Replacement of Ink ribbon cassette				
	Replacement of Chart				
	Coefficient of Span Adjustment Value				
	Others				

Note : Replacement of Filter to be every 2 weeks or depend on the dirtiness of the Filter
: Gas Pressure to be 150 kg/cm3 at the biginning
: Silica gel to be replaced with a new one when it turns pink color
: Replacement of Floppy disk and Chart to be every one month
: Coefficient of Span Adjustment Value to be confirmed

Records for Measurement not to be carried out due to some reasons

Place: Name of Monitoring Station:

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
SO_2				
NO				
NO_2				
WD				
WS				

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
SO_2				
NO				
NO_2				
WD				
WS				

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
SO_2				
NO				
NO_2				
WD				
WS				

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
SO_2				
NO				
NO_2				
WD				
WS				

Examples : A: Adjustment B: Automatic Adjustment C: Power Failure D: Equipment or Instruments Breakdown E: Inappropriate Instruction F: Obstructing Gas G: Equipment or Instruments change H: Logger breakdown I: Chart Failure J: Leak K: Lowering Zero L: Others

Maintenance & Check Lists for Meteorology Meter

Place: Name of Monitoring Station:

Month:	Date:				
The body of Instrument	Confirmation of appearance				
	Clean up the glass dome(S.R)				
	Check color of silica gel (S.R)				
	Check poly dome (N.R)				
	Drain off dehumidifier (N.R)				
	Clean up filter and leak nozzle (N.R)				
	Confirmation of normal movement of fan (S.R,N.R)				
	Confirmation of ventilation (Temp.)				
Logger	Record Logged data into Floppy Disk				
	Others				
Recorder	Check of Date and Time				
	Replacement of pens (for Wind direction & speed)				
	Fill up ink in pens(for others)				
	Replacement of Chart				

Note: S.R = Solar Radiation Meter N.R = Net Radiation Meter

Note : Replacement of Poly dome should be done when it is found deformation or etc.

: Silica gel is to be replaced with a new one when it turns pink color

: Withdrawal of Floppy disk and Chart is to be done in every one month

Records for Measurement not to be carried out due to some reasons

Place: Name of Monitoring Station:

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
WD WS TEMP SR NR				

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
WD WS TEMP SR NR				

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
WD WS TEMP SR NR				

Month :

Item	Time of Measurement carried out	Time of Measurement not carried out	Reasons of Measurement not to be able to carried out	Remarks
WD WS TEMP SR NR				

Examples of Reasons of Measurement not to be able to carried out : A: Adjustment B: Power Failure C: Equipment or Instruments Breakdown D: Inappropriate Instruction E: Equipment or Instruments change F: Logger breakdown G: Chart Failure H: Lowering Zero I: Others

Appendix 6-3

SPM Data Sheet

Tabriz

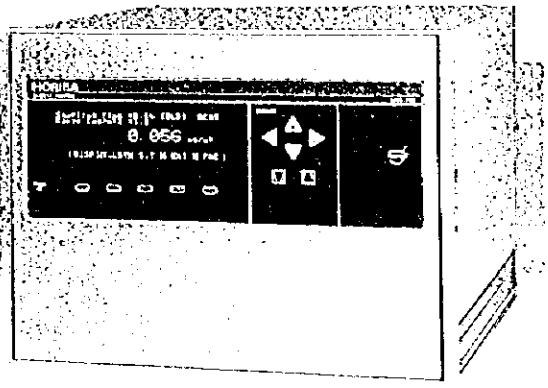
Sample No. is	Sampling location	Sampling start time	Sampling finish time is	ave temp	atm press	period (min)	volume (m3)	volume (25 1atm)	SPM (ug) is	SPM (ug/m3)	V (ug/g)	conc (ug/m3)	Ni (ug/g)	conc (ug/m3)	Pb (ug/g)	conc (ug/m3)	Zn (ug/g)	conc (ug/m3)
TS-1	Baranloo	1998/2/3 15:43	1998/2/14 12:45	0	650	14222	298,273	278,463	13000	46.68	0.191	0.009	0.248	0.012	0.874	0.041	2.560	0.120
T-5	Baranloo	1998/2/23 11:30	1998/3/4 12:25	5	650	13015	251,112	230,218	11500	49.95	0.169	0.008	0.079	0.004	1.013	0.051	16.370	0.818
T-2	Baranloo	1998/3/4 12:35	1998/3/31 9:00	5	650	37225	747,248	685,072	25300	36.93	0.015	0.001	0.096	0.004	0.914	0.034	9.640	0.356
T-13	Baranloo	1998/3/31 10:15	1998/4/29 11:10	10	650	41815	810,565	729,991	23900	32.74	0.168	0.006	0.119	0.004	0.605	0.020	11.800	0.386
T-22	Baranloo	1998/4/29 11:15	1998/5/31 12:40	15	650	46165	911,311	806,474	23700	29.39	0.194	0.006	0.009	0.000	0.563	0.017	15.270	0.449
T-34	Baranloo	1998/5/31 12:50	1998/6/26 9:35	20	650	35805	705,995	614,115	30000	48.85	0.179	0.009	0.099	0.005	0.520	0.025	13.950	0.681
T-40	Baranloo	1998/6/26 9:40	1998/7/28 18:15	35	650	48035	895,577	741,085	50000	67.47	0.014	0.001	0.013	0.001	0.026	0.002	0.080	0.005
T-49	Baranloo	1998/7/28 18:20	1998/8/26 14:20	35	650	40080	785,322	649,850	48000	73.86	0.013	0.001	0.005	0.000	0.022	0.002	5.600	0.414
T-67	Baranloo	1998/9/21 12:05	1998/10/21 9:45	25	650	41620	812,610	694,995	47100	67.77	0.012	0.001	0.011	0.001	0.099	0.007	1.122	0.076
T-76	Baranloo	1998/10/21 9:50	1998/11/2 10:15	25	650	17305	324,331	277,388	27100	97.70	0.103	0.010	1.344	0.131	1.000	0.098	1.000	0.098
T-79	Baranloo	1998/11/2 10:20	1998/11/30 8:35	25	650	38775	745,112	637,267	46900	73.60	0.017	0.001	0.012	0.001	0.102	0.008	1.267	0.093
T-88	Baranloo	1998/11/30 8:40	1998/12/27 10:25	10	650	38985	758,831	683,400	55200	80.77	0.0112	0.001	0.0222	0.002	0.112	0.009	1.467	0.118
T-100	Baranloo	1998/12/27 10:30	1999/1/26 10:50	10	650	43220	872,071	719,495	39700	55.18								
T-103	Baranloo	1999/1/26 10:55	1999/2/22 9:45	10	650	37370	733,178	604,903	22100	36.53								
T-106	Baranloo	1999/2/22 9:50	1999/3/9 10:50	10	650	21660	416,840	343,910	13200	38.38								
T-109	Baranloo	1999/3/9 10:55	1999/3/31 10:30	10	650	30215	612,712	505,513	23000	45.50								
T-112	Baranloo	1999/3/31 10:35	1999/5/2 16:25	20	650	47030	880,278	701,479	24000	34.21								
TS-3	Mayan	1998/2/3 17:15	1998/2/14 17:15	0	650	15840	309,182	288,647	8700	30.14	0.171	0.005	0.101	0.003	0.134	0.004	1.890	0.057
T-4	Mayan	1998/2/17 12:45	1998/3/4 13:15	5	650	21630	406,336	372,525	16000	42.95	0.172	0.007	0.123	0.005	1.190	0.051	6.300	0.271
T-1	Mayan	1998/3/4 13:25	1998/3/31 10:00	5	650	37235	732,752	671,782	18100	26.94	0.155	0.004	0.137	0.004	1.155	0.031	18.680	0.503
T-14	Mayan	1998/3/31 11:00	1998/4/29 10:20	10	650	40280	816,058	734,938	16200	22.04	0.149	0.003	0.087	0.002	1.056	0.023	13.760	0.303
T-23	Mayan	1998/4/29 10:37	1998/5/31 13:40	15	650	46263	837,786	741,407	18100	24.41	0.157	0.004	0.117	0.003	1.006	0.025	24.340	0.594
T-35	Mayan	1998/5/31 13:45	1998/6/26 10:55	20	650	35830	717,328	623,974	22700	36.38	0.162	0.006	0.119	0.004	1.150	0.042	22.550	0.821
T-41	Mayan	1998/6/26 11:00	1998/7/28 11:00	35	650	46080	919,922	761,231	40000	52.55	0.012	0.001	0.014	0.001	0.028	0.001	0.137	0.007
T-50	Mayan	1998/7/28 11:10	1998/8/26 15:00	35	650	41990	860,761	712,275	36300	50.96	0.017	0.001	0.005	0.000	0.014	0.001	0.122	0.006
T-69	Mayan	1998/9/21 15:25	1998/10/21 10:50	25	650	41485	826,129	706,558	38300	54.21	0.010	0.001	0.099	0.005	0.101	0.005	1.022	0.055
T-78	Mayan	1998/10/21 10:55	1998/11/2 12:40	25	650	17385	342,013	292,511	3100	10.60	0.011	0.000	0.102	0.001	0.132	0.001	1.167	0.012
T-81	Mayan	1998/11/2 12:45	1998/11/29 11:10	25	650	37345	775,618	663,358	46900	70.70	0.011	0.001	0.010	0.001	0.099	0.007	0.967	0.068
T-90	Mayan	1998/11/29 11:15	1998/12/27 11:55	10	650	40360	809,508	729,039	52300	71.74	0.028	0.002	0.022	0.002	0.196	0.014	1.977	0.142
T-102	Mayan	1998/12/27 12:00	1999/1/26 11:30	10	650	41730	866,790	715,138	33600	46.98								
T-105	Mayan	1999/1/26 11:35	1999/2/22 10:40	10	650	37385	790,905	652,530	21300	32.64								
T-108	Mayan	1999/2/22 10:45	1999/3/9 12:00	10	650	21675	435,189	359,049	11700	32.59								
T-111	Mayan	1999/3/9 12:05	1999/3/31 11:50	10	650	30275	626,884	517,206	17400	33.64								
T-114	Mayan	1999/3/31 11:55	1999/5/2 17:30	20	650	47015	928,230	739,691	17300	23.39								
TS-4	Qaramalek	1998/2/7 15:45	1998/2/21 16:40	0	650	20215	384,866	359,305	9800	27.27	0.204	0.006	0.162	0.004	3.090	0.084	1.460	0.040
T-6	Qaramalek	1998/2/21 16:50	1998/3/4 14:10	5	650	14240	301,578	276,485	15200	54.98	0.157	0.009	0.049	0.003	0.239	0.013	15.700	0.863
T-3	Qaramalek	1998/3/4 14:15	1998/3/31 11:15	5	650	37260	723,438	663,243	25600	38.60	0.160	0.006	0.105	0.004	1.071	0.041	8.330	0.322
T-15	Qaramalek	1998/3/31 11:45	1998/4/29 12:25	10	650	41800	799,308	719,853	24000	33.34	0.152	0.005	0.106	0.004	1.153	0.038	8.490	0.283
T-24	Qaramalek	1998/4/29 12:30	1998/5/31 16:05	15	650	46295	562,366	497,671	11800	23.71	0.155	0.004	0.051	0.001	1.026	0.024	17.820	0.423
T-36	Qaramalek	1998/5/31 16:15	1998/6/26 16:10	20	650	35995	717,574	624,188	20500	32.84	0.172	0.006	0.075	0.002	1.150	0.038	18.250	0.599
T-42	Qaramalek	1998/6/26 16:15	1998/7/27 11:15	35	650	42900	784,442	649,122	29000	44.68	0.015	0.001	0.029	0.001	0.168	0.007	0.356	0.016
T-51	Qaramalek	1998/7/27 11:25	1998/8/27 11:00	35	650	43175	949,667	785,845	32800	41.74	0.011	0.000	0.022	0.001	0.049	0.002	3.536	0.148
T-68	Qaramalek	1998/9/21 17:20	1998/10/20 10:35	25	650	39915	821,778	702,836	23400	33.29	0.017	0.001	0.016	0.001	0.111	0.004	1.323	0.044
T-77	Qaramalek	1998/10/20 10:40	1998/11/2 17:50	25	650	19150	371,654	317,862	22200	69.84	0.019	0.001	0.019	0.001	0.132	0.009	1.447	0.101
T-80	Qaramalek	1998/11/2 17:55	1998/12/1 10:15	25	650	39860	809,928	692,702	50400	72.76	0.019	0.001	0.018	0.001	0.137	0.010	1.247	0.091
T-89	Qaramalek	1998/12/1 10:20	1998/12/29 9:45	10	650	38845	801,384	721,723	42700	59.16	0.017	0.001	0.012	0.001	0.127	0.008	1.236	0.073
T-101	Qaramalek	1998/12/29 9:50	1999/1/26 13:05	10	650	40515	846,304	698,236	39400	56.43								
T-104	Qaramalek	1999/1/26 13:10	1999/2/22 11:45	10	650	37355	752,546	620,882	23900	38.49								
T-107	Qaramalek	1999/2/22 11:50	1999/3/9 13:20	10	650	21690	418,378	345,179	16300	47.22								
T-110	Qaramalek	1999/3/9 13:25	1999/3/31 14:25	10	650	31740	597,338	492,829	21200	43.02								
T-113	Qaramalek	1999/3/31 14:35	1999/5/2 20:05	20	650	47010	967,276	770,806	23800	30.88								

Esfahan

Sample No. is	Sampling location	Sampling start time	Sampling finish time is	ave temp	atm press	period (min)	volume (m3)	volume (25 1atm)	SPM (ug) is	SPM (ug/m3)	V (ug/g)	conc (ug/m3)	Ni (ug/g)	conc (ug/m3)	Pb (ug/g)	conc (ug/m3)	Zn (ug/g)	conc (ug/m3)
ES-1	Golshahr	1998/2/8 11:00	1998/2/23 12:35	10	630	21695	432,700	377,697	10600	28.06	0.211	0.006	0.023	0.001	1.690	0.047	0.960	0.027
ES-500	Golshahr	1998/2/23 12:40	1998/3/26 10:20	10	630	43060	867,639	757,349	33700	44.50	0.192	0.009	0.150	0.007	4.168	0.185	7.170	0.319
ES-509	Golshahr	1998/3/26 10:20	1998/4/25 14:55	15	630	43475	864,998	741,935	33500	45.15	0.120	0.005	0.187	0.008	2.452	0.111	26.240	1.185
E-519	Golshahr	1998/4/25 16:45	1998/5/25 14:50	20	630	41645	796,141	671,221	36800	54.83	0.142	0.008	0.210	0.012	2.126	0.117	15.030	0.824
E-534	Golshahr	1998/5/25 14:50	1998/6/27 15:10	30	630	47540	1400,734	1141,974	31600	27.67	0.135	0.004	0.202	0.006	2.769	0.077	22.750	0.630
E-540	Golshahr	1998/6/27 15:10	1998/7/30 9:20	35	630	46450	756,000	606,337	87000	143.48	0.012	0.002	0.037	0.005	0.504	0.072	0.417	0.060
E-543	Golshahr	1998/7/30 9:20	1998/9/7 16:00	35	630	55120	728,000	583,680	91600	156.88	0.017	0.003	0.012	0.002	0.736	0.115	0.542	0.085
E-553	Golshahr	1998/9/7 10:00	1998/9/27 11:00	35	630	28860	582,350	467,064	45800	98.06	0.019	0.002	0.010	0.001	0.390	0.038	0.687	0.067
E-562	Golshahr	1998/9/27 11:00	1998/10/21 9:00	35	630	33000	633,928	508,431	58200	114.47	0.019	0.002	0.016	0.002	0.399	0.046	0.625	0.072
E-565	Golshahr	1998/10/21 9:00	1998/11/22 15:00	35	630	46440	890,108	713,896	10070	14.11	0.021	0.000	0.017	0.000	0.422	0.006	0.711	0.010
E-574	Golshahr	1998/11/22 15:00	1998/12/26 15:00	35	630	48960	929,756	745,695	12110	16.24	0.020	0.000	0.017	0.000	0.470	0.008	0.820	0.013
E-583	Golshahr	1998/12/26 15:00	1999/1/13 10:00	35	630	24180	484,635	388,694	33700	86.70	0.022	0.002	0.017	0.001	0.452	0.039	0.798	0.069
E-602	Golshahr	1999/1/13 10:00	1999/1/31 12:35	10	630	26075	488,108	390,318	26100	66.87								
E-592	Golshahr	1999/1/31 12:35	1999/3/3 10:15	20	630	43060	843,028	651,124	32900	50.53								
E-601	Golshahr	1999/3/3 10:15	1999/4/8 12:00	20	630	7305	983,836	759,879	32800	43.16								
E-610	Golshahr	1999/4/8 12:00	1999/5/10 14:00	25	630	46200	1007,486	765,090	32200	42.09								
ES-2	Kaveh	1998/2/8 12:30	1998/2/23 16:10	10	630	21820	465,657	406,465	12400	30.51	0.099	0.003	0.029	0.001	1.520	0.046	1.380	0.042
ES-502	Kaveh	1998/2/23 11:50	1998/3/26 12:15	10	630	44665	834,495	728,418	42200	57.93	0.155	0.009	0.143	0.008	3.837	0.222	7.100	0.411
E-511	Kaveh	1998/2/26 12:15	1998/4/25 15:40	15	630	39085	888,552	762,138	42400	55.63	0.143	0.008	0.143	0.008	2.764	0.154	26.240	1.460
E-521	Kaveh	1998/4/25 15:40	1998/5/25 14:00	20	630	41660	821,828	692,878	44300	63.94	0.100	0.006	0.157	0.010	2.348	0.150	15.320	0.980
E-535	Kaveh	1998/5/25 14:00	1998/6/27 0:00	30	630	46920	1065,290	868,497	19100	21.99	0.115	0.003	0.172	0.004	2.322	0.051	28.150	0.619
E-541	Kaveh	1998/6/27 19:40	1998/7/30 11:30	35	630	47030	740,000	593,505	49700	83.74	0.162	0.014	0.167	0.014	0.125	0.010	0.195	0.016
E-544	Kaveh	1998/7/30 11:30	1998/9/7 11:00	35	630	10050	720,000	577,464	86600	149.97	0.013	0.002	0.042	0.006	0.724	0.109	0.218	0.033
E-554	Kaveh	1998/9/7 11:00	1998/9/27 14:30	35	630	29010	650,281	521,547	51800	99.32	0.016	0.002	0.016	0.002	0.402	0.040	0.807	0.080
E-563	Kaveh	1998/9/27 14:30	1998/10/21 11:00	35	630	32910	701,343	562,501	59500	105.78	0.017	0.002	0.016	0.002	0.377	0.040	0.833	0.088
E-566	Kaveh	1998/10/21 10:00	1998/11/22 17:45	35	630	46545	984,900	789,923	12550	15.89	0.018	0.000	0.016	0.000	0.432	0.007	0.998	0.016
E-575	Kaveh	1998/11/22 17:45	1998/12/26 14:00	35	630	48735	1018,560	816,919	15950	19.52	0.018	0.000	0.017	0.000	0.445	0.009	0.942	0.018
E-584	Kaveh	1998/12/26 14:00	1999/1/13 13:00	35	630	24420	570,380	457,464	39100	85.47	0.019	0.002	0.017	0.001	0.422	0.036	0.967	0.083
E-601	Kaveh	1999/1/13 13:00	1999/1/31 11:25	10	630	24385	541,145	432,730	31500	72.79								
E-593	Kaveh	1999/1/31 11:25	1999/3/3 8:45	20	630	43040	295,234	228,028	32200	141.21								
E-602	Kaveh	1999/3/3 8:45	1999/4/8 11:15	20	630	7350	440,158	339,962	15800	46.48								
E-611	Kaveh	1999/4/8 11:15	1999/5/10 14:50	25	630	46295	660,078	501,266	30200	60.25								
ES-3	Shariati	1998/2/8 15:20	1998/2/23 10:50	10	630	19890	457,498	399,343	6900	17.28	0.165	0.003	0.032	0.001	1.150	0.020	1.610	0.028
ES-501	Shariati	1998/2/23 10:56	1998/3/26 13:05	10	630	44769	894,157	780,496	33000	42.28	0.176	0.007	0.206	0.009	3.569	0.151	2.410	0.102
E-510	Shariati	1998/3/26 13:05	1998/4/25 16:45	15	630	43420	836,273	717,297	38600	53.81	0.118	0.006	0.218	0.012	5.069	0.273	9.660	0.520
E-520	Shariati	1998/4/25 14:55	1998/5/25 13:15	20	630	41660	633,154	533,808	30300	56.76	0.112	0.006	0.330	0.019	1.934	0.110	11.710	0.665
E-536	Shariati	1998/5/25 13:15	1998/6/27 17:20	30	630	47765	841,703	686,214	12400	18.07	0.152	0.003	0.250	0.005	5.822	0.105	8.750	0.158
E-542	Shariati	1998/6/27 17:25	1998/7/30 11:00	35	630	47135	747,000	599,119	65300	108.99	0.015	0.002	0.011	0.001	0.248	0.027	0.165	0.018
E-545	Shariati	1998/7/30 11:00	1998/9/7 10:00	35	630	10020	726,000	582,276	60600	104.07	0.002	0.000	0.047	0.005	0.754	0.078	0.192	0.020
E-555	Shariati	1998/9/7 10:00	1998/9/27 12:00	35	630	28920	551,095	441,997	37300	84.39	0.020	0.002	0.021	0.002	0.412	0.035	1.336	0.113
E-564	Shariati	1998/9/27 15:10	1998/10/21 12:30	35	630	32960	591,820	474,659	59100	124.51	0.019	0.002	0.017	0.002	0.412	0.051	1.266	0.158
E-567	Shariati	1998/10/21 12:30	1998/11/22 16:00	35	630	46410	826,557	662,926	85400	128.82	0.020	0.003	0.018	0.002	0.444	0.057	1.397	0.180
E-576	Shariati	1998/11/22 16:00	1998/12/26 13:00	35	630	48780	871,102	698,653	12540	17.95	0.023	0.000	0.029	0.001	0.492	0.009	1.620	0.029
E-585	Shariati	1998/12/26 13:00	1999/1/13 12:45	35	630	24465	461,366	370,031	29100	78.64	0.212	0.017	0.028	0.002	0.469	0.037	1.557	0.122
E-600	Shariati	1999/1/13 12:45	1999/1/31 10:15	10	630	24330	453,700	362,804	22100	60.91								
E-594	Shariati	1999/1/31 10:15	1999/3/3 16:00	20	630	44985	653,755	504,937	25000	49.51								
E-603	Shariati	1999/3/3 16:00	1999/4/8 10:30	20	630	5430	794,824	613,893	10900	17.76								
E-612	Shariati	1999/4/8 10:35	1999/5/10 15:30	25	630	46375	707,653	537,395	21500	40.01								

APDA-360

Ambient Particulate Monitor



Features

The APDA-360 Ambient Particulate Monitor uses beta-ray absorption to show the mass of air suspended particles under 10 um in size.

The system has two basic units: the analyzer and the pump. A separate sample intake connects directly to the analyzer. Oversize particles are filtered out by impactor or cyclone filtration.

Ambient air is pumped in at a constant flow rate for a predetermined time. A glass-fiber filter tape collects the air-suspended particles.

The beta source is sealed carbon-14, under 100 microcuries. No special license is required to use the system.

The plastic-scintillator detector gives long-term operation at low maintenance cost.

Principle

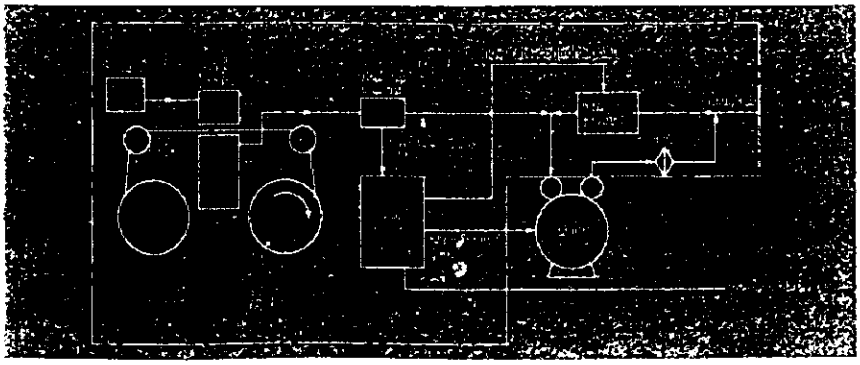
Beta ray absorption

Absorption of beta rays passing through matter depends upon the mass of the matter. Sample at a constant flow rate is passed through the monitor during the measurement cycle and the particulates are captured at a spot on the tape. The intensity of the beta rays after they have passed through the particulates on the tape is measured by a plastic scintillator. The tape background is also measured for each cycle. These data are processed by an integral microprocessor to give the concentration of particulates in the ambient air. The flow regulator keeps the sample flow constant.
(The tape may be used for one full month.)

Specifications

Principle: Beta ray absorption
Application: Suspended particulate matter (SPM) in ambient air (up to 10 μm)
Range: 0-0.25/0.5/1.0/5.0 mg/m³
Measurement cycle: 30 min/1/3/12/24 h, switch selectable
Accuracy (60-minute measurement): ±10 μg/m³ or ±10% of reading, whichever is greater
Beta source: Sealed ^{14}C, 100 uCi or less
Detector: Plastic scintillator
Sample tape: Rolled glass fiber, 21 m/roll
Sample flow: 16.7 ℓ/min, regulated
Data display: Time, flowrate and mg/m³, switch selectable
Printer: Separate unit (optional)
Indication: Measured value, range, alarm, maintenance screen
Alarms: Out-of-paper error, count error, flow-rate error, etc.
On-screen messages are available in four languages: English, German, French, and Japanese.
Input/output:
- 0-1 V/0-10 V/4-20mA
- Contact input/output

Ambient temperature: 0-40°C
Power: 100/115/230 VAC, 50/60 Hz (to be specified)
Dimensions: 430 w × 310 h × 400 d mm 16.9 w × 12.2 h × 15.8 d in
Weight: Approx. 19 kg, 42 lbs



Appendix 6-5

Settled Dust Data Sheet

Tabriz

Sample No. is	Sampling location	Start date is on the	Finish date is on the	Total days	Weight (mg)	t/km2/m	V INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M	Ni INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M	Pb INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M	Zn INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M
TSD-1	Baranloo	1998/2/3	1998/2/28	25	37.8	0.764	0.467	0.947	1.414	1.080	0.181	0.049	0.230	0.176	0.054	-	0.054	0.041	1.200	0.701	1.901	1.453
T-8	Baranloo	1998/2/28	1998/3/25	25	223.8	4.524	0.155	0.150	0.305	1.380	1.018	0.042	1.060	4.795	0.704	0.060	0.764	3.456	9.200	1.509	10.709	48.446
T-16	Baranloo	1998/3/25	1998/4/29	35	352.6	5.091	0.150	0.152	0.302	1.537	0.890	0.020	0.910	4.633	0.966	0.042	1.008	5.132	31.400	0.398	31.798	161.883
T-25	Baranloo	1998/4/29	1998/5/31	32	360.3	5.690	0.149	0.120	0.269	1.531	1.097	-	1.097	6.242	1.059	0.024	1.083	6.162	8.470	1.373	9.843	56.005
T-37	Baranloo	1998/5/31	1998/6/26	26	272.5	5.296	0.142	0.150	0.292	1.547	0.875	0.025	0.900	4.767	0.920	0.037	0.957	5.069	30.200	0.782	30.982	164.093
T-42	Baranloo	1998/6/26	1998/7/28	32	558.2	8.815	0.012	0.017	0.029	0.251	0.048	0.016	0.064	0.563	0.072	0.014	0.085	0.751	0.446	0.334	0.779	6.869
T-52	Baranloo	1998/7/28	1998/8/26	29	453.1	7.896	0.004	0.005	0.009	0.071	0.020	0.005	0.025	0.193	0.015	0.005	0.020	0.156	0.436	0.050	0.486	3.839
T-70	Baranloo	1998/9/21	1998/10/19	28	343.0	6.190	0.013	0.009	0.022	0.136	0.102	0.003	0.105	0.648	0.066	0.003	0.069	0.429	1.099	0.102	1.201	7.435
T-82	Baranloo	1998/10/19	1998/11/15	27	340.0	6.364	0.018	0.012	0.030	0.188	0.111	0.005	0.116	0.738	0.077	0.002	0.079	0.504	1.102	0.178	1.280	8.145
T-91	Baranloo	1998/11/15	1998/12/15	30	224.5	3.782	0.019	0.006	0.025	0.096	0.142	0.002	0.144	0.545	0.098	0.004	0.103	0.388	1.312	0.077	1.389	5.253
TSD-2	Mayan	1998/2/3	1998/2/28	25	43.9	0.887	0.329	0.145	0.474	0.421	0.037	0.017	0.054	0.048	0.022	0.012	0.034	0.030	0.308	0.535	0.843	0.748
T-9	Mayan	1998/2/28	1998/3/25	25	403.8	8.162	0.160	0.148	0.308	2.514	0.380	0.046	0.426	3.477	0.686	0.028	0.714	5.828	2.480	0.457	2.937	23.973
T-17	Mayan	1998/3/25	1998/4/29	35	647.0	9.342	0.157	0.148	0.305	2.849	0.510	0.010	0.520	4.858	1.203	0.038	1.241	11.593	136.800	0.559	137.359	1,283.156
T-26	Mayan	1998/4/29	1998/5/31	32	573.3	9.054	0.157	0.118	0.275	2.490	0.911	0.059	0.970	8.782	3.500	0.048	3.548	32.122	800.250	0.666	800.916	7,251.121
T-38	Mayan	1998/5/31	1998/6/26	26	204.9	3.982	0.160	0.172	0.332	1.322	0.495	0.047	0.542	2.159	1.150	0.072	1.222	4.867	135.900	0.882	136.782	544.733
T-43	Mayan	1998/6/26	1998/7/28	32	425.4	6.718	0.001	0.014	0.016	0.104	0.013	0.006	0.019	0.128	0.016	0.013	0.029	0.193	0.414	0.073	0.488	3.276
T-53	Mayan	1998/7/28	1998/8/26	29	572.6	9.978	0.000	0.012	0.012	0.122	0.019	0.003	0.022	0.220	0.020	0.006	0.026	0.257	0.384	0.057	0.441	4.396
T-71	Mayan	1998/9/21	1998/10/19	28	236.8	4.274	0.015	0.007	0.021	0.091	0.112	0.003	0.115	0.492	0.069	0.004	0.073	0.312	1.122	0.099	1.221	5.218
T-83	Mayan	1998/10/19	1998/11/15	27	220.6	4.129	0.017	0.010	0.027	0.111	0.050	0.001	0.051	0.210	0.177	0.001	0.178	0.734	1.267	0.022	1.289	5.323
T-92	Mayan	1998/11/15	1998/12/15	30	165.2	2.783	0.019	0.012	0.031	0.087	0.057	0.005	0.062	0.172	0.187	0.007	0.193	0.538	1.450	0.098	1.548	4.308
TSD-3	Qaramalek	1998/2/7	1998/2/28	21	246.5	5.932	0.118	0.224	0.342	2.029	0.012	0.039	0.051	0.303	0.148	0.216	0.364	2.159	0.545	0.662	1.207	7.160
T-7	Qaramalek	1998/2/28	1998/3/25	25	245.3	4.958	0.140	0.145	0.285	1.413	0.455	0.025	0.480	2.380	1.882	0.013	1.895	9.396	9.500	0.476	9.976	49.465
T-18	Qaramalek	1998/3/25	1998/4/29	35	269.8	3.895	0.167	0.145	0.312	1.215	0.442	0.061	0.503	1.959	2.216	0.048	2.264	8.819	130.200	0.261	130.461	508.207
T-27	Qaramalek	1998/4/29	1998/5/31	32	369.4	5.834	0.162	0.121	0.283	1.651	0.658	0.044	0.702	4.095	1.960	0.042	2.002	11.679	43.600	0.663	44.263	258.211
T-39	Qaramalek	1998/5/31	1998/6/26	26	222.2	4.319	0.172	0.132	0.304	1.313	0.435	0.055	0.490	2.116	2.150	0.037	2.187	9.445	131.100	0.775	131.875	569.534
T-44	Qaramalek	1998/6/26	1998/7/28	32	559.2	8.831	0.002	0.012	0.014	0.123	0.015	0.004	0.018	0.162	0.022	0.005	0.027	0.236	0.432	0.022	0.454	4.006
T-54	Qaramalek	1998/7/28	1998/8/26	29	283.5	4.940	0.002	0.014	0.015	0.074	0.013	0.001	0.015	0.072	0.028	0.006	0.034	0.168	0.481	0.092	0.573	2.830
T-72	Qaramalek	1998/9/21	1998/10/19	28	390.0	7.039	0.016	0.006	0.022	0.156	0.080	0.003	0.083	0.583	0.102	0.003	0.105	0.740	0.768	0.089	0.857	6.032
T-84	Qaramalek	1998/10/19	1998/11/15	27	242.7	4.542	0.016	0.011	0.027	0.124	0.084	0.001	0.085	0.384	0.122	0.003	0.125	0.566	0.877	0.043	0.920	4.177
T-93	Qaramalek	1998/11/15	1998/12/15	30	169.8	2.860	0.019	0.000	0.019	0.054	0.113	0.000	0.113	0.322	0.156	0.000	0.156	0.447	1.322	0.006	1.328	3.798

Esfahan

Sample No. is	Sampling location	Start date is on the	Finish date is on the	Total days	Weight (mg)	t/km2/m	V INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M	Ni INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M	Pb INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M	Zn INS mg/kg	SOL mg/kg	total mg/kg	g/km2/M
ESD-1	Golshahr	1998/2/8	1998/2/23	15	37.4	1.260	0.382	0.147	0.529	0.667	0.023	-	0.023	0.029	0.666	0.042	0.708	0.892	1.322	0.490	1.812	2.283
E-503	Golshahr	1998/2/23	1998/3/26	31	72.4	1.180	0.119	0.055	0.174	0.205	0.240	0.031	0.271	0.320	1.357	0.029	1.386	1.636	15.090	0.077	15.167	17.900
E-513	Golshahr	1998/3/26	1998/4/25	30	95.0	1.600	0.155	0.015	0.170	0.272	0.304	0.048	0.352	0.563	1.151	0.010	1.161	1.858	15.520	0.331	15.851	25.366
E-524	Golshahr	1998/4/25	1998/5/25	30	39.8	0.670	0.159	0.007	0.166	0.111	0.236	0.078	0.314	0.211	0.557	0.155	0.712	0.477	10.580	1.916	12.496	8.378
E-537	Golshahr	1998/5/25	1998/6/27	33	734.5	11.248	0.165	0.012	0.177	1.991	0.252	0.045	0.297	3.341	0.625	0.012	0.637	7.165	12.220	0.325	12.545	141.103
E-546	Golshahr	1998/6/27	1998/7/30	33	181.0	2.772	0.001	0.004	0.005	0.013	0.012	0.005	0.017	0.048	0.088	0.006	0.094	0.261	0.136	0.004	0.141	0.390
E-556	Golshahr	1998/9/1	1998/9/30	29	426.1	7.425	0.010	0.001	0.011	0.082	0.012	0.002	0.014	0.101	0.111	0.006	0.117	0.871	1.297	0.004	1.301	9.658
E-568	Golshahr	1998/9/27	1998/10/27	30	220.0	3.706	0.011	0.003	0.014	0.053	0.023	0.002	0.025	0.093	0.112	0.003	0.115	0.425	1.344	0.007	1.351	5.005
E-577	Golshahr	1998/10/27	1998/11/27	31	238.5	3.888	0.013	0.007	0.020	0.078	0.029	0.004	0.033	0.129	0.167	0.004	0.171	0.664	1.720	0.009	1.729	6.723
E-586	Golshahr	1998/11/27	1998/12/26	29	148.0	2.579	0.013	0.006	0.019	0.049	0.028	0.004	0.032	0.082	0.147	0.004	0.151	0.390	1.667	0.009	1.676	4.322
ESD-2	Kaveh	1998/2/8	1998/2/23	15	248.5	8.372	0.125	0.171	0.296	2.478	0.015	-	0.015	0.126	0.058	0.054	0.112	0.938	0.391	0.159	0.550	4.605
E-505	Kaveh	1998/2/23	1998/3/26	31	107.9	1.759	0.168	0.012	0.180	0.317	0.356	0.057	0.413	0.726	1.294	0.060	1.354	2.382	12.340	0.019	12.359	21.738
E-515	Kaveh	1998/3/26	1998/4/25	30	142.4	2.399	0.170	0.018	0.188	0.451	0.270	0.037	0.307	0.736	1.132	0.056	1.188	2.850	8.020	0.043	8.063	19.340
E-526	Kaveh	1998/4/25	1998/5/25	30	128.2	2.159	0.168	0.018	0.186	0.402	0.365	0.020	0.385	0.831	0.919	0.064	0.983	2.123	10.860	0.057	10.917	23.575
E-538	Kaveh	1998/5/25	1998/6/27	33	47.8	0.732	0.165	0.012	0.177	0.130	0.275	0.022	0.297	0.217	1.250	0.047	1.297	0.949	9.150	0.033	9.183	6.721
E-547	Kaveh	1998/6/27	1998/7/30	33	262.1	4.014	0.002	0.002	0.004	0.016	0.020	0.003	0.023	0.093	0.046	0.003	0.049	0.197	0.434	0.015	0.449	1.803
E-557	Kaveh	1998/9/1	1998/9/30	29	435.2	7.584	0.011	0.001	0.012	0.093	0.021	0.002	0.023	0.177	0.132	0.007	0.139	1.050	1.436	0.004	1.440	10.920
E-569	Kaveh	1998/9/27	1998/10/27	30	33.9	0.571	0.021	0.002	0.023	0.013	0.030	0.003	0.033	0.019	0.011	0.007	0.017	0.010	1.247	0.003	1.250	0.714
E-578	Kaveh	1998/10/27	1998/11/27	31	276.5	4.507	0.022	0.002	0.024	0.107	0.042	0.007	0.049	0.219	0.144	0.007	0.151	0.682	1.437	0.003	1.440	6.488
E-587	Kaveh	1998/11/27	1998/12/26	29	34.1	0.594	0.023	0.002	0.025	0.015	0.039	0.005	0.044	0.026	0.126	0.008	0.134	0.080	1.549	0.003	1.552	0.922
ESD-3	Shariati	1998/2/8	1998/2/23	15	99.4	3.349	0.500	0.072	0.572	1.915	0.092	0.013	0.105	0.352	0.710	0.012	0.722	2.418	2.352	0.200	2.552	8.546
E-504	Shariati	1998/2/23	1998/3/26	31	109.6	1.787	0.170	0.070	0.240	0.429	0.435	0.069	0.504	0.900	3.202	0.046	3.248	5.803	14.080	0.344	14.424	25.770
E-514	Shariati	1998/3/26	1998/4/25	30	92.3	1.555	0.129	0.058	0.187	0.291	0.286	0.053	0.339	0.527	1.437	0.065	1.502	2.335	14.330	0.481	14.811	23.028
E-525	Shariati	1998/4/25	1998/5/25	30	96.1	1.619	0.192	0.012	0.204	0.330	0.368	-	0.368	0.596	0.875	0.050	0.925	1.497	12.150	0.061	12.211	19.767
E-539	Shariati	1998/5/25	1998/6/27	33	148.7	2.277	0.115	0.048	0.163	0.371	0.270	0.055	0.325	0.740	1.720	0.072	1.792	4.081	15.450	0.325	15.775	35.921
E-548	Shariati	1998/6/27	1998/7/30	33	413.0	6.324	0.001	0.017	0.018	0.114	0.030	0.011	0.041	0.258	0.163	0.008	0.170	1.077	0.399	0.025	0.425	2.685
E-558	Shariati	1998/9/1	1998/9/30	29	273.9	4.773	0.021	0.002	0.023	0.111	0.056	0.003	0.059	0.284	0.431	0.008	0.439	2.094	1.612	0.007	1.619	7.725
E-570	Shariati	1998/9/27	1998/10/27	30	50.5	0.851	0.021	0.001	0.022	0.019	0.006	0.002	0.008	0.007	0.107	0.004	0.111	0.095	1.422	0.001	1.423	1.211
E-579	Shariati	1998/10/27	1998/11/27	31	186.2	3.035	0.025	0.007	0.032	0.098	0.056	0.007	0.063	0.190	0.480	0.008	0.488	1.482	1.905	0.057	1.962	5.956
E-588	Shariati	1998/11/27	1998/12/26	29	76.7	1.337	0.027	0.006	0.033	0.044	0.061	0.006	0.067	0.090	0.467	0.009	0.476	0.636	1.877	0.062	1.939	2.592

Appendix 6-6

Result of bag sampling at Qaemich (summer,1998)

Date	Time	SO2 (ppm)	NO (ppm)	NO2 (ppm)	NOx (ppm)	WD	WS (m/s)	Temp. (℃)
6/30	15	0.0009	0.0000	0.0047	0.0047	E	3.0	35
	16	0.0007	0.0000	0.0039	0.0039	ESE	3.6	35
	17	0.0006	0.0000	0.0032	0.0032	E	3.7	35
	18	0.0006	0.0000	0.0043	0.0043	ESE	3.6	34
	19	0.0006	0.0000	0.0061	0.0061	ESE	4.0	33
	20※	0.0007	0.0002	0.0086	0.0090	ESE	4.6	32
	21※	0.0007	0.0004	0.0134	0.0138	ESE	3.9	31
	22※	0.0009	0.0000	0.0104	0.0105	ESE	4.6	30
	23	0.0006	0.0000	0.0132	0.0132	ESE	4.9	30
	24	0.0003	0.0005	0.0029	0.0034	ESE	5.2	29
7/1	1	0.0003	0.0004	0.0017	0.0021	ESE	3.4	28
	2	0.0001	0.0005	0.0021	0.0026	ESE	3.0	28
	3	0.0002	0.0000	0.0018	0.0018	WSW	1.4	23
	4	0.0004	0.0001	0.0025	0.0026	SW	1.0	19
	5	0.0003	0.0004	0.0025	0.0029	NNW	1.6	19
	6	0.0003	0.0009	0.0044	0.0052	N	1.0	19
	7	0.0002	0.0000	0.0044	0.0044	WSW	0.4	20
	8	0.0016	0.0020	0.0148	0.0169	SW	1.5	24
	9	0.0021	0.0021	0.0157	0.0178	WNW	2.5	26
	10	0.0008	0.0008	0.0087	0.0095	W	1.6	29
	11	0.0005	0.0002	0.0066	0.0068	WNW	2.4	30
	12	0.0023	0.0003	0.0075	0.0078	NW	1.5	31
	13	0.0032	0.0004	0.0146	0.0150	NW	1.9	33
	14	0.0058	0.0004	0.0124	0.0128	NW	1.6	34

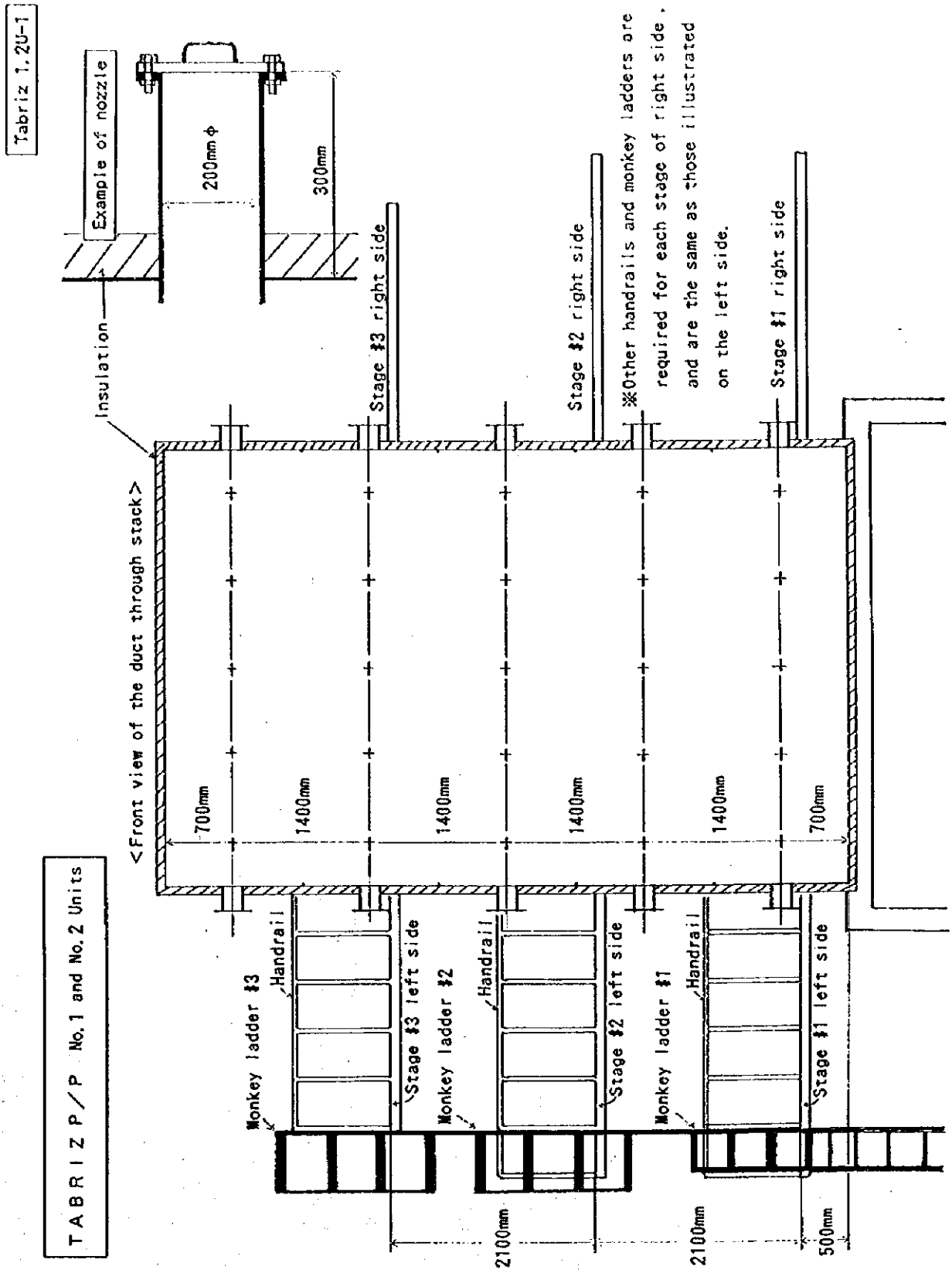
※ samples collected down the hill (behind the school) where more down-wash takes place.

All other samples are collected within 1000m down the school (almost center of village).

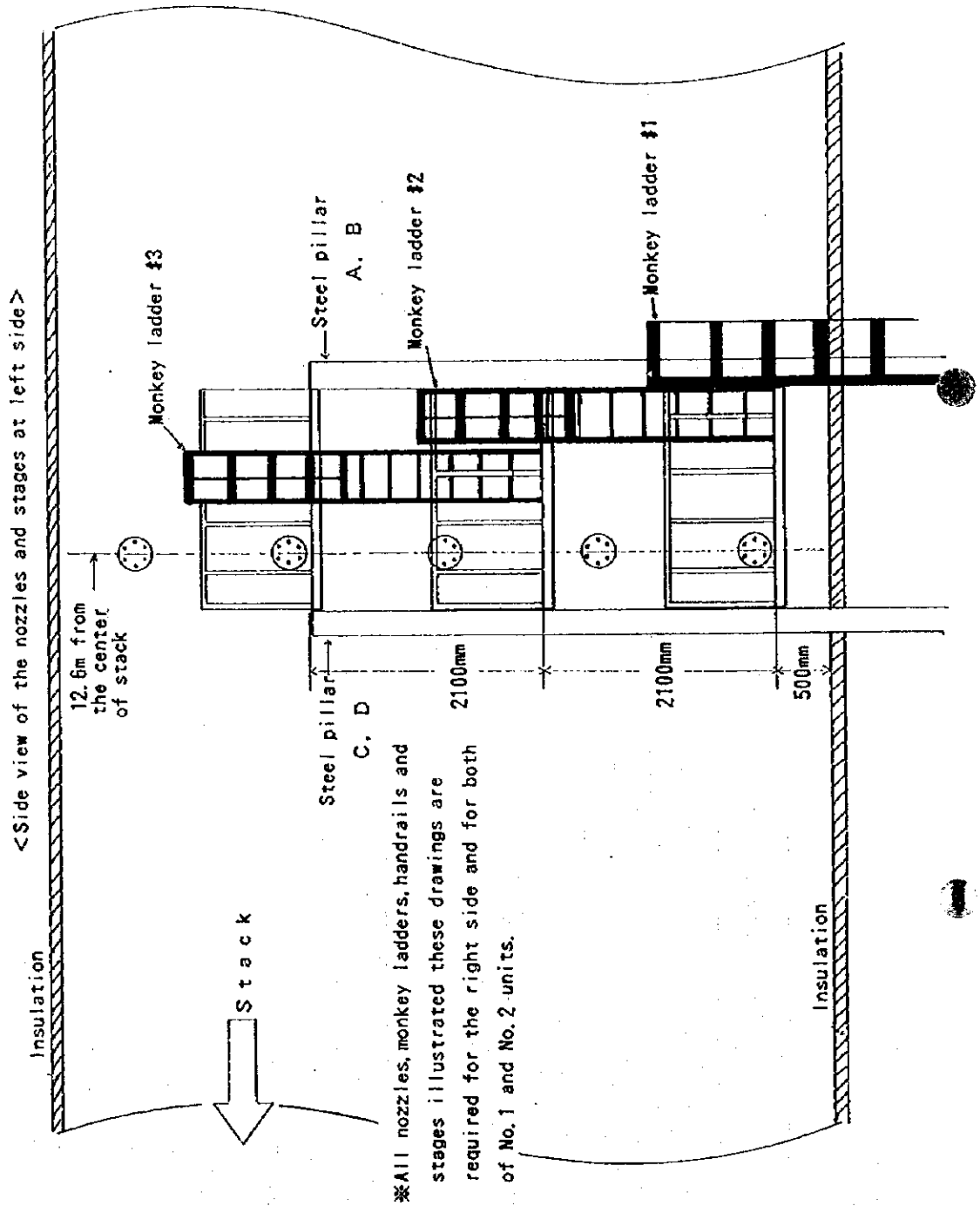
WD: Wind Direction WS: Wind Speed TEP.: Temperature

Result of bag sampling at Qaemich (winter,1999)

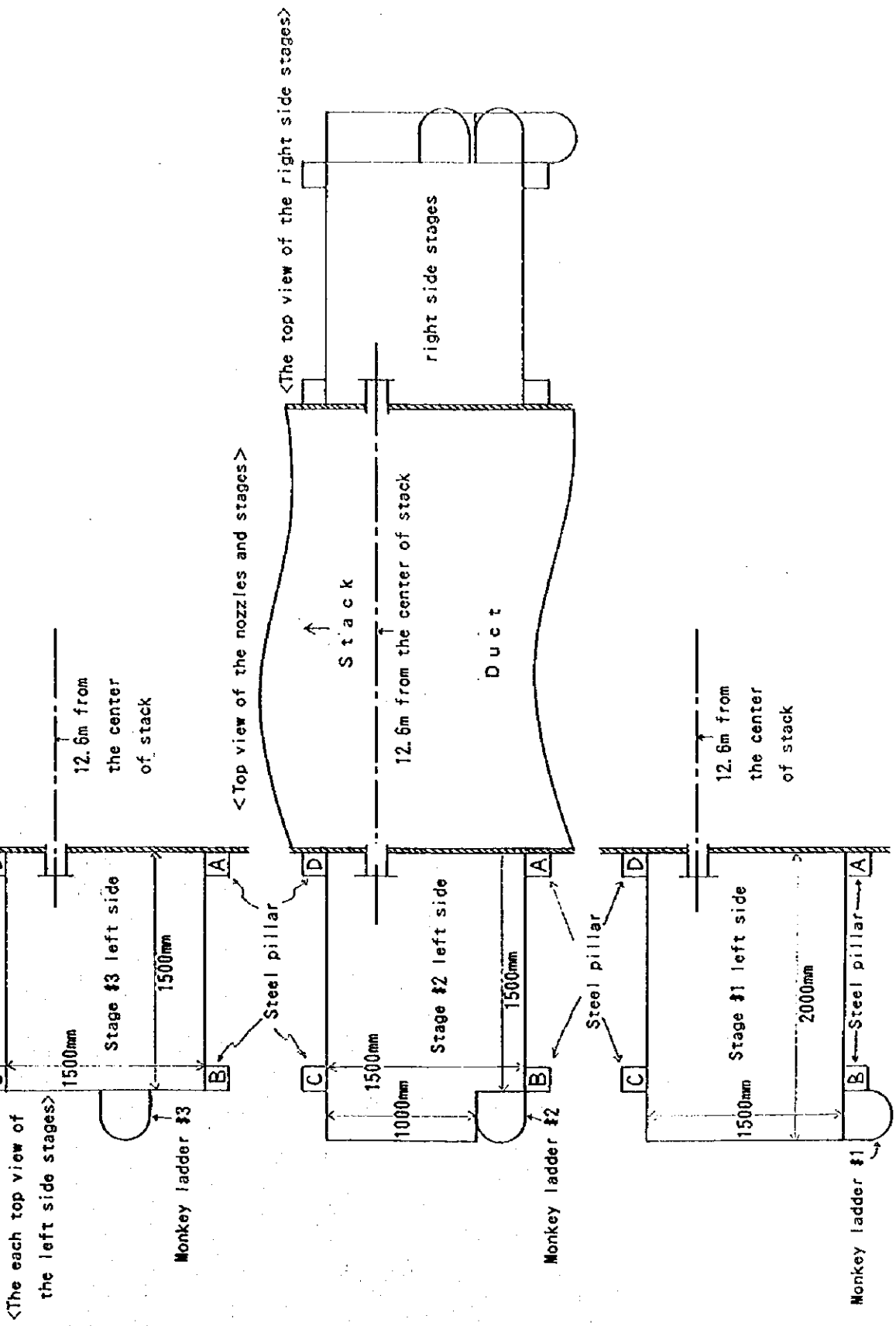
Date	Time	SO2 (ppm)	NO (ppm)	NO2 (ppm)	NOx (ppm)	WD	WS (m/s)	Temp. (℃)
1/25	15	0.0050	0.0003	0.0151	0.0154	N	3.3	4.6
	16	0.0040	0.0004	0.0180	0.0183	N	3.5	4.3
	17	0.0041	0.0003	0.0262	0.0267	N	3.1	3.7
	18	0.0044	0.0064	0.0356	0.0421	NNE	3.5	2.6
	19	0.0028	0.0012	0.0328	0.0340	NNE	3.8	2.2
	20	0.0045	0.0314	0.0349	0.0661	NNE	3.6	2.1
	21	0.0033	0.0170	0.0311	0.0329	N	2.9	1.5
	22	0.0058	0.0080	0.0360	0.0440	NNE	2.9	1.4
	23	0.0024	0.0040	0.0279	0.0320	S	1.4	1.3
	24	0.0031	0.0152	0.0253	0.0406	NNW	0.7	1.0
1/26	1	0.0046	0.0023	0.0302	0.0324	NNE	1.0	1.5
	2	0.0047	0.0017	0.0291	0.0308	N	1.4	0.7
	3	0.0040	0.0013	0.0274	0.0287	N	1.8	0.3
	4	0.0032	0.0013	0.0264	0.0275	NNE	3.2	0.1
	5	0.0039	0.0036	0.0321	0.0357	NNE	3.3	0.0
	6	0.0011	0.0111	0.0138	0.0249	N	2.5	0.1
	7	0.0011	0.0038	0.0187	0.0225	W	0.5	-0.1
	8	0.0021	0.0052	0.0313	0.0365	WNW	0.75	-1.0
	9	0.0023	0.0026	0.0217	0.0243	SW	0.7	-0.6
	10	0.0030	0.0042	0.0275	0.0315	WSW	1.6	2.2
	11	0.0041	0.0020	0.0210	0.0227	SSW	1.6	3.5
	12	0.0018	0.0010	0.0161	0.0169	WNW	2.0	4.0
	13	0.0018	0.0055	0.0250	0.0306	W	2.9	5.0
	14	0.0017	0.0014	0.0162	0.0175	NW	3.0	6.2


Tabriz 1, 2U-1
Example of nozzle
200mmΦ
300mm
Insulation
Stage #3 right side
Stage #2 right side
※Other handrails and monkey ladders are required for each stage of right side, and are the same as those illustrated on the left side.
Stage #1 right side
<Front view of the duct through stack>
700mm
1400mm
1400mm
1400mm
1400mm
700mm
Handrail
Monkey ladder #3
Stage #3 left side
Handrail
Monkey ladder #2
Stage #2 left side
Handrail
Monkey ladder #1
Stage #1 left side
2100mm
2100mm
500mm
TABRIZ P/P No.1 and No.2 Units

Tabriz 1, 2U-2

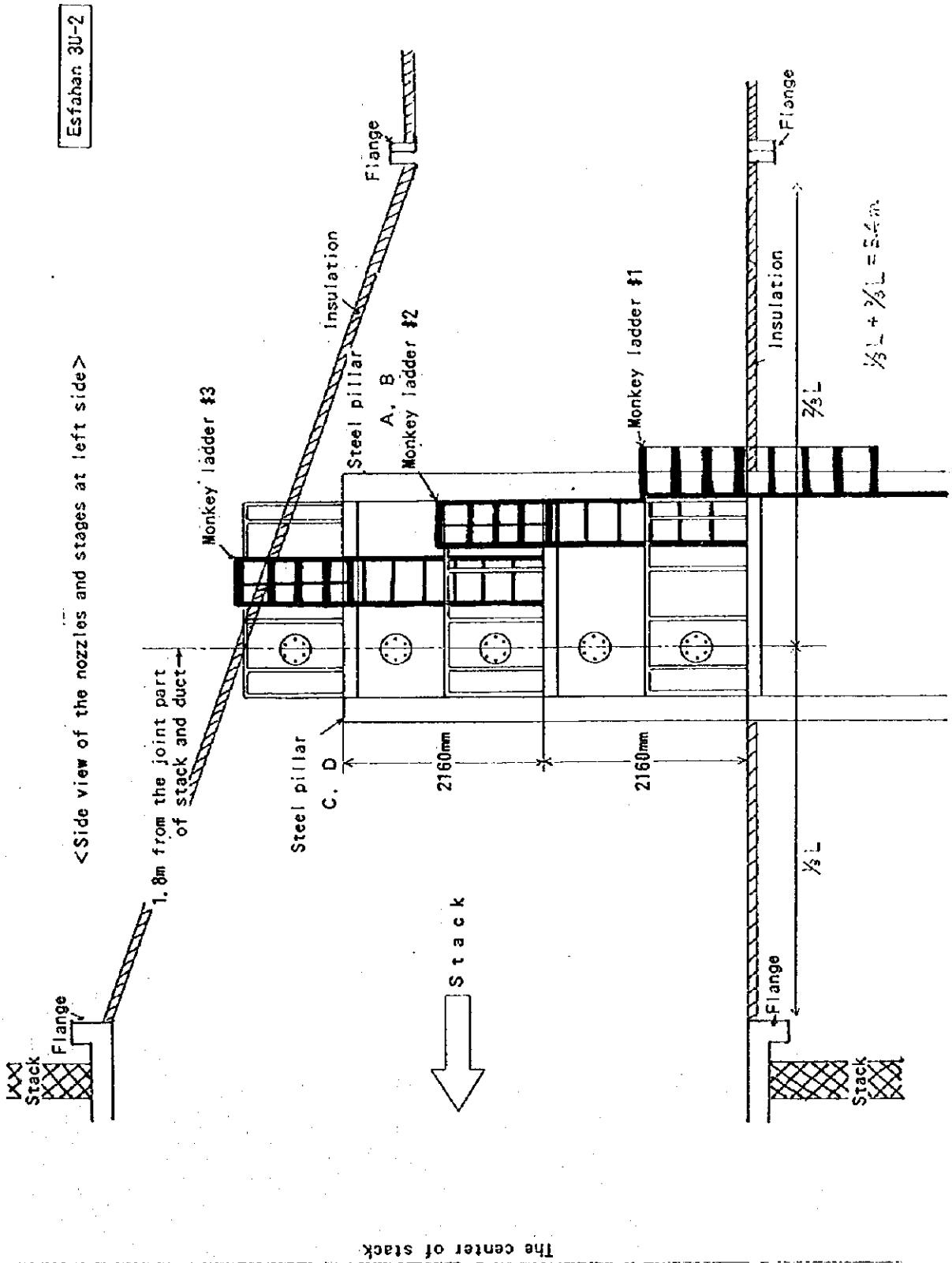

<Side view of the nozzles and stages at left side>
Insulation
12.6m from the center of stack
Monkey ladder #3
Steel pillar A, B
Monkey ladder #2
Monkey ladder #1
Steel pillar C, D
2100mm
2100mm
500mm
Stack
Insulation
※All nozzles, monkey ladders, handrails and stages illustrated these drawings are required for the right side and for both of No.1 and No.2 units.

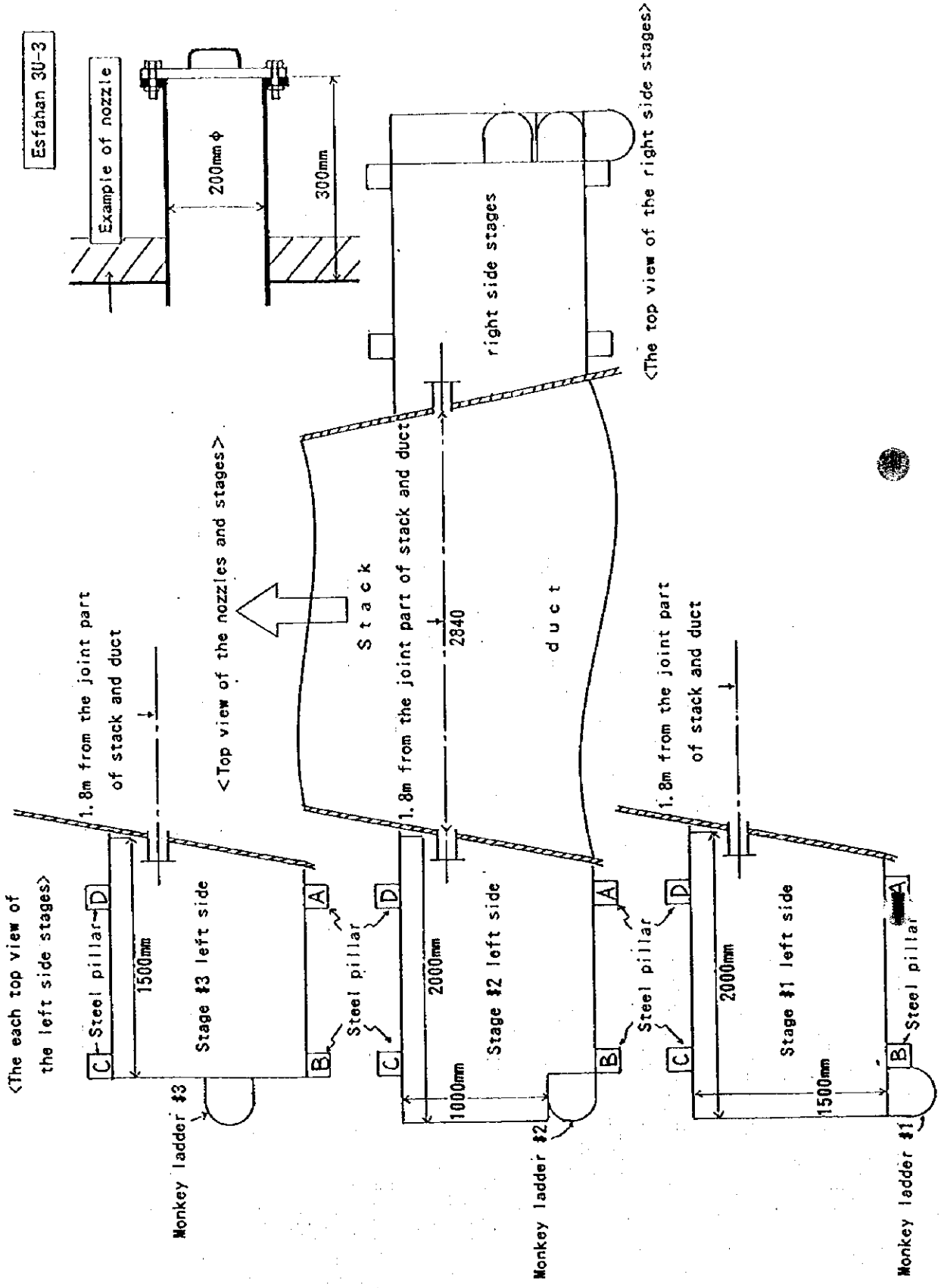
Tabriz 1, 2U-3


<The top view of the right side stages>
right side stages
<Top view of the nozzles and stages>
Stack
12.6m from the center of stack
Duct
12.6m from the center of stack
12.6m from the center of stack
Steel pillar
Steel pillar
Steel pillar
Steel pillar
Stage #3 left side
Stage #2 left side
Stage #1 left side
1500mm
1500mm
1500mm
1500mm
1000mm
1500mm
2000mm
A
B
C
D
Monkey ladder #3
Monkey ladder #2
Monkey ladder #1
<The each top view of the left side stages>

Esfahan 3U-1

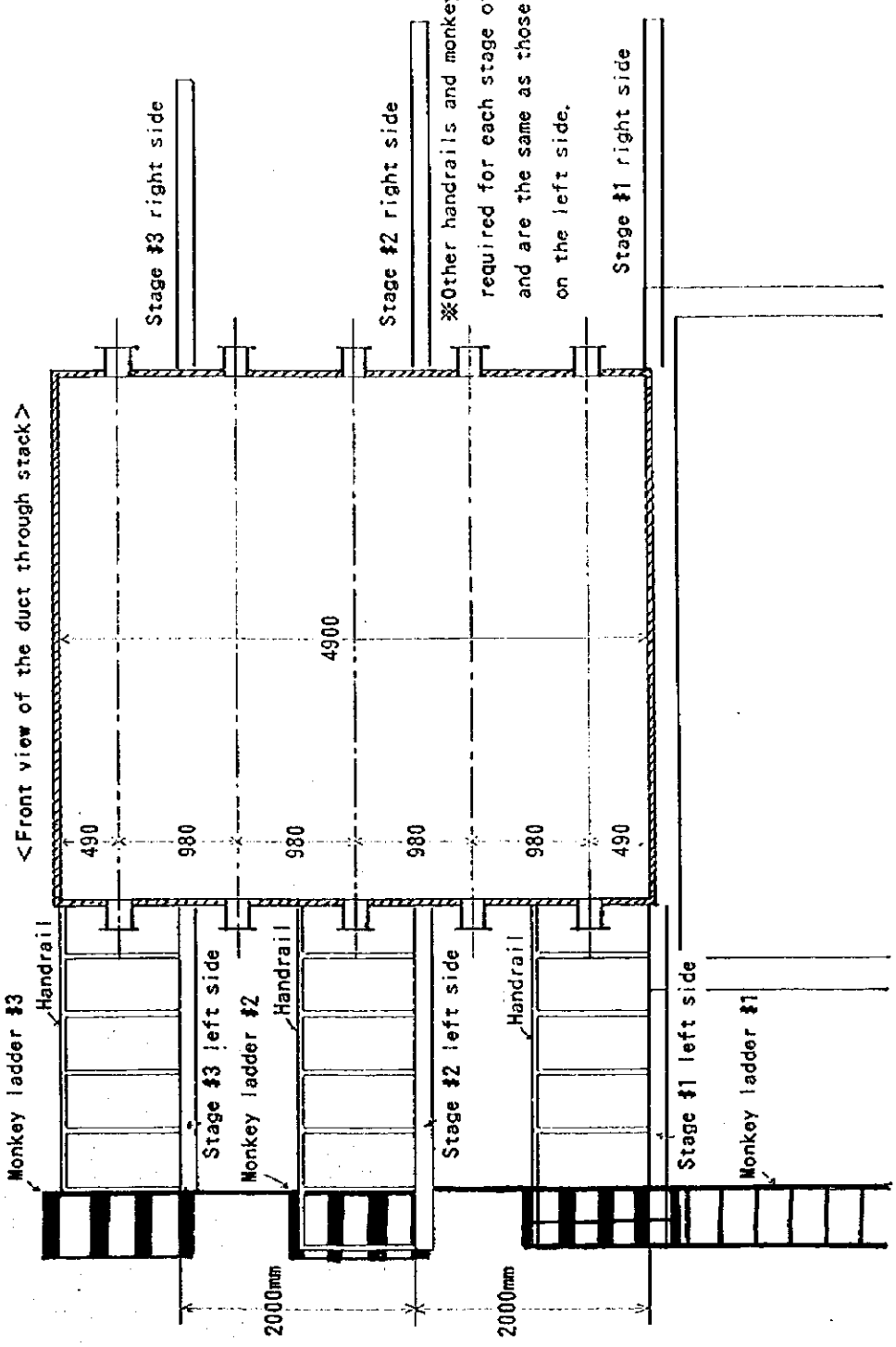
ESFAHAN P/P No.3 Units


Esfahan 3U-2
<Side view of the nozzles and stages at left side>
1.8m from the joint part of stack and duct
Flange
Stack
Steel pillar
C, D
Monkey ladder #3
Insulation
Flange
Steel pillar
A, B
Monkey ladder #2
2160mm
Monkey ladder #1
2160mm
Insulation
Flange
Stack
Stack
The center of stack

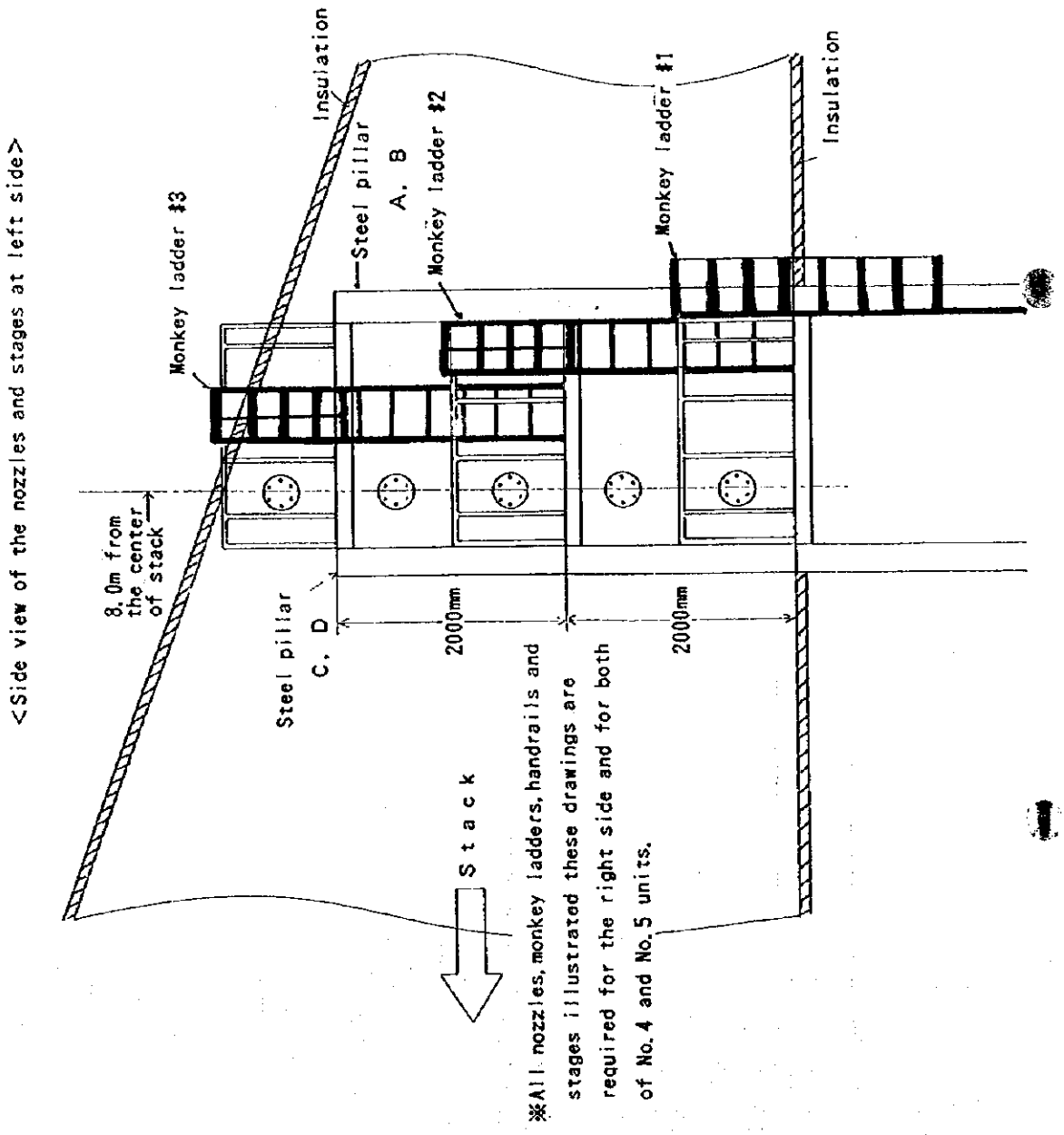

Esfahan 3U-3
Example of nozzle
200mm φ
300mm
<The top view of the right side stages>
right side stages
<Top view of the nozzles and stages>
S t a c k
d u c t
1.8m from the joint part of stack and duct
2840
1.8m from the joint part of stack and duct
1.8m from the joint part of stack and duct
<The each top view of the left side stages>
Steel pillar
Steel pillar
Steel pillar
Steel pillar
1500mm
2000mm
2000mm
1500mm
1000mm
Stage #3 left side
Stage #2 left side
Stage #1 left side
Monkey ladder #3
Monkey ladder #2
Monkey ladder #1
A
B
C
D

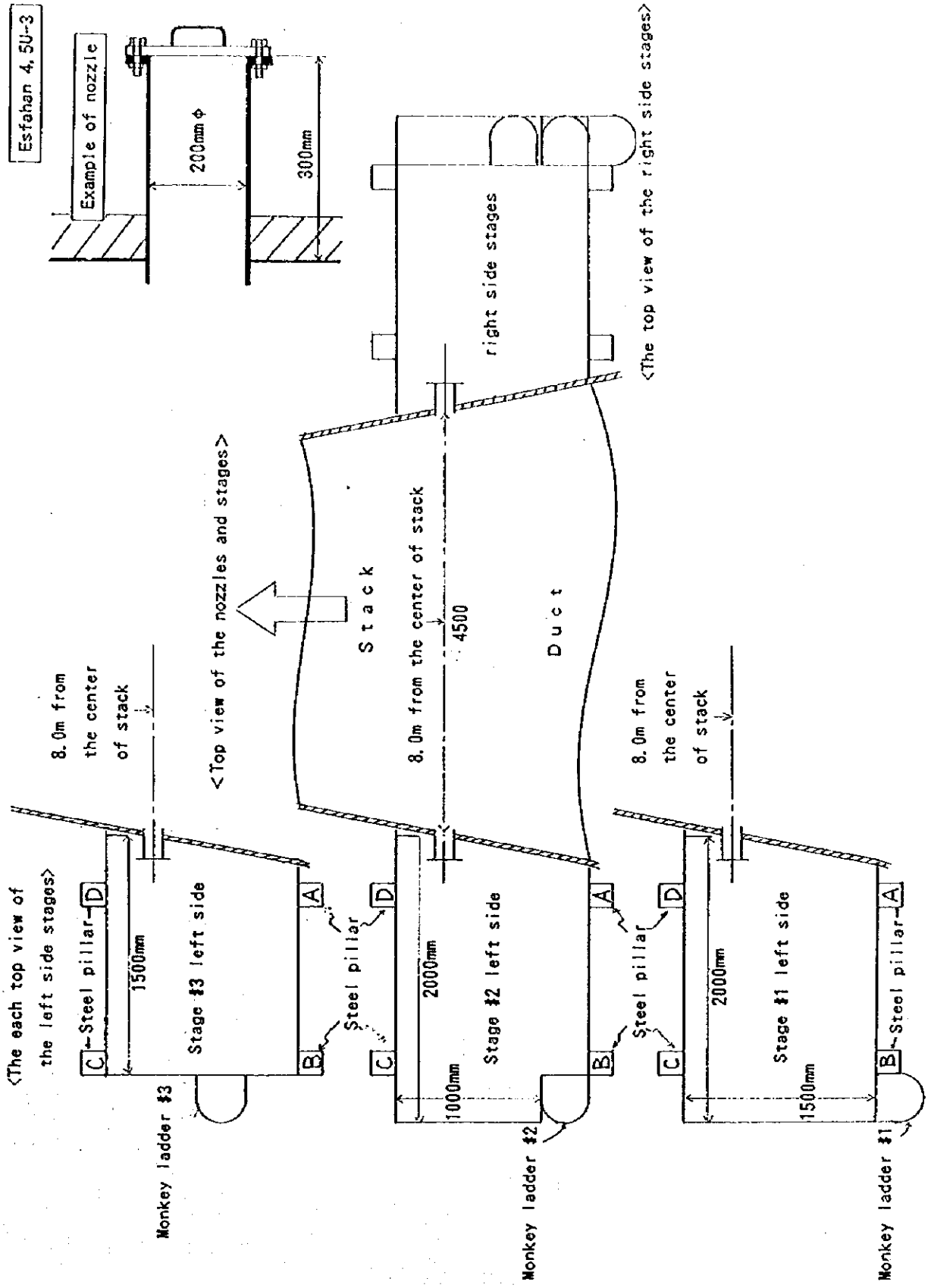
Esfahan 4, SU-1

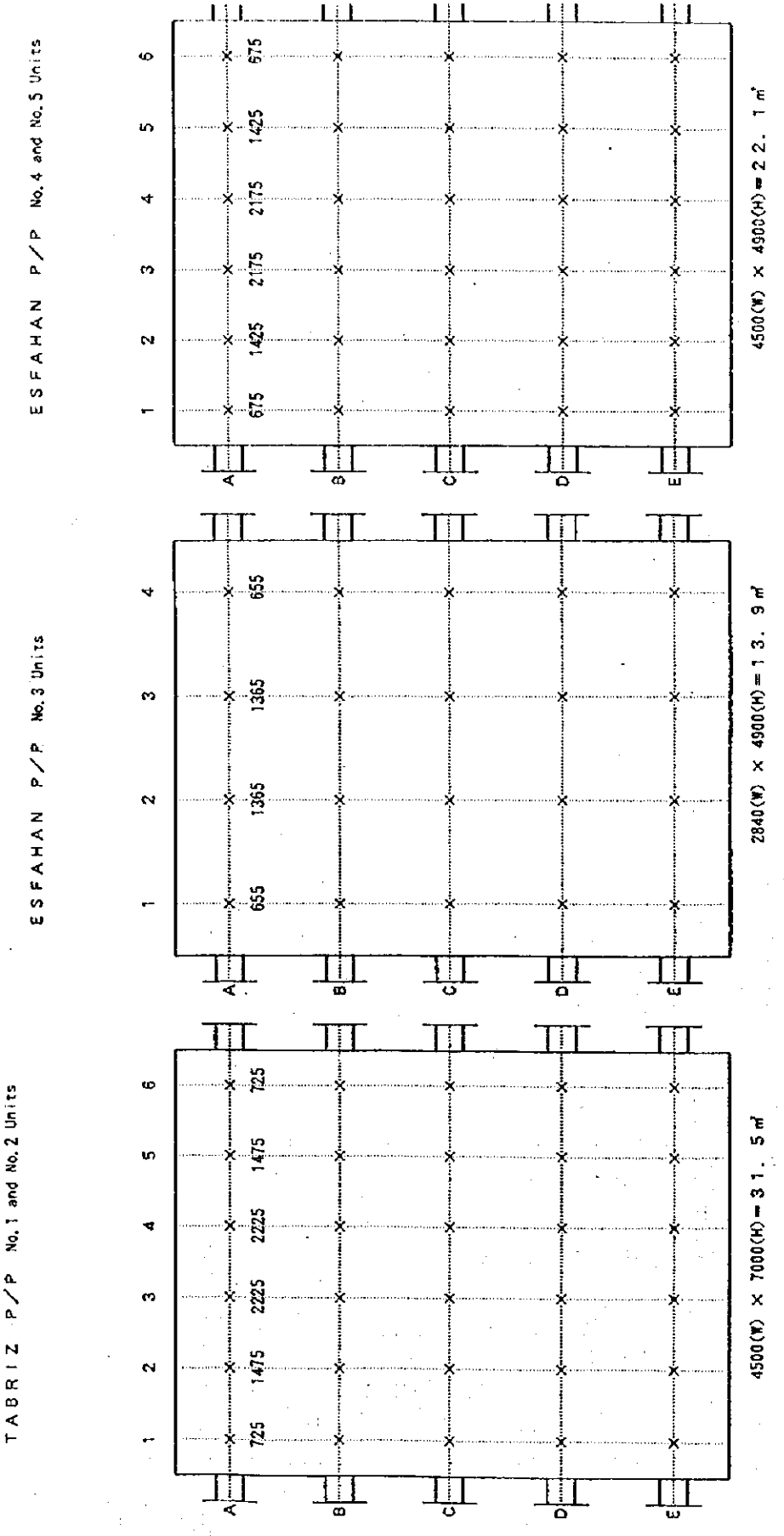
ESFAHAN P/P No. 4 and No. 5 Units



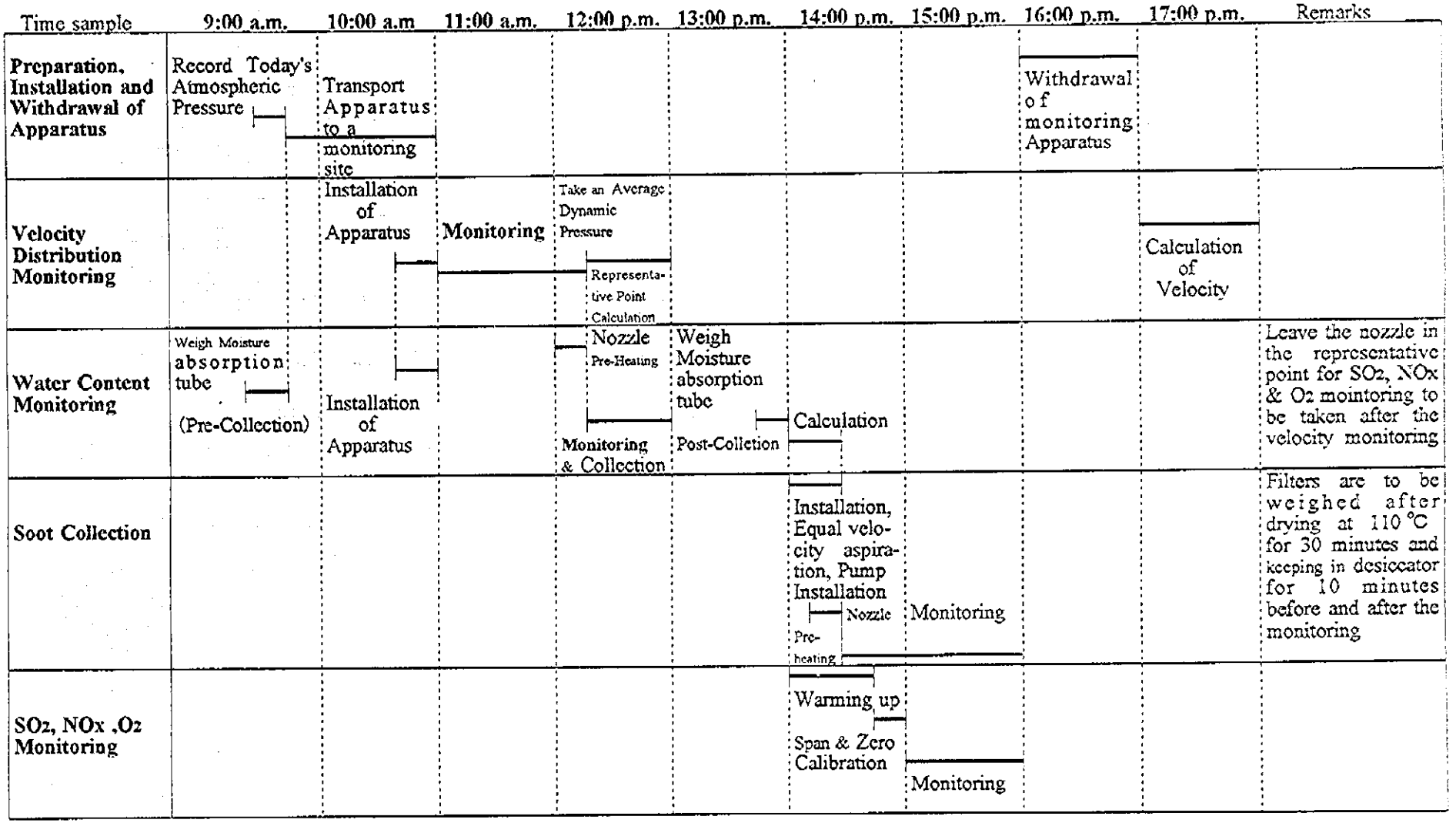
Esfahan 4, SU-2




Esfahan 4, 5U-3
Example of nozzle
200mmφ
300mm
<The top view of the right side stages>
right side stages
<Top view of the nozzles and stages>
Stack
Duct
8.0m from the center of stack
4500
8.0m from the center of stack
8.0m from the center of stack
<The each top view of the left side stages>
Steel pillar
1500mm
Stage #3 left side
Steel pillar
2000mm
Stage #2 left side
Steel pillar
2000mm
Stage #1 left side
1000mm
1500mm
Monkey ladder #3
Monkey ladder #2
Monkey ladder #1


TABRIZ P/P No.1 and No.2 Units
4500(W) × 7000(H) = 31.5㎡
ESFAHAN P/P No.3 Units
2840(W) × 4900(H) = 13.9㎡
ESFAHAN P/P No.4 and No.5 Units
4500(W) × 4900(H) = 22.1㎡

Stack Gas Monitoring Process Model



Stack Gas Monitoring Results for Unit 1 & 2 at Tabriz Power Plant

Unit (Rated Capacity : MWe)		Unit 1 (350)							Unit 2 (350)
Date		Feb.1 '98	June 18, '98	June 20,'98	June 21 '98	June 22 '98	Aug. 8 '98	Oct. 27 '98	Jan.4,'99
Time		10:00-16:00	12:10-12:40	10:20-15:00	9:45-13:00	9:45-13:00	11:52-19:00	10:39-16:00	10:00-17:00
Output	MWe	350	290	290	290	290	345	345	345
Fuel Consumption	t/h	HO :	HO:	HO : 65	HO : 65	HO : 65	HO : 79	HO : 79	HO : 73
HO=Heavy Oil, NG=Natural Gas	mN/h								
Atmospheric Pressure	mmHg	654	-	653	653	650	653	653	673.0
Static Pressure Average	mm	-0.86	-	-0.72	(-0.90)	(-0.40)	-0.54	-0.65	-0.896
Stack Duct Sectional Area	m²	31.5		31.5	31.5	31.5	31.5	31.5	31.5
Representative Point for Soot Collection		B-2	B-2	B-2	(B-2)	(B-2)	A-2	B-3	D-3
Stack Gas Average Temperature	°C	194	-	189	(-190)	(-192)	198	182	190.3
Stack Gas Average Velocity	m/s	19.8	-	20.1	(18.6)	(16.6)	22.5	20.4	19.4
O2 Concentration	%	No monitoring	11.6	13.5	12.8	12.2	12.6	3.47	4.60
H2O, Water Content	%	10.78	No monitoring	9.76	9.55	No monitoring	10.1	13.1	No monitoring
Stack Gas Flow Rate (W)	mN/h	1.13×10^6	-	1.16×10^6	-	-	1.27×10^6	1.19×10^6	1.15×10^6
Stack Gas Flow Rate (D)	mN/h	1.00×10^6	-	1.04×10^6	-	-	1.14×10^6	1.03×10^6	-
Soot Conc. Avg. at Representative Point (D)	g/mN	0.16	No monitoring	0.05	0.05	0.05	0.12	0.25	No monitoring
Soot Concentration (6% O2)	g/mN	-	-	0.10	0.10	0.09	0.21	0.21	-
Soot Flow Rate / hour	kg/h	163	-	54.2	-	-	135	258	-
SO2 Concentration (D)	ppm	No monitoring	822	647	642	742	770	1,530	676
SO2 (6% O2)	ppm		1,310	1,300	1,180	1,260	1,370	1,310	618
SO2 Flow Rate / hour	kg/h		-	1,930	-	-	2,510	4,530	-
NOx Concentration (D)	ppm	No monitoring	242	193	236	243	273	**3250	**5200
NOx (6% O2)	ppm		384	386	432	414	485	-	-
NOx Flow Rate / hour	kg/h		-	269	-	-	417	-	-

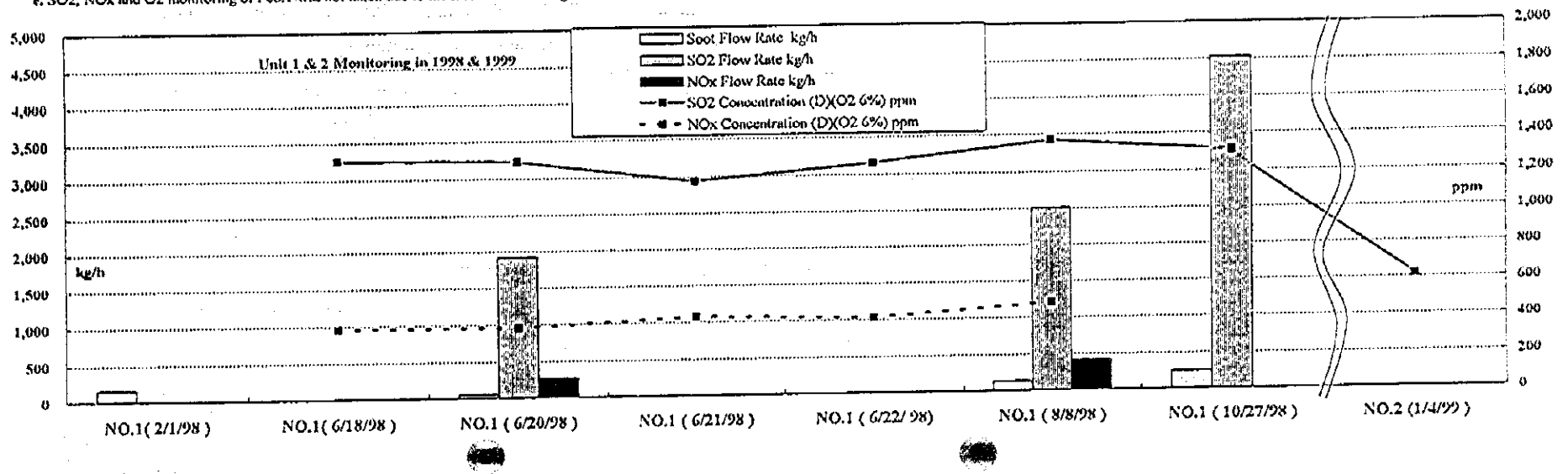
Note: a. Figures in parentheses indicate values measured at the representative point only

b. No monitoring for Unit 2 was taken in 1998 due to its boiler's stoppage from maintenance and unexpected facilities trouble

c. ** indicates Extra-ordinary values which are not suitable for evaluation because of a NOx analyzer's malfunction.

d. Each stack gas flow rate is obtained by calculation when the distribution of gas velocity is measured only.

e. SO2, NOx and O2 monitoring of Feb.1 was not taken due to the fact that standard gases were not delivered in time to meet the monitoring.



Stack Gas Monitoring Results for Unit 3, 4 & 5 at Esfahan Power Plant

Unit (Rated Capacity : MWe)		Unit 3 (120)						
Date		Feb. 23,'98	June 4, '98	June 5,'98	June 11 '98	Aug. 16 '98	Oct 13 '98	Jan 24 '99
Time		10:00-16:00	10:30-19:00	10:30-18:30	10:00-18:00	12:00-18:30	10:00-14:30	10:00-14:30
Output	MWe	75	75	74	75	75	120	77
Fuel Consumption	t/h	HO :	HO :	HO : 19.2	HO : 10.8	HO : 11	HO : 19.2	HO : 20
HO=Heavy Oil, NG=Natural Gas	mN/h				NG : 10,800	NG : 11,000	NG : 17,100	
Atmospheric Pressure	mmHg	639.1	631.4	632.8	631.0	631	637	629.5
Static Pressure Average	mm	-0.77	-	-0.21	(-0.48)	-0.27	0.24	-0.55
Stack Duct Sectional Area	m²	13.9	-	13.9	13.9	13.9	13.9	13.9
Representative Point for Soot Collection		C-2	(B-3)	B-3	(B-3)	B-1	B-1	B-1
Stack Gas Average Temperature	°C	144	-	146	(141)	152	155	137
Stack Gas Average Velocity	m/s	13.3	-	15.2	(9.63)	15.1	22.5	15.1
O2 Concentration	%	No monitoring	8.79	8.47	16.9	12.7	9.28	11.0
H2O, Water Content	%		No monitoring	7.01	10.1	9.63	11.1	8.65
Stack Gas Flow Rate (W)	mN/h	0.37×10^6	-	0.41×10^6	-	0.40×10^6	0.60×10^6	0.42×10^6
Stack Gas Flow Rate (D)	mN/h	0.34×10^6	-	0.38×10^6	-	0.36×10^6	0.54×10^6	0.38×10^6
Soot Conc. Avg. at Representative Point	g/mN	0.19	No monitoring	0.22	0.13	0.13	0.10	0.09
Soot Concentration (6% O2)	g/mN	-	-	0.263	0.467	0.240	0.122	0.134
Soot Flow Rate / hour	kg/h	65.4	-	84.5	-	48.4	50.9	33.9
SO2 Concentration (D)	ppm	No monitoring	1,110	1,160	170	348	519	868
SO2 (6% O2)	ppm		1,370	1,390	624	629	661	1,300
SO2 Flow Rate / hour	kg/h		-	1,280	-	362	794	944
NOx Concentration (D)	ppm	No monitoring	175	136	36	137	233	118
NOx (6% O2)	ppm		216	163	133	248	298	177
NOx Flow Rate / hour	kg/h		-	70	-	67	167	60

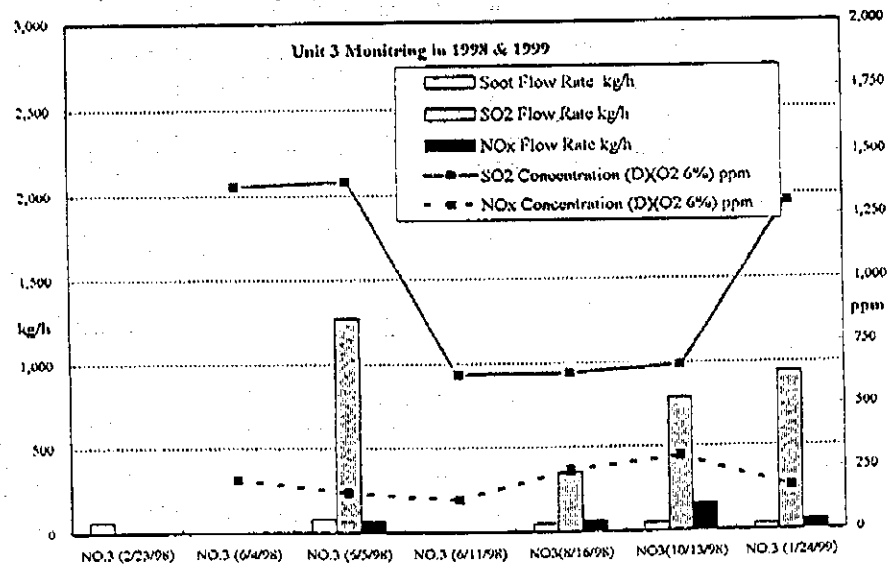
Unit 4 (320)					
Feb. 22, '98	June 6, '98	June 7, '98	Aug 20, '98	Oct. 14, '98	Jan 26 '99
10:00-16:00	10:30-18:00	10:30-18:00	4:30-8:30	9:10-12:00	9:00-13:00
165	320	320	160	160	160
HO :	HO : 71	HO : 70	HO : 23	HO : 3.2	HO : 36
			NG : 20,000	NG : 32,700	NG :
633.2	633.2	631.7	630.2	637.7	631
-0.24	1.36	(1.12)	-0.36	-0.61	-0.45
22.1	22.1	22.1	22.1	22.1	22.1
C-3	D-3	(D-3)	D-5	C-3	B-6
172	191	(193)	182	158	147
21.9	32.2	(19.9)	19.5	19.0	19.7
No monitoring	12.6	12.7	10.9	9.22	6.75
9.60	9.92	9.61	9.30	13.9	8.97
0.89×10^6	1.26×10^6	-	0.77×10^6	0.80×10^6	0.84×10^6
0.80×10^6	1.13×10^6	-	0.70×10^6	0.69×10^6	0.77×10^6
0.11	0.41	0.31	0.06	0.03	0.09
-	0.735	0.563	0.088	0.038	0.091
87.8	467	-	41.3	20.8	66.2
No monitoring	798	763	436	159	1,280
	1,420	1,370	650	203	1,350
	2,580	-	872	315	2,820
No monitoring	152	164	**360	**690	228
	271	296	**537	**879	240
	231	-	**338	**640	235

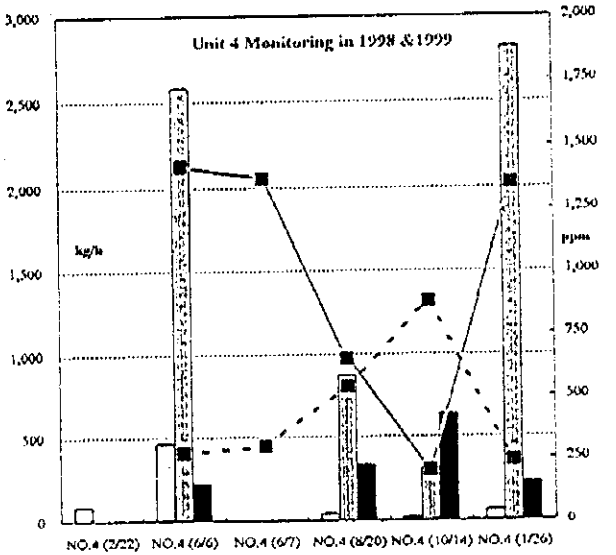
Unit 5 (320)		
June 8 '98	June 10 '98	Jan. 27 '99
10:20-17.00	10:15-16:00	8:50-12:30
220	220	170
HO : 3	HO : 4	HO : 39
NG : 45,000	NG : 47,000	
630.8	631	634
0.11	(0.25)	-0.64
22.1	22.1	22.1
D-2	(D-3)	D-6
146	(148)	124
21.6	(20.5)	17.9
15.5	14.8	8.11
14.6	15.1	8.86
0.93×10^6	-	0.82×10^6
0.79×10^6	-	0.74×10^6
0.02	0.03	0.12
0.051	0.063	0.136
14.8	-	87.0
34	35	1,200
94	85	1,390
77	-	2,540
41	32	155
112	78	180
44	-	154

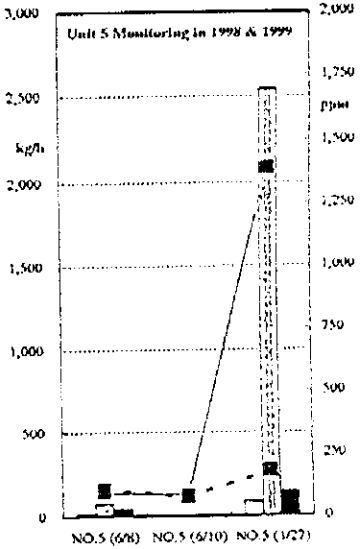
Note: a. Figures in parentheses indicate values measured at the representative point only. b. ** indicates extra-ordinary values which are not suitable for evaluation because of a NOx analyzer's malfunction.

c. Each stack gas flow rate is obtained by calculation when the distribution of gas velocity is measured only.

d. SO2, NOx and O2 monitoring of Feb. 22 & 23 was not taken due to the fact that standard gases were not delivered in time to meet the monitoring.







Monitoring Results for Unit 1 at Tabriz P/P	(1998/2/1, 10:00-16:00)
Fuel Type : Heavy Oil (the Q'ty/h was not confirmed)	Output : 350MW (Max.)

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	872.2	Pitot coef.		0.85	Density (g/cm3)		1		
mmHg	654.4	Water Temperature		3	γ 0=1.3kgf/m3N		1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kg/m3)	Velocity (m/s)
A-1	78	160		0.1	8.2		195.2	0.652	13.3
A-2	78	255		0.1	17.7		196.3	0.650	19.6
A-3	78	255	95	0.1	17.7	-0.815	197.2	0.649	19.7
A-4	39	170		0.2	26.2		197.8	0.648	23.9
A-5	39	172		0.2	26.6		198.6	0.647	24.1
A-6									
B-1	78	145		0.1	6.7		194.4	0.653	12.1
B-2	78	255		0.1	17.7		196.2	0.651	19.6
B-3	78	285	130	0.1	20.7	-0.717	197.2	0.649	21.2
B-4	14	155		0.2	28.2		196.7	0.650	24.8
B-5	14	155		0.2	28.2		193.2	0.655	24.7
B-6									
C-1	90	143		0.1	5.3		195.5	0.651	10.7
C-2	90	183		0.1	9.3		196.3	0.650	14.2
C-3	90	225	70	0.1	13.5	-0.864	196.2	0.650	17.1
C-4	15	125		0.2	22.0		194.5	0.653	21.8
C-5	15	175		0.2	32.0		191.9	0.656	26.3
C-6									
D-1	69	160		0.1	9.1		195.0	0.652	14.1
D-2	69	245		0.1	17.6		194.9	0.652	19.5
D-3	69	249	85	0.1	18.0	-0.839	193.1	0.655	19.7
D-4	13	150		0.2	27.4		192.8	0.655	24.3
D-5	13	155		0.2	28.4		192.3	0.656	24.8
D-6									
E-1	72	180		0.1	10.8		191.9	0.656	15.3
E-2	72	230		0.1	15.8		192.5	0.655	18.5
E-3	72	235	45	0.1	16.3	-1.064	191.6	0.657	18.7
E-4	13	135		0.2	24.4		190.0	0.659	22.9
E-5	13	153		0.2	28.0		191.0	0.657	24.6
E-6									
Average					19.0	-0.860	194.5	0.653	19.8

= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	13.3	19.6	19.7	23.9	24.1		20.1
	-14.4	-0.4	-0.4	9.1	9.5		
B	12.1	19.6	21.2	24.8	24.7		20.5
	-17.2	-0.4	3.1	11.0	10.8		
C	10.7	14.2	17.1	21.8	26.3		18.0
	-20.2	-12.4	-5.9	4.5	14.3		
D	14.1	19.5	19.7	24.3	24.8		20.5
	-12.8	-0.6	-0.2	10.0	10.9		
E	15.3	18.5	18.7	22.9	24.6		20.0
	-10.1	-3.0	-2.4	6.8	10.5		
Average	13.1	18.3	19.3	23.6	24.9		19.8
					Standard Deviation =		4.5

5. Temperature (℃) / Deviation

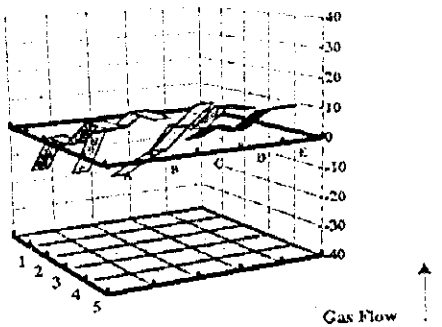
Temperature (℃) / Deviation

	1	2	3	4	5	6	Average
A	195.2	196.3	197.2	197.8	198.6		197.0
	3.0	7.7	11.6	14.2	17.6		
B	194.4	196.2	197.2	196.7	193.2		195.5
	-0.4	7.3	11.6	9.4	-5.5		
C	195.5	196.3	196.2	194.5	191.9		194.9
	4.3	7.7	7.3	0.0	-11.1		
D	195.0	194.9	193.1	192.8	192.3		193.6
	2.2	1.7	-6.0	-7.2	-9.4		
E	191.9	192.5	191.6	190.0	191.0		191.4
	-11.1	-8.5	-12.4	-19.2	-14.9		
Average	194.4	195.2	195.1	194.4	193.4		194.5
					Standard Deviation =		2.3

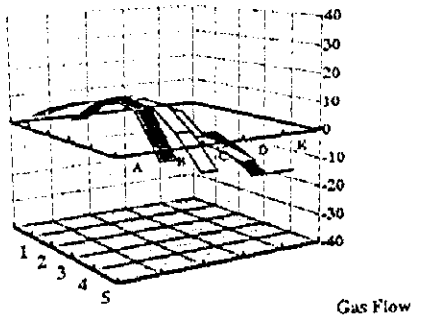
Calculation Formula

$$\text{Deviation} = \frac{(\text{Velocity} - \text{Average Velocity}) \times 10}{\text{Standard Deviation}}$$

Velocity Deviation Distribution Graph



Temperature Deviation Distribution Graph



2. Water Content

	1	D-2	2	D-2
Temp. Average (℃)	2.5-4.4	3.5	4.4-5	4.7
Gas Manometer (mm)	*0	0.00	*0	0.00
Pre.Weight (g)	123.611	121.274	124.200	121.356
Post.Weight (g)	125.223	121.305	124.224	122.948
Balance Weight (g)	1.612	0.03	0.02	1.60
Total Weight (g)	1.643		1.622	
Sucked Volume (L)	20		20	
Pv. (mmHg)	5.74		6.26	
Xw (%)	10.82%		10.75%	
Average Xw (%)	10.78%			

* Manometer was frozen, so that it could not be measured

3. Soot Concentration

	1	B-2	2	B-2
Temp. Average (℃)		4		6
Gas Manometer (mm)	6	0.44	6.00	0.44
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	18.09 L/min		18.09 L/min	
Collected Soot Amount	0.069 g		0.067 g	
Sucked Stack Gas V(L)	500	421	500	417
Pv. (mmHg)	5.95		6.86	
Soot Concentration	0.164 g/m3N		0.160 g/m3N	
Ave. Soot Concentration	0.162 g/m3N			
O2 Conversion Value	g/m3N		Ave.O2 ######	

6. SO2, NOx, & O2 Raw Data

	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	Avg.
SO2(ppm)												#######
NOx(ppm)												#######
O2 %												#######
SO2(O2)												#######
NOx(O2)												#######

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

* SO2, NOx and O2 monitoring was not taken due to the fact that standard gases were not delivered in time to meet the monitoring.

Monitoring Results for Unit 1 at Tabriz Power Plant (1998/6/20, 10:20-15:00)
Fuel Type : Heavy Oil (65tons/h) Output : 290MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	870.2	Pitot coef.	0.85	Density	0.776			
mmHg	652.9	Ethanol Temperatur	36	γ0=1.3kgf/m3N	1.3			
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	12	105		0.1	7.2		189.6	0.659	12.5
A-2	12	265		0.1	19.6		190.1	0.658	20.6
A-3	6	150	65	0.2	22.3	-0.514	190.6	0.657	21.9
A-4	4	160		0.2	24.2		187.4	0.662	22.8
A-5	4	170		0.2	25.8		186.5	0.663	23.5
A-6	4	180		0.2	27.3		184.5	0.666	24.1
B-1	6	60		0.2	8.4		189.1	0.659	13.4
B-2	6	130		0.2	19.2		190.1	0.657	20.4
B-3	6	150	35	0.2	22.3	-0.856	189.7	0.658	21.9
B-4	4	155		0.2	23.4		190.1	0.657	22.5
B-5	4	130		0.2	19.6		191.4	0.656	20.6
B-6	4	140		0.2	21.1		189.5	0.658	21.3
C-1	4	55		0.2	7.9		187.3	0.662	13.0
C-2	4	80		0.2	11.8		190.5	0.657	15.9
C-3	4	110	15	0.2	16.5	-0.748	191.2	0.656	18.8
C-4	3	120		0.2	18.2		192.0	0.655	19.8
C-5	3	140		0.2	21.3		191.5	0.656	21.4
C-6	3	180		0.2	27.5		186.3	0.663	24.2
D-1	4	50		0.2	7.1		186.5	0.663	12.4
D-2	4	120		0.2	18.0		189.9	0.658	19.7
D-3	4	125	32	0.2	18.8	-0.678	188.7	0.660	20.1
D-4	0	150		0.2	23.3		190.0	0.658	22.4
D-5	0	162		0.2	25.1		191.1	0.656	23.3
D-6	0	175		0.2	27.2		187.1	0.662	24.1
E-1	4	60		0.2	8.7		186.0	0.663	13.6
E-2	4	102		0.2	15.2		187.1	0.662	18.0
E-3	4	115	15	0.2	17.2	-0.790	188.5	0.660	19.2
E-4	0	140		0.2	21.7		190.2	0.657	21.6
E-5	0	165		0.2	25.6		193.0	0.653	23.6
E-6	0	195		0.2	30.3		191.0	0.656	25.6
Average					19.4	-0.717	189.2	0.659	20.1

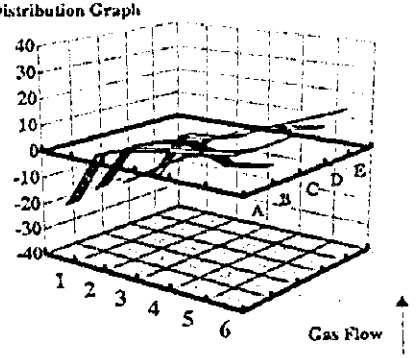
= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	12.5	20.6	21.9	22.8	23.5	24.1	20.9
	-20.0	1.3	4.9	7.1	8.9	10.6	
B	13.4	20.4	21.9	22.5	20.6	21.3	20.0
	-17.4	0.8	4.9	6.3	1.3	3.2	
C	13.0	15.9	18.8	19.8	21.4	24.2	18.9
	-18.5	-10.8	-3.2	-0.7	3.6	10.9	
D	12.4	19.7	20.1	22.4	22.3	24.1	20.3
	-20.2	-1.0	0.0	6.1	8.4	10.6	
E	13.6	18.0	19.2	21.6	23.6	25.6	20.3
	-16.9	-5.3	-2.2	4.1	9.1	14.4	
Average	13.0	18.9	20.4	21.8	22.5	23.9	20.1
						Standard Deviation =	3.8

Velocity Deviation Distribution Graph

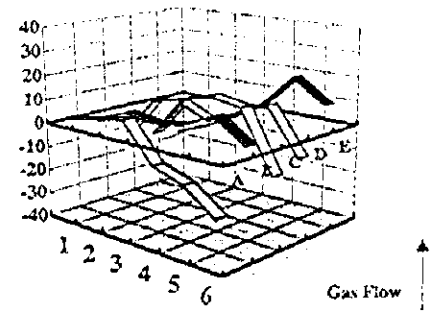


5. Temperature (℃) / Deviation

Temperature (℃) / Deviation

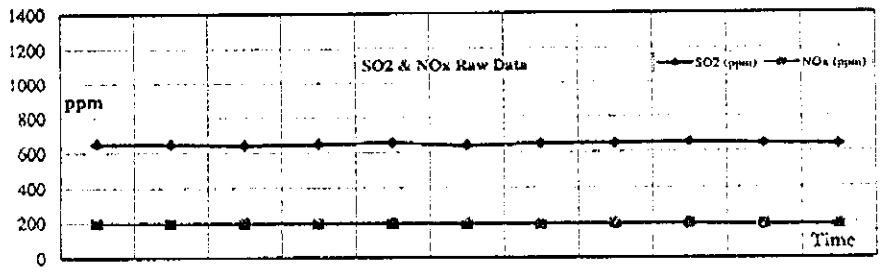
	1	2	3	4	5	6	Average
A	189.6	190.1	190.6	187.4	186.5	184.5	188.1
	1.9	4.3	6.7	-8.8	-13.2	-22.8	
B	189.1	190.1	189.7	190.1	191.4	189.5	190.0
	-0.6	4.3	2.3	4.3	10.6	1.4	
C	187.3	190.5	191.2	192.0	191.5	186.3	189.8
	-9.3	6.2	9.6	13.5	11.1	-14.1	
D	186.5	189.9	188.7	190.0	191.1	187.1	188.9
	-13.2	3.3	-2.5	3.8	9.1	-10.2	
E	186.0	187.1	188.5	190.2	193.0	191.0	189.3
	-15.6	-10.2	-3.5	4.8	18.3	8.6	
Average	187.7	189.5	189.7	189.9	190.7	187.7	189.2
						Standard Deviation =	2.1

Temperature Deviation Distribution Graph



Calculation Formula

Deviation = (Velocity-Average Velocity) ×10 / Standard Deviation



2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)		32.5		30.5
Gas Manometer (mm)	2mm	0.147	2mm	0.147
Pre.Weight (g)	124.179	126.659	124.753	122.847
Post.Weight (g)	125.423	126.677	125.982	122.892
Balance Weight (g)	1.244	0.018	1.229	0.045
Total Weight (g)	1.262		1.274	
Sucked Volume (L)	20		20	
Pv. (mmHg)	36.52		32.58	
Xw (%)	9.77%		9.74%	
Average Xw (%)	9.76%			

3. Soot Concentration

	1	B-2	2	B-2
Temp. Average (℃)		32		32
Gas Manometer (mm)	6	0.441	6	0.4412
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	25.3 L/min		25.3 L/min	
Collected Soot Amount	0.0131 g		0.0097 g	
Sucked Stack Gas V(L)	300	218	300	218
Pv. (mmHg)	35.50		35.50	
Soot Concentration	0.060 g/m3N		0.044 g/m3N	
Ave. Soot Concentration	0.052 g/m3N			
O2 Conversion Value	0.146 g/m3N		Ave.O2	13.51

6. SO2, NOx, & O2 Raw Data

	12:51	12:54	12:57	13:00	13:03	13:06	13:09	13:12	13:15	13:18	13:21	Avg.
SO2 (ppm	651	648	642	649	656	639	648	649	654	645	639	647
NOx (ppm	196	193	195	195	196	192	193	195	193	187	187	193
O2 %	13.47	13.52	13.50	13.50	13.40	13.67	13.48	13.50	13.42	13.52	13.61	13.51
SO2(O2)	1297	1299	1284	1298	1295	1308	1293	1298	1294	1293	1297	1296
NOx(O2)	390	387	390	390	386	393	385	390	383	375	379	386

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 1 at Tabriz Power Plant (1998/6/21, 9:45-13:00)
Fuel Type : Heavy Oil (65tons/h) Output : 290MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	870	Pitot coef.	0.85	Density	0.779				
mmHg	652.7	Ethanol Temperature	32	γ 0=1.3kgf/m3N	1.3				
Rep. Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
B-2	32	135	28	0.2	16.0	-0.898	189.8	0.658	18.6

2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)		29.75		30.5
Gas Manometer (mm)	2	0.147	2	0.147
Pre.Weight (g)	127.946	125.292	127.451	124.774
Post.Weight (g)	129.136	125.340	128.658	124.827
Balance Weight (g)	1.19	0.048	1.207	0.053
Total Weight (g)	1.238		1.260	
Sucked Volume (L)	20		20	
Pv. (mmHg)	31.20		32.58	
Xw (%)	9.46%		9.65%	
Average Xw (%)	9.55%			

3. Soot Concentration

	1	B-2	2	B-2
Temp. Average (℃)		33		34
Gas Manometer (mm)	12	0.882	12	0.882
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	20.01 L/min		20.01 L/min	
Collected Soot Amount	0.0107 g		0.0120 g	
Sucked Stack Gas V(L)	300	217	300	215
Pv. (mmHg)	37.57		39.74	
Soot Concentration	0.049 g/m3N		0.056 g/m3N	
Ave. Soot Concentration	0.053 g/m3N			
O2 Conversion Value	0.135 g/m3N		Ave.O2	12.82

SO2, NOx, & O2 Raw Data measured on June 18, 1998

	12:10	12:13	12:16	12:19	12:22	12:25	12:28	12:31	12:34	12:37	12:40	Avg.
SO2 (ppm	792	796	788	815	819	824	834	861	862	829	824	822
NOx (ppm	255	260	252	257	234	233	235	242	229	229	233	242
O2 %	11.80	11.85	11.92	11.66	11.64	11.56	11.38	11.09	11.16	11.52	11.58	11.56
SO2(O2)	1,291	1,305	1,302	1,309	1,313	1,309	1,300	1,303	1,314	1,312	1,312	1,306
NOx(O2)	416	426	416	412	374	370	367	366	349	362	370	384

SO2, NOx, & O2 Raw Data measured on June 20, 1998

	12:51	12:54	12:57	13:00	13:03	13:06	13:09	13:12	13:15	13:18	13:21	Avg.
SO2 (ppm	651	648	642	649	656	639	648	649	654	645	639	647
NOx (ppm	196	193	195	195	196	192	193	195	193	187	187	193
O2 %	13.47	13.52	13.50	13.50	13.40	13.67	13.48	13.50	13.42	13.52	13.61	13.51
SO2(O2)	1,297	1,299	1,284	1,298	1,295	1,308	1,293	1,298	1,294	1,293	1,297	1,296
NOx(O2)	390	387	390	390	386	393	385	390	383	375	379	386

SO2, NOx, & O2 Raw Data measured on June 21, 1998

	11:15	11:18	11:21	11:24	11:27	11:30	11:33	11:36	11:39	11:42	11:45	Avg.
SO2 (ppm	666	660	651	642	640	631	634	635	635	635	637	642
NOx (ppm	249	242	237	235	233	234	234	232	230	231	235	236
O2 %	12.52	12.59	12.79	12.88	12.86	12.88	12.88	12.92	12.94	12.88	12.87	12.82
SO2(O2)	1,178	1,177	1,189	1,186	1,179	1,166	1,171	1,179	1,182	1,173	1,175	1,178
NOx(O2)	440	431	432	434	430	433	432	430	429	427	433	432

SO2, NOx, & O2 Raw Data measured on June 22, 1998

	11:22	11:25	11:28	11:31	11:34	11:37	11:40	11:43	11:46	11:49	11:52	Avg.
SO2 (ppm	746	742	748	750	754	738	744	739	737	743	722	742
NOx (ppm	250	247	250	251	250	244	242	240	242	241	222	243
O2 %	12.03	12.13	12.10	12.07	12.11	12.22	12.25	12.29	12.25	12.25	12.39	12.19
SO2(O2)	1,247	1,255	1,261	1,260	1,272	1,261	1,275	1,273	1,263	1,274	1,258	1,264
NOx(O2)	417	418	421	421	421	416	415	413	414	413	387	414

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 1 at Tabriz Power Plant (1998/6/22, 9:45-13:00)
Fuel Type : Heavy Oil (65tons/h) Output : 290MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

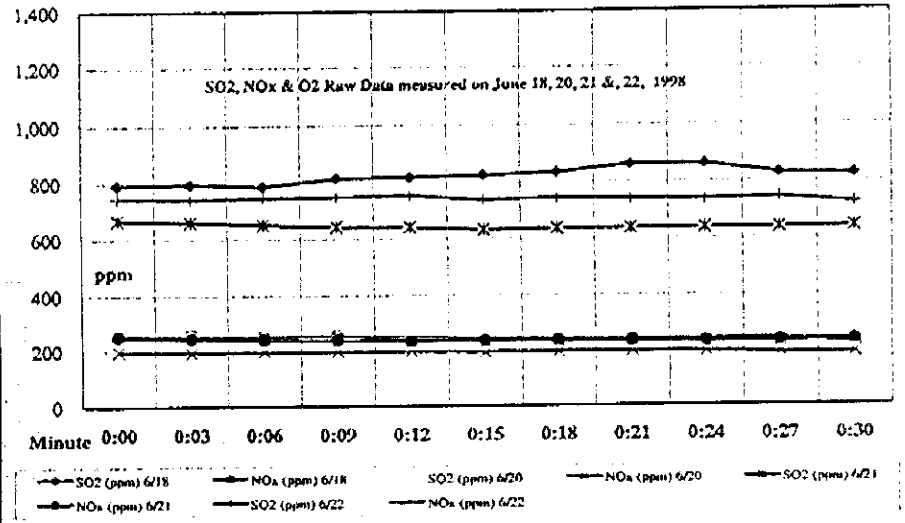
Pa	866.2	Pitot coef.	0.85	Density	0.778				
mmHg	649.9	Ethanol Temperature	33	γ 0=1.3kgf/m3N	1.3				
Rep. Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
B-2	17	180	65	0.1	12.7	-0.399	191.5	0.653	16.6

2. Water Content

* **Water content monitoring of 22 June, 1999 was not carried out.**

3. Soot Concentration

	1	B-2	2	B-2
Temp. Average (℃)		33		33
Gas Manometer (mm)	12	0.882	12	0.882
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	17.66 L/min		17.66 L/min	
Collected Soot Amount	0.0228 g		0.0217 g	
Sucked Stack Gas V(L)	600	432	600	432
Pv. (mmHg)	37.57		37.57	
Soot Concentration	0.053 g/m3N		0.050 g/m3N	
Ave. Soot Concentration	0.052 g/m3N			
O2 Conversion Value	0.123 g/m3N		Ave.O2	12.19



Monitoring Results for Unit 1 at Tubriz P/P	(1998/8/8, 11:52-19:00)
Fuel Type : Heavy Oil (79tons/h)	Output : 345MW (Max.)

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	870.2	Pitot coef.		0.85	Density		0.777		
mmHg	652.9	Exhaust Temperature		34	γ 0=1.3kgf/m3N		1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	0	55		0.2	8.5		194.5	0.652	13.6
A-2	0	150		0.2	23.3		198.3	0.646	22.6
A-3	0	185	80	0.2	28.7	-0.613	197.7	0.647	25.1
A-4	0	200		0.2	31.1		194.1	0.652	26.0
A-5	0	210		0.2	32.6		194.3	0.652	26.6
A-6	0	210		0.2	32.6		194.7	0.651	26.6
B-1	0	55		0.2	8.5		194.5	0.651	13.6
B-2	0	140		0.2	21.8		194.0	0.652	21.7
B-3	0	190	70	0.2	29.5	-0.769	198.8	0.645	25.5
B-4	0	175		0.2	27.2		196.8	0.648	24.4
B-5	0	170		0.2	26.4		198.6	0.646	24.1
B-6	0	180		0.2	28.0		194.3	0.652	24.7
C-1	0	50		0.2	7.8		197.3	0.648	13.0
C-2	0	85		0.2	13.2		198.3	0.646	17.0
C-3	0	115	30	0.2	17.9	-0.607	199.6	0.644	19.8
C-4	0	110		0.2	17.1		199.0	0.645	19.4
C-5	0	180		0.2	28.0		200.0	0.644	24.8
C-6	0	220		0.2	34.2		201.0	0.643	27.4
D-1	0	55		0.2	8.5		196.7	0.649	13.7
D-2	0	120		0.2	18.6		198.6	0.646	20.2
D-3	0	145	90	0.2	22.5	-0.169	199.6	0.645	22.2
D-4	0	215		0.2	33.4		196.7	0.649	27.0
D-5	0	230		0.2	35.7		200.0	0.644	28.0
D-6	0	220		0.2	34.2		201.0	0.643	27.4
E-1	0	70		0.2	10.9		195.5	0.650	15.4
E-2	0	120		0.2	18.6		197.5	0.647	20.2
E-3	0	165	70	0.2	25.6	-0.562	197.4	0.648	23.7
E-4	0	175		0.2	27.2		200.0	0.644	24.5
E-5	0	230		0.2	35.7		203.0	0.640	28.1
E-6	0	235		0.2	36.5		201.0	0.643	28.4
Average					24.1	-0.544	197.8	0.647	22.5

= The Representative Point

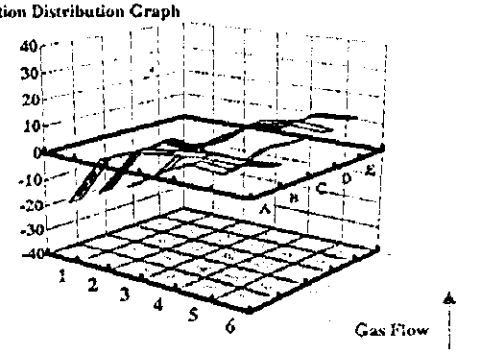
4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation	1	2	3	4	5	6	Average
A	13.6	22.6	25.1	26.0	26.6	26.6	23.4
	-18.3	0.2	5.3	7.2	8.5	8.5	
B	13.6	21.7	25.5	24.4	24.1	24.7	22.3
	-18.3	-1.6	6.1	3.9	3.3	4.5	
C	13.0	17.0	19.8	19.4	24.8	27.4	20.2
	-19.5	-11.3	-5.5	-6.4	4.8	10.2	
D	13.7	20.2	22.2	27.0	28.0	27.4	23.1
	-18.2	-4.7	-0.5	9.3	11.4	10.2	
E	15.4	20.2	23.7	24.5	28.1	28.4	23.4
	-14.6	-4.7	2.4	4.0	11.6	12.1	
Average	13.9	20.4	23.3	24.2	26.3	26.9	22.5
						Standard Deviation =	4.9

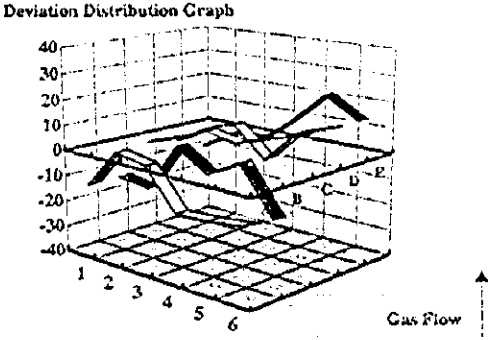
5. Temperature (℃) / Deviation

Temperature (℃) / Deviation	1	2	3	4	5	6	Average
A	194.5	198.3	197.7	194.1	194.3	194.7	195.6
	-13.2	2.2	-0.2	-14.8	-14.0	-12.4	
B	194.5	194.0	198.8	196.8	198.6	195.3	196.2
	-13.2	-15.3	4.2	-3.9	3.4	-14.0	
C	197.3	198.3	199.6	199.0	200.0	201.0	199.2
	-1.9	2.2	7.5	5.0	9.1	13.1	
D	196.7	198.6	199.6	196.7	200.0	201.0	198.8
	-4.3	3.4	7.5	-4.3	9.1	13.1	
E	195.5	197.5	197.4	200.0	203.0	201.0	199.1
	-9.2	-1.1	-1.5	9.1	21.3	13.1	
Average	195.7	197.3	198.6	197.3	199.2	198.4	197.8
						Standard Deviation =	2.5

Velocity Deviation Distribution Graph

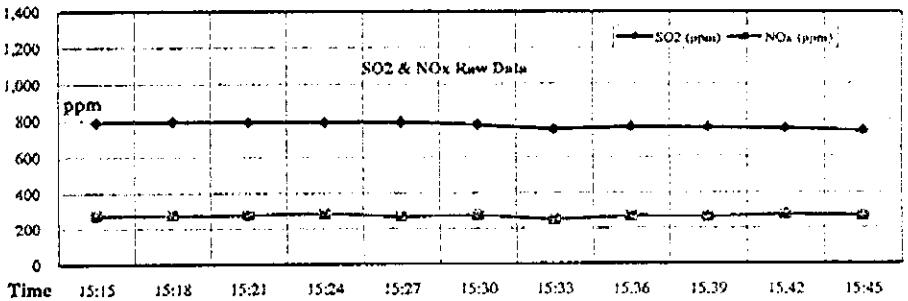


Temperature Deviation Distribution Graph



Calculation Formula

Deviation = (Velocity-Average Velocity) ×10 / Standard Deviation



2. Water Content

	1	C-4	2	C-4
Temp. Average (℃)		33		32.5
Gas Manometer (mm)	2mm	0.147	2mm	0.147
Pre.Weight (g)	129.175	125.341	128.659	124.829
Post.Weight (g)	130.508	125.389	129.874	124.856
Balance Weight (g)	1.333	0.05	1.215	0.027
Total Weight (g)	1.381		1.242	
Sucked Volume (L)	20		20	
Pv. (mmHg)	37.57		36.52	
Xw (%)	10.63%		9.63%	
Average Xw (%)	10.13%			

3. Soot Concentration

Suspected Values

	1	A-2	2	A-2
Temp. Average (℃)		31		32
Gas Manometer (mm)	6	0.441	6	0.4412
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	23.8 L/min		25.3 L/min	
Collected Soot Amount	0.0370 g		0.0490 g	
Sucked Stack Gas V(L)	500	366	500	364
Pv. (mmHg)	33.53		35.50	
Soot Concentration	0.101 g/m3N		0.135 g/m3N	
Ave. Soot Concentration	0.118 g/m3N			
O2 Conversion Value	0.294 g/m3N	Ave.O2	12.57	

6. SO2, NOx, & O2 Raw Data

	15:15	15:18	15:21	15:24	15:27	15:30	15:33	15:36	15:39	15:42	15:45	Avg.
SO2 (ppm)	789	791	790	790	787	774	749	761	756	751	736	770
NOx (ppm)	278	276	280	286	269	277	251	272	265	275	270	273
O2 %	12.36	12.34	12.40	12.46	12.64	12.62	12.72	12.69	12.78	12.68	12.59	12.57
SO2(O2)	1,370	1,370	1,378	1,388	1,412	1,385	1,357	1,374	1,380	1,354	1,313	1,371
NOx(O2)	482	479	489	503	483	496	455	490	483	497	482	485

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 1 at Tabriz P/P	(1998/10/27, 10:39-16:00)
Fuel Type : Heavy Oil (79tons/h)	Output : 345MW (Max.)

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	870.2	Pitot coef.		0.85	Density		0.788		
mmHg	652.9	Ethanol Temperatur		21	γ0=1.3kgf/m3N		1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	0	60		0.1	4.7		173.1	0.682	9.9
A-2	0	135		0.1	10.6		176.9	0.676	14.9
A-3	0	145	0	0.2	22.9	-1.214	179.1	0.673	21.9
A-4	0	190		0.2	29.9		180.5	0.671	25.1
A-5	0	190		0.2	29.9		181.6	0.669	25.2
A-6	0	195		0.2	30.7		186.1	0.663	25.6
B-1	0	105		0.2	16.5		179.5	0.673	18.7
B-2	0	230		0.1	18.1		180.1	0.672	19.5
B-3	0	280	110	0.1	22.1	-0.535	180.2	0.672	21.6
B-4	0	160		0.1	12.6		182.8	0.668	16.3
B-5	0	175		0.2	27.6		183.4	0.667	24.2
B-6	0	155		0.2	24.4		184.1	0.666	22.8
C-1	0	75		0.1	5.9		178.9	0.674	11.1
C-2	0	155		0.1	12.2		182.0	0.670	16.1
C-3	0	230	90	0.1	18.1	-0.441	183.2	0.668	19.6
C-4	0	110		0.2	17.3		184.3	0.666	19.2
C-5	0	150		0.2	23.6		186.5	0.663	22.5
C-6	0	190		0.2	29.9		187.0	0.662	25.3
D-1	0	70		0.1	5.5		177.1	0.677	10.7
D-2	0	185		0.1	14.6		180.1	0.672	17.5
D-3	0	220	50	0.1	17.3	-0.631	181.6	0.670	19.1
D-4	0	190		0.2	29.9		183.8	0.667	25.2
D-5	0	205		0.2	32.3		184.2	0.666	26.2
D-6	0	200		0.2	31.5		188.2	0.660	26.0
E-1	0	110		0.1	8.7		178.2	0.675	13.5
E-2	0	225		0.1	17.7		181.3	0.671	19.3
E-3	0	250	110	0.1	19.7	-0.409	181.6	0.670	20.4
E-4	0	175		0.2	27.6		186.8	0.663	24.3
E-5	0	195		0.2	30.7		186.0	0.664	25.6
E-6	0	189		0.2	29.8		187.9	0.661	25.3
Average					20.8	-0.646	182.2	0.669	20.4

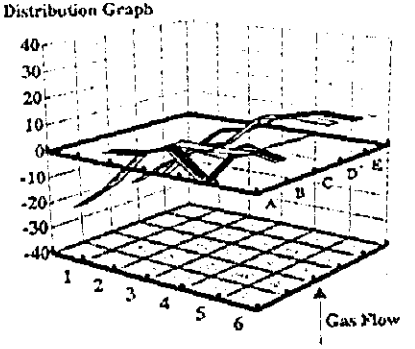
= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	9.9	14.9	21.9	25.1	25.2	25.6	20.4
	-21.4	-11.2	3.1	9.6	9.7	10.6	
B	18.7	19.5	21.6	16.3	24.2	22.8	20.5
	-3.6	-1.8	2.3	-8.3	7.7	4.8	
C	11.1	16.1	19.6	19.2	22.5	25.3	19.0
	-18.9	-8.9	-1.7	-2.5	4.2	9.9	
D	10.7	17.5	19.1	25.2	26.2	26.0	20.8
	-19.7	-5.9	-2.6	9.8	11.8	11.4	
E	13.5	19.3	20.4	24.3	25.6	25.3	21.4
	-14.2	-2.2	0.0	7.9	10.6	9.9	
Average	12.8	17.5	20.5	22.0	24.7	25.0	20.4
					Standard Deviation =		4.9

Velocity Deviation Distribution Graph

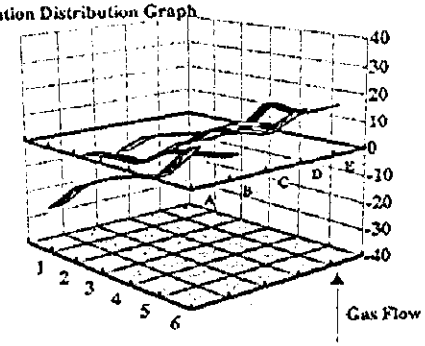


5. Temperature (℃) / Deviation

Temperature (℃) / Deviation

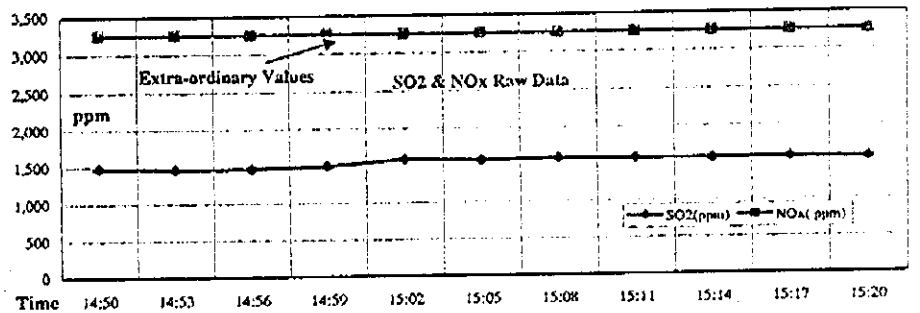
	1	2	3	4	5	6	Average
A	172.1	176.9	179.1	180.5	181.6	186.1	179.6
	-25.3	-14.7	-8.6	-4.7	-1.7	10.8	
B	179.5	180.1	180.2	182.8	183.4	184.1	181.7
	-7.5	-5.8	-5.6	1.7	3.3	5.3	
C	178.9	182.0	183.2	184.3	186.5	187.0	183.7
	-9.2	-0.6	2.8	5.8	11.9	13.3	
D	177.1	180.1	181.6	183.8	184.2	188.2	182.5
	-14.2	-5.8	-1.7	4.4	5.5	16.6	
E	178.2	181.3	181.6	186.8	186.0	187.9	183.6
	-11.1	-2.5	-1.7	12.8	10.5	15.8	
Average	177.4	180.1	181.1	183.6	184.3	186.7	182.2
					Standard Deviation =		3.6

Temperature Deviation Distribution Graph



Calculation Formula

$$\text{Deviation} = \frac{(\text{Velocity} - \text{Average Velocity}) \times 10}{\text{Standard Deviation}}$$



2. Water Content

	1	D-2	2	D-2
Temp. Average (℃)		21		21
Gas Manometer (mm)	2mm	0.147	2mm	0.147
Pre.Weight (g)	131.329	124.975	128.123	126.707
Post.Weight (g)	132.577	125.966	129.405	126.957
Balance Weight (g)	1.248	0.99	1.28	0.25
Total Weight (g)	2.239		1.532	
Sucked Volume (L)	20		20	
Pv. (mmHg)	18.47		18.47	
Xw (%)	15.23%		10.95%	
Average Xw (%)	13.09%			

3. Soot Concentration

	1	E-3	2	E-3
Temp. Average (℃)		21		21
Gas Manometer (mm)	6	0.441	6.00	0.441
Nozzle Diameter	4 mm		4 mm	
Qm (Equal Velocity A)	19.6 L/min		19.6 L/min	
Collected Soot Amount	0.0931 g		0.0998 g	
Sucked Stack Gas V(L)	500	388	500	388
Pv. (mmHg)	18.47		18.47	
Soot Concentration	0.240 g/m3N		0.257 g/m3N	
Ave. Soot Concentration	0.249 g/m3N			
O2 Conversion Value	0.298 g/m3N		Ave.O2	3.47

6. SO2, NOx, & O2 Raw Data

	14:50	14:53	14:56	14:59	15:02	15:05	15:08	15:11	15:14	15:17	15:20	Avg.
SO2(ppm	1,481	1,460	1,459	1,495	1,580	1,560	1,579	1,566	1,560	1,568	1,556	1,533
NOx(ppm	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250
O2 %	4.13	4.21	4.28	3.95	3.00	3.00	2.95	3.07	3.01	3.02	3.60	3.47
SO2(O2)	1,317	1,304	1,309	1,315	1,317	1,300	1,312	1,310	1,301	1,308	1,341	1,312
NOx(O2)	-	-	-	-	-	-	-	-	-	-	-	-

Extra-ordinary Values

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 2 at Tabriz P/P	(1999/1/4, 10:00-17:00)
Fuel Type : Heavy Oil (73tons/h)	Output : 345MW (Max.)

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	897	Pitot coef.		0.85	Density	0.806		
mmHg	673.0	Ethanol Temperatur		0	γ 0=1.3kgf/m3N	1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	0	125		0.1	10.1		194.8	0.670	14.6
A-2	0	285		0.1	23.0		191.4	0.675	21.9
A-3	0	270	-26	0.1	21.8	-1.310	191.0	0.676	21.4
A-4	0	140		0.2	22.6		194.5	0.671	21.8
A-5	0	155		0.2	25.0		194.6	0.671	23.0
A-6	0	160		0.2	25.8		194.5	0.671	23.3
B-1	0	245		0.1	19.7		193.4	0.673	20.4
B-2	0	250		0.1	20.2		192.5	0.674	20.6
B-3	0	270	28	0.1	21.8	-0.990	193.3	0.673	21.4
B-4	0	135		0.2	21.8		194.0	0.672	21.4
B-5	0	140		0.2	22.6		193.8	0.672	21.8
B-6	0	145		0.2	23.4		191.5	0.676	22.1
C-1	0	85		0.1	6.9		193.2	0.673	12.0
C-2	0	155		0.1	12.5		193.6	0.673	16.2
C-3	0	178	-31	0.1	14.3	-0.946	193.1	0.673	17.4
C-4	0	60		0.2	9.7		191.4	0.676	14.2
C-5	0	85		0.2	13.7		189.5	0.679	16.9
C-6	0	105		0.2	16.9		188.9	0.679	18.8
D-1	0	90		0.1	7.3		187.3	0.682	12.3
D-2	0	195		0.1	15.7		191.0	0.677	18.1
D-3	0	215	45	0.1	17.3	-0.654	190.9	0.677	19.0
D-4	0	189		0.2	30.5		180.0	0.693	25.0
D-5	0	165		0.2	26.6		190.0	0.678	23.6
D-6	0	190		0.2	30.6		187.8	0.681	25.2
E-1	0	70		0.1	5.6		181.0	0.692	10.7
E-2	0	160		0.1	12.9		187.3	0.682	16.4
E-3	0	175	29	0.1	14.1	-0.577	189.5	0.679	17.2
E-4	0	120		0.2	19.3		188.9	0.680	20.1
E-5	0	175		0.2	28.2		180.0	0.693	24.0
E-6	0	145		0.2	23.4		185.4	0.685	22.0
Average					18.8	-0.896	190.3	0.678	19.4

= The Representative Point

No monitoring was taken

2. Water Content

	1	D-5	2	D-5
Temp. Average (℃)		0		0
Gas Manometer (mm)		0.00		0.00
Pre.Weight (g)	0.000	0.000	0.000	0.000
Post.Weight (g)	0.000	0.000	0.000	0.000
Balance Weight (g)	0	0.00	0.00	0.00
Total Weight (g)	0.000		0.000	
Sucked Volume (L)	20		20	
Pv. (mmHg)	4.45		4.45	
Xw (%)	0.00%		0.00%	
Average Xw (%)	0.00%			

3. Soot Concentration

	1	D-3	2	D-3
Temp. Average (℃)		0		0
Gas Manometer (mm)		0.00		0.00
Nozzle Diameter	4 mm		4 mm	
Qm (Equal Velocity A)	L/min		L/min	
Collected Soot Amount	g		g	
Sucked Stack Gas V(L)		0		0
Pv. (mmHg)	4.45		4.45	
Soot Concentration	###### g/m3N		###### g/m3N	
Ave. Soot Concentration	###### g/m3N			
O2 Conversion Value	###### g/m3N		Ave.O2	4.60

4. Velocity (m/s) / Deviation

	1	2	3	4	5	6	Velocity (m/s) Deviation Average
A	14.6	21.9	21.4	21.8	23.0	23.3	21.0
	-12.3	6.4	4.9	6.1	9.0	10.0	
B	20.4	20.6	21.4	21.4	21.8	22.1	21.3
	2.5	2.9	5.0	5.1	6.1	6.9	
C	12.0	16.2	17.4	14.2	16.9	18.8	15.9
	-18.9	-8.2	-5.2	-13.2	-6.4	-1.6	
D	12.3	18.1	19.0	25.0	23.6	25.2	20.5
	-18.2	-3.3	-1.0	14.1	10.6	14.8	
E	10.7	16.4	17.2	20.1	24.0	22.0	18.4
	-22.1	-7.8	-5.8	1.7	11.7	6.5	
Average	14.0	18.6	19.3	20.5	21.9	22.3	19.4
						Standard Deviation =	3.9

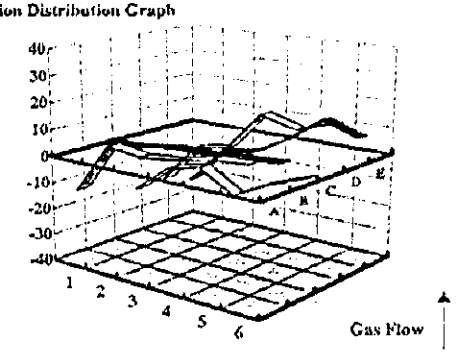
5. Temperature (℃) / Deviation

	1	2	3	4	5	6	Temperature (℃) Deviation Average
A	194.8	191.4	191.0	194.5	194.6	194.5	193.5
	10.8	2.7	1.7	10.1	10.3	10.1	
B	193.4	192.5	193.3	194.0	193.8	191.5	193.1
	7.5	5.3	7.2	8.9	8.4	2.9	
C	193.2	193.6	193.1	191.4	189.5	188.9	191.6
	7.0	8.0	6.8	2.7	-1.8	-3.3	
D	187.3	191.0	190.9	180.0	190.0	187.8	187.8
	-7.1	1.7	1.5	-24.5	-0.6	-5.9	
E	181.0	187.3	189.5	188.9	180.0	185.4	185.4
	-22.1	-7.1	-1.8	-3.3	-24.5	-11.6	
Average	189.9	191.2	191.6	189.8	189.6	189.6	190.3
						Standard Deviation =	4.2

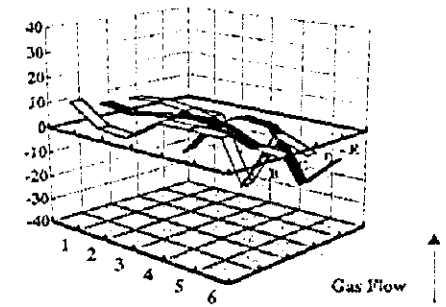
Calculation Formula

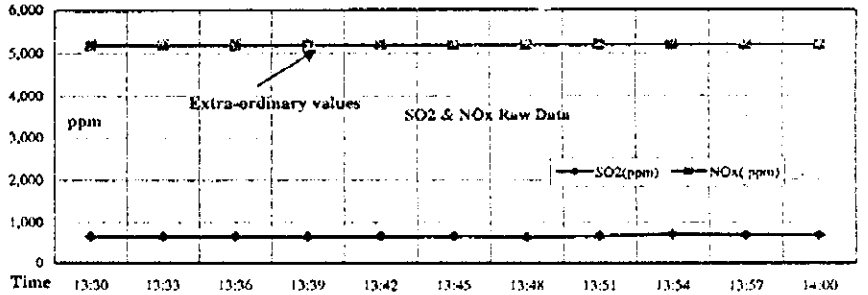
$$\text{Deviation} = \frac{(\text{Velocity-Average Velocity}) \times 10}{\text{Standard Deviation}}$$

Velocity Deviation Distribution Graph



Temperature Deviation Distribution Graph





6. SO2, NOx, & O2 Raw Data

	13:30	13:33	13:36	13:39	13:42	13:45	13:48	13:51	13:54	13:57	14:00	Avg.
SO2(ppm)	667	662	665	663	673	677	652	677	715	692	693	676
NOx(ppm)	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200	5,200
O2 %	4.46	4.74	4.63	4.74	4.74	4.75	4.61	4.94	4.33	4.33	4.32	4.60
SO2(O2)	605	611	609	612	621	625	597	632	643	623	623	618
NOx(O2)	-	-	-	-	-	-	-	-	-	-	-	-

Extra-ordinary Values

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 3 at Esfahan P/P	(1998/2//23, 10:00-16:00)
Fuel Type : Heavy Oil (the Q'ty/h was not confirmed)	Output : 75MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	851.9	Pitot coef.		0.85	Density (g/cm3)		1	
mmHg	639.1	Water Temperature		20	γ0=1.3kgf/m3N		1.3	
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	67	56		0.05	-0.6		143.2	0.717	-
A-2	67	62	90	0.05	-0.3	0.098	147.8	0.709	-
A-3	18	85		0.1	6.7		150.0	0.706	11.6
A-4									
B-1	49	160		0.05	5.6		139.6	0.722	10.4
B-2	49	160	-85	0.05	5.6	-0.787	142.1	0.718	10.5
B-3	15	175		0.1	16.0		150.0	0.705	17.9
B-4									
C-1	47	175		0.1	12.8		138.0	0.725	15.8
C-2	47	94	-100	0.1	4.7	-1.331	149.0	0.706	9.7
C-3	15	105		0.1	9.0		147.0	0.709	13.4
C-4									
D-1	39	125		0.1	8.6		137.5	0.726	13.0
D-2	39	140	0	0.1	10.1	-0.823	142	0.718	14.1
D-3	76	127		0.1	5.1		147.5	0.709	10.1
D-4									
E-1	39	220		0.1	18.1		136.5	0.728	18.8
E-2	39	150	-20	0.1	11.1	-1.024	139.3	0.723	14.7
E-3	76	155		0.1	7.9		149.3	0.706	12.6
E-4									
Average					8.0	-0.773	143.9	0.715	13.3

= The Representative Point

2. Water Content

	1	B-2	2	B-2
Temp. Average (℃)		13.25		13
Gas Manometer (mm)	2	0.147	2	0.147
Pre.Weight (g)	124.111	123.708	120.718	124.529
Post.Weight (g)	125.071	123.719	121.634	124.535
Balance Weight (g)	0.96	0.01	0.916	0.01
Total Weight (g)	0.971		0.922	
Sucked Volume (L)	20		20	
Pv. (mmHg)	11.24		11.06	
Xw (%)	7.12%		6.78%	
Average Xw (%)	6.95%			

3. Soot Concentration

	1	C-2	2	C-2
Temp. Average (℃)		11		11
Gas Manometer (mm)	4	0.294	4	0.294
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	10.0 L/min		10.0 L/min	
Collected Soot Amount	0.046 g		0.048 g	
Sucked Stack Gas V(L)	315	251	300	239
Pv. (mmHg)	9.67		9.67	
Soot Concentration	0.184 g/m3N		0.200 g/m3N	
Ave. Soot Concentration	0.192 g/m3N			
O2 Conversion Value	g/m3N		Ave.O2 ######	

4. Velocity (m/s) / Deviation

	1	2	3	4	5	6	Velocity (m/s) Deviation Average
A	-	-	11.6 -5.7				11.6
B	10.4 -9.7	10.5 -9.6	17.9 15.8				12.9
C	15.8 8.6	9.7 -12.2	13.4 0.4				13.0
D	13.0 -1.1	14.1 2.8	10.1 -10.8				12.4
E	18.8 18.7	14.7 5.0	12.6 -2.3				15.4
Average	14.5	12.3	13.1				13.3
						Standard Deviation =	2.9

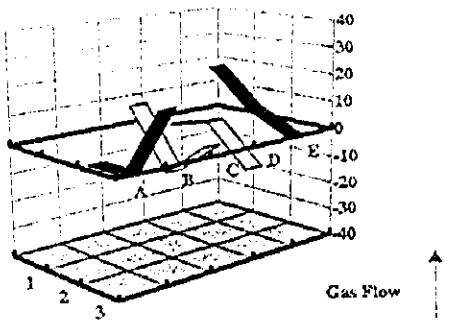
5. Temperature (℃) / Deviation

	1	2	3	4	5	6	Temperature (℃) Deviation Average
A	143.2 -1.5	147.8 7.8	150.0 12.2				147.0
B	139.6 -8.7	142.1 -3.7	150.0 12.2				143.9
C	138.0 -11.9	149.0 10.2	147.0 6.2				144.7
D	137.5 -12.9	142.0 -3.9	147.5 7.2				142.3
E	136.5 -14.9	139.3 -9.3	149.3 10.8				141.7
Average	139.0	144.0	148.8				143.9
						Standard Deviation =	5.0

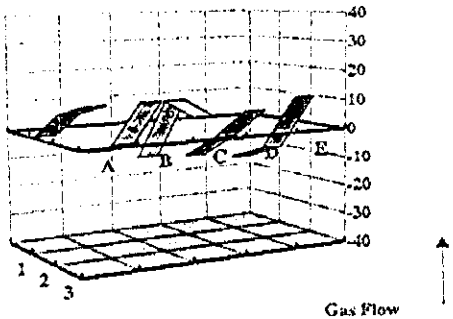
Calculation Formula

$$\text{Deviation} = \frac{(\text{Velocity}-\text{Average Velocity}) \times 10}{\text{Standard Deviation}}$$

Velocity Deviation Distribution Graph



Temperature Deviation Distribution Graph



*** 6. SO2, NOx, & O2 Raw Data**

	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	Avg.
SO2(ppm)												######
NOx(ppm)												######
O2 %												######
SO2(O2)												######
NOx(O2)												######

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

* SO2, NOx and O2 monitoring was not taken due to the fact that standard gases were not delivered in time to meet the monitoring.

Monitoring Results for Unit 3 at Esfahan P/P	(1998/6/5, 10:30-18:30)
Fuel Type : Heavy Oil (19.2tons/h)	Output : 74MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	843.5	Pitot coef.		0.85	Density		1	Etahnol	0.777
mmHg	632.8	Water Temperature		34	γ0=1.3kgf/m3N		1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	70	85		0.1	1.5		144.5	0.708	5.5
A-2	70	90	70	0.1	2.0	-0.106	143.4	0.710	6.3
A-3	10	95		0.1	6.6		141.1	0.714	11.4
A-4	10	105		0.1	7.4		140.9	0.714	12.1
B-1	70	140		0.1	7.0		145.9	0.705	11.9
B-2	70	205	160	0.1	13.5	-0.055	147.5	0.703	16.5
B-3	39	193		0.1	12.0		146.0	0.705	15.5
B-4	39	195		0.1	12.1		145.7	0.706	15.6
C-1	73	175		0.1	10.2		146.0	0.705	14.3
C-2	73	230	130	0.05	7.9	-0.207	147.9	0.702	12.6
C-3	24	132		0.1	8.4		147.0	0.703	13.0
C-4	24	135		0.1	8.6		145.9	0.705	13.2
D-1	80	250		0.1	17.0		144.5	0.708	18.4
D-2	80	255	200	0.1	17.5	-0.047	147.7	0.702	18.8
D-3	47	160		0.2	17.6		147.8	0.702	18.8
D-4	47	170		0.2	19.1		143.7	0.709	19.5
E-1	35	155		0.2	24.0		148.4	0.701	22.0
E-2	35	150	75	0.2	23.0	-0.634	148.9	0.700	21.6
E-3	44	150		0.2	16.5		146.5	0.704	18.2
E-4	44	150		0.2	16.5		143.2	0.709	18.1
Average					12.4	-0.210	145.6	0.706	15.2

= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation	1	2	3	4	5	6	Average
A	5.5	6.3	11.4	12.1			8.8
	-21.5	-19.6	-8.2	-6.8			
B	11.2	16.5	15.5	15.6			14.9
	-7.3	2.9	0.7	0.9			
C	14.3	12.6	13.0	13.2			13.3
	-1.9	-5.7	-4.8	-4.5			
D	18.4	18.8	18.8	19.5			18.9
	7.3	8.0	8.1	9.7			
E	22.0	21.6	18.2	18.1			20.0
	15.2	14.2	6.7	6.6			
Average	14.4	15.2	15.4	15.7			15.2
				Standard Deviation =			4.5

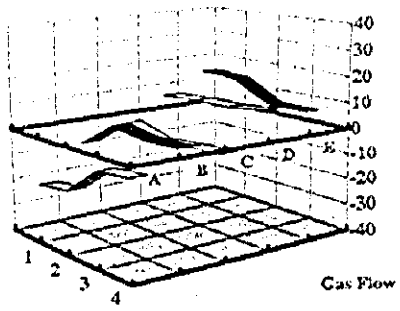
5. Temperature (℃) / Deviation

Temperature (℃) / Deviation	1	2	3	4	5	6	Average
A	144.5	143.4	141.1	140.9			142.5
	-4.9	-9.7	-19.8	-20.7			
B	145.9	147.5	146.0	145.7			146.3
	1.2	8.2	1.6	0.3			
C	146.0	147.9	147.0	145.9			146.7
	1.6	10.0	6.0	1.2			
D	144.5	147.7	147.8	143.7			145.9
	-4.9	9.1	9.5	-8.4			
E	148.4	148.9	146.5	143.2			146.8
	12.1	14.3	3.8	-10.6			
Average	145.9	147.1	145.7	143.9			145.6
				Standard Deviation =			2.3

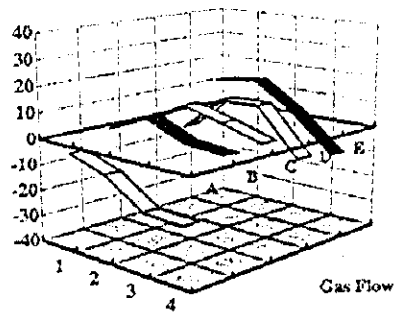
Calculation Formula

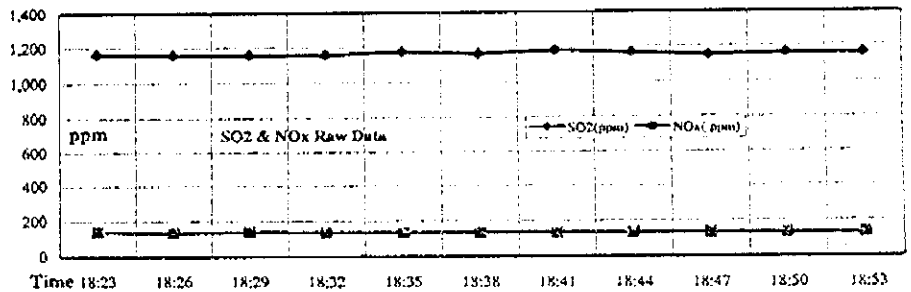
$$\text{Deviation} = \frac{(\text{Velocity} - \text{Average Velocity}) \times 10}{\text{Standard Deviation}}$$

Velocity Deviation Distribution Graph



Temperature Deviation Distribution Graph





2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)		32.5		32.5
Gas Manometer (mm)	4	0.294	4	0.294
Pre.Weight (g)	122.573	125.427	124.188	124.604
Post.Weight (g)	123.384	125.467	124.983	124.658
Balance Weight (g)	0.811	0.04	0.795	0.05
Total Weight (g)	0.851		0.849	
Sucked Volume (L)	20		20	
Pv. (mmHg)	36.52		36.52	
Xw (%)	7.02%		7.00%	
Average Xw (%)	7.01%			

3. Soot Concentration

	1	B-3	2	B-3
Temp. Average (℃)	35-35.5	35.25	35.5-36	35.75
Gas Manometer (mm)	10	0.735	5	0.368
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	18.3 L/min		18.3 L/min	
Collected Soot Amount	0.0455 g		0.0467 g	
Sucked Stack Gas V(L)	310	213	300	206
Pv. (mmHg)	42.61		43.80	
Soot Concentration	0.213 g/m3N		0.227 g/m3N	
Ave. Soot Concentration	0.220 g/m3N			
O2 Conversion Value	0.369 g/m3N		Ave.O2	8.47

6. SO2, NOx, & O2 Raw Data

	18:23	18:26	18:29	18:32	18:35	18:38	18:41	18:44	18:47	18:50	18:53	Avg.
SO2(ppm)	1,165	1,159	1,160	1,158	1,172	1,160	1,179	1,165	1,150	1,159	1,159	1,162
NOx(ppm)	140	135	140	137	136	137	135	136	135	134	134	136
O2 %	8.55	8.67	8.41	8.59	8.50	8.45	8.45	8.38	8.41	8.40	8.40	8.47
SO2(O2)	1,404	1,410	1,382	1,400	1,406	1,386	1,409	1,385	1,370	1,380	1,380	1,392
NOx(O2)	169	165	166	165	163	164	161	162	161	159	159	163

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 3 at Esfahan P/P (1998/6/11, 10:30-18:00)
Fuel Type : Heavy Oil (10.8tons/h) & Natural Gas 10,800m3N/h Output : 75MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	841	Pitot coef.	0.85	Density	0.776				
mmHg	631.0	Ethanol Temperature	36	γ0=1.3kgf/m3N	1.3				
Rep. Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
B-3	45	75	25	0.2	4.66	-0.476	141.1	0.711	9.63

2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)		29.5		29.5
Gas Manometer (mm)	2	0.147	2	0.147
Pre.Weight (g)	126.697	125.205	126.174	124.690
Post.Weight (g)	127.950	125.294	127.453	124.777
Balance Weight (g)	1.253	0.089	1.279	0.087
Total Weight (g)	1.342		1.366	
Sucked Volume (L)	22		20	
Pv. (mmHg)	30.75		30.75	
Xw (%)	9.62%		10.65%	
Average Xw (%)	10.14%			

3. Soot Concentration

	1	B-3	2	B-3
Temp. Average (℃)	31-32	31.5	32-32	32
Gas Manometer (mm)	14	1.029	14	1.029
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	11.75 L/min		11.75 L/min	
Collected Soot Amount	0.0252 g		0.0284 g	
Sucked Stack Gas V(L)	300	211	300	211
Pv. (mmHg)	34.50		35.50	
Soot Concentration	0.119 g/m3N		0.135 g/m3N	
Ave. Soot Concentration	0.127 g/m3N			
O2 Conversion Value	0.654 g/m3N		Ave.O2	16.92

SO2, NOx, & O2 Raw Data measured on June 4, 1998

	17:40	17:43	17:46	17:49	17:52	17:55	17:58	18:01	18:04	18:07	18:10	Avg.
SO2 (ppm)	1,184	1,186	1,189	1,187	1,190	1,191	1,193	1,200	936	899	899	1,114
NOx (ppm)	175	182	188	188	187	184	185	186	191	129	132	175
O2 %	8.09	7.88	7.71	7.79	7.71	7.82	7.79	7.80	10.88	11.62	11.65	8.79
SO2(O2)	1,376	1,356	1,342	1,348	1,343	1,355	1,355	1,364	1,387	1,438	1,442	1,373
NOx(O2)	203	208	212	213	211	209	210	211	283	206	212	216

Air Intake

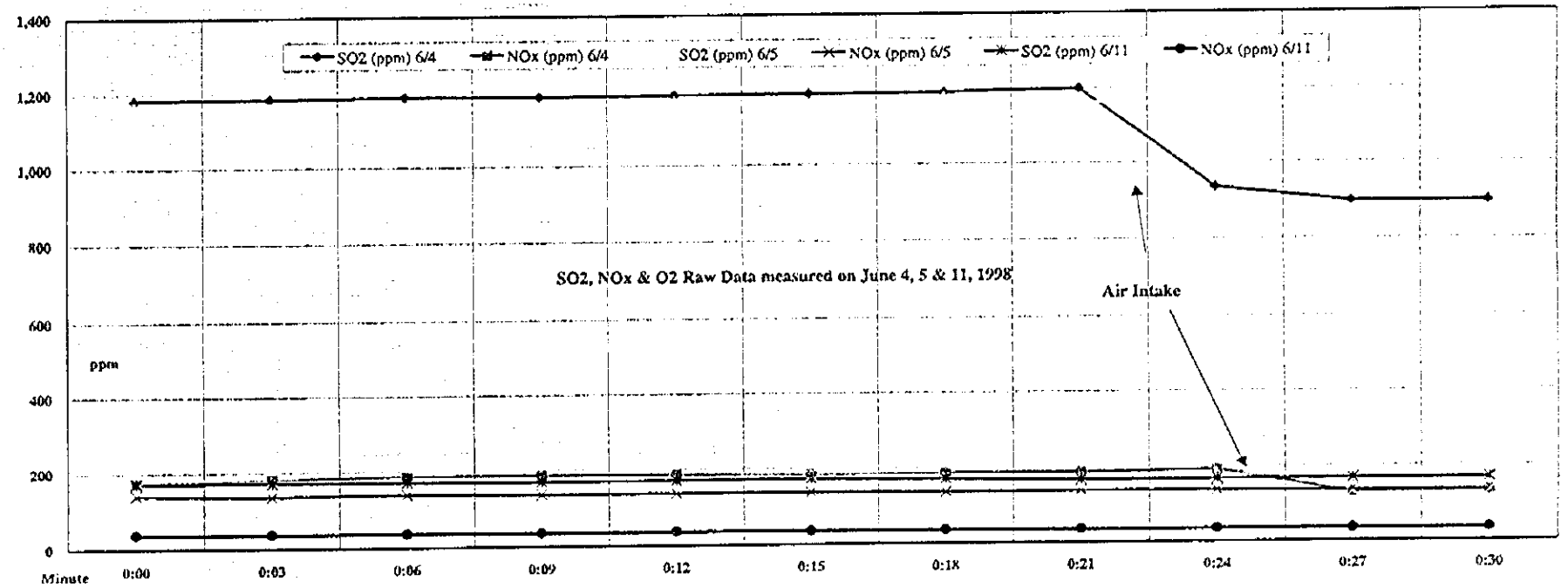
SO2, NOx, & O2 Raw Data measured on June 5, 1998

	18:23	18:26	18:29	18:32	18:35	18:38	18:41	18:44	18:47	18:50	18:53	Avg.
SO2 (ppm)	1,165	1,159	1,160	1,158	1,172	1,160	1,179	1,165	1,150	1,159	1,159	1,162
NOx (ppm)	140	135	140	137	136	137	135	136	135	134	134	136
O2 %	8.55	8.67	8.41	8.59	8.50	8.45	8.45	8.38	8.41	8.40	8.40	8.47
SO2(O2)	1,404	1,410	1,382	1,400	1,406	1,386	1,409	1,385	1,370	1,380	1,380	1,392
NOx(O2)	169	165	166	165	163	164	161	162	161	159	159	163

SO2, NOx, & O2 Raw Data measured on June 11, 1998

	14:45	14:48	14:51	14:54	14:57	15:00	15:03	15:06	15:09	15:12	15:15	Avg.
SO2 (ppm)	172	171	172	171	171	172	170	166	166	167	167	170
NOx (ppm)	38	37	38	36	37	36	36	35	35	34	34	36
O2 %	16.96	16.93	16.87	16.89	16.98	16.89	16.87	16.97	16.94	16.93	16.93	16.92
SO2(O2)	638	632	624	623	638	629	618	616	614	615	615	624
NOx(O2)	142	138	136	132	138	131	130	130	130	126	126	133

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%



Monitoring Results for Unit 3 at Esfahan P/P (1998/8/16, 12:00-18:30)
Fuel Type : Heavy Oil (11tons/h) & Natural Gas (11,000m3N/h) Output : 75MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	840.5	Pitot coef.		0.85	Density		0.76		
mmHg	631	Ethanol Temperatur		43	γ 0=1.3kgf/m3N		1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity. (m/s)
A-1	4	90		0.1	6.54		143.0	0.708	11.4
A-2	4	75	10	0.1	5.40	-0.253	144.5	0.705	10.4
A-3	0	55		0.1	4.18		148.0	0.699	9.2
A-4	0	40		0.1	3.04		150.0	0.696	7.9
B-1	7	180		0.1	13.1		143.2	0.707	16.2
B-2	7	120	30	0.1	8.59	-0.328	150.6	0.695	13.2
B-3	0	115		0.1	8.74		154.2	0.689	13.4
B-4	0	90		0.1	6.84		153.2	0.691	11.8
C-1	7	110		0.1	7.83		157.7	0.683	12.7
C-2	7	90	20	0.1	6.31	-0.262	154.1	0.689	11.4
C-3	0	100		0.1	7.60		156.1	0.686	12.5
C-4	0	165		0.1	12.5		154.3	0.689	16.1
D-1	2	145		0.2	21.7		156.3	0.686	21.2
D-2	2	115	70	0.1	8.59	-0.076	156.0	0.686	13.3
D-3	0	250		0.1	19.0		155.5	0.687	19.8
D-4	0	265		0.1	20.1		151.7	0.693	20.3
E-1	4	130		0.2	19.2		154.4	0.689	19.8
E-2	4	120	50	0.2	17.6	-0.423	158.7	0.682	19.1
E-3	0	150		0.2	22.8		154.0	0.689	21.6
E-4	0	145		0.2	22.0		153.0	0.691	21.3
Average					12.1	-0.268	152.4	0.692	15.1

= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	11.4	10.4	9.2	7.9			9.7
	-8.3	-10.6	-13.3	-16.3			
B	16.2	13.2	13.4	11.8			13.7
	2.4	-4.3	-3.9	-7.4			
C	12.7	11.4	12.5	16.1			13.2
	-5.4	-8.4	-5.9	2.1			
D	21.2	13.3	19.8	20.3			18.6
	13.6	-4.1	10.4	11.6			
E	19.8	19.1	21.6	21.3			20.5
	10.6	9.0	14.6	13.7			
Average	16.3	13.5	15.3	15.5			15.1
				Standard Deviation =			4.5

5. Temperature (℃) / Deviation

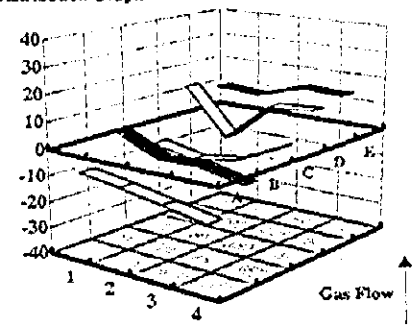
Temperature (℃) / Deviation

	1	2	3	4	5	6	Average
A	143.0	144.5	148.0	150.0			146.4
	-20.5	-17.3	-9.6	-5.3			
B	143.2	150.6	154.2	153.2			150.3
	-20.1	-4.0	3.9	1.7			
C	157.7	154.1	156.1	154.3			155.6
	11.5	3.6	8.0	4.1			
D	156.3	156.0	155.5	151.7			154.9
	8.4	7.8	6.7	-1.6			
E	154.4	158.7	154.0	153.0			155.0
	4.3	13.7	3.4	1.3			
Average	150.9	152.8	153.6	152.4			152.4
				Standard Deviation =			4.6

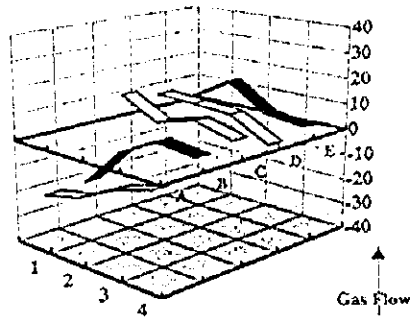
Calculation Formula

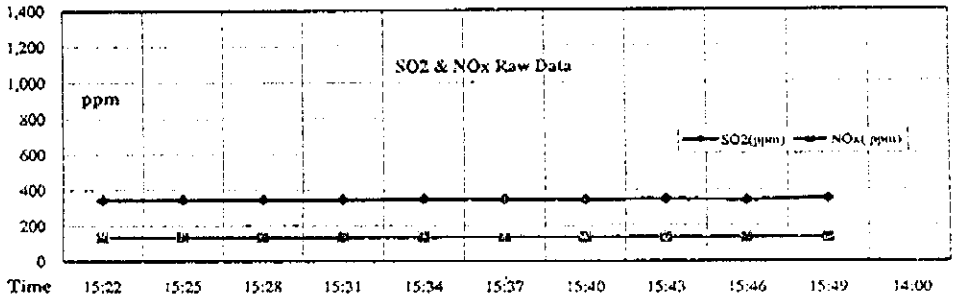
$$\text{Deviation} = \frac{(\text{Velocity} - \text{Average Velocity}) \times 10}{\text{Standard Deviation}}$$

Velocity Deviation Distribution Graph



Temperature Deviation Distribution Graph





2. Water Content

	1	C-3	2	C-3
Temp. Average (℃)		32.5		32.5
Gas Manometer (mm)	4	0.294	4	0.294
Pre.Weight (g)	125.856	123.695	127.652	126.442
Post.Weight (g)	126.982	123.712	128.842	126.503
Balance Weight (g)	1.126	0.02	1.190	0.06
Total Weight (g)	1.143		1.251	
Sucked Volume (L)	20		20	
Pv. (mmHg)	36.52		36.52	
Xw (%)	9.24%		10.02%	
Average Xw (%)	9.63%			

3. Soot Concentration

	1	B-1	2	B-1
Temp. Average (℃)		38		38
Gas Manometer (mm)	10	0.735	5	0.368
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	18.74 L/min		18.74 L/min	
Collected Soot Amount	0.0240 g		0.0302 g	
Sucked Stack Gas V(L)	310	208	300	201
Pv. (mmHg)	49.55		49.55	
Soot Concentration	0.115 g/m3N		0.150 g/m3N	
Ave. Soot Concentration	0.133 g/m3N			
O2 Conversion Value	0.335 g/m3N		Ave.O2	12.69

6. SO2, NOx, & O2 Raw Data monitored on August 16, 1998

	15:22	15:25	15:28	15:31	15:34	15:37	15:40	15:43	15:46	15:49	14:00	Avg.
SO2(ppm)	345	347	346	348	351	350	347	350	344	353		348
NOx(ppm)	135	137	137	137	138	139	138	137	138	138		137
O2 %	12.91	12.36	12.39	12.89	13.00	12.65	12.65	12.96	12.58	12.49		12.69
SO2(O2)	640	602	603	644	658	629	623	653	613	622		629
NOx(O2)	251	238	239	253	259	250	248	256	246	243		248

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 3 at Esfahan P/P (1998/10/13, 10:00-14:30)
Fuel Type : Heavy Oil (19.2tons/h) & Natural Gas(17,100m3N/h) Output : 120MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	849	Pitot coef.		0.85	Density	0.783			
mmHg	637	Ethanol Temperatu		27	γ0=1.3kgf/m3N	1.3			
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	0	70		0.2	11.0		148.2	0.707	14.8
A-2	0	50	75	0.2	7.8	0.448	150.0	0.704	12.6
A-3	0	40		0.2	6.3		148.0	0.707	11.2
A-4	0	20		0.2	3.1		142.4	0.717	7.9
B-1	0	180		0.2	28.2		144.5	0.712	23.7
B-2	0	120	70	0.2	18.8	-0.192	153.5	0.697	19.5
B-3	0	110		0.2	17.2		154.2	0.696	18.7
B-4	0	125		0.2	19.6		152.8	0.698	19.9
C-1	0	130		0.2	20.4		159.4	0.688	20.5
C-2	0	100	70	0.2	15.7	-0.026	158.0	0.690	17.9
C-3	0	120		0.2	18.8		162.5	0.683	19.7
C-4	0	200		0.2	31.3		159.8	0.687	25.4
D-1	0	180		0.3	47.0		158.0	0.692	31.0
D-2	0	170	200	0.3	44.4	1.481	159.2	0.690	30.2
D-3	0	260		0.2	40.7		161.2	0.687	29.0
D-4	0	230		0.2	36.0		156.4	0.694	27.1
E-1	0	170		0.3	44.4		155.0	0.694	30.1
E-2	0	160	90	0.3	41.8	-0.491	159.5	0.687	29.3
E-3	0	170		0.3	44.4		159.1	0.688	30.2
E-4	0	180		0.3	47.0		156.5	0.692	31.0
Average					27.2	0.244	154.9	0.695	22.5

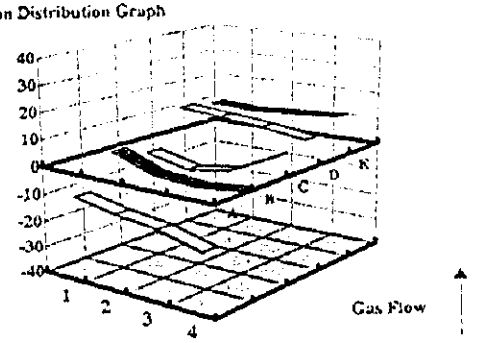
= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	14.8 -10.6	12.6 -13.7	11.2 -15.5	7.9 -20.1			11.6
B	23.7 1.6	19.5 -4.1	18.7 -5.2	19.9 -3.5			20.5
C	20.5 -2.8	17.9 -6.3	19.7 -3.8	25.4 4.0			20.9
D	31.0 11.7	30.2 10.6	29.0 8.9	27.1 6.4			29.3
E	30.1 10.5	29.3 9.4	30.2 10.6	31.0 11.7			30.2
Average	24.0	21.9	21.8	22.3			22.5
				Standard Deviation =			7.3

Velocity Deviation Distribution Graph

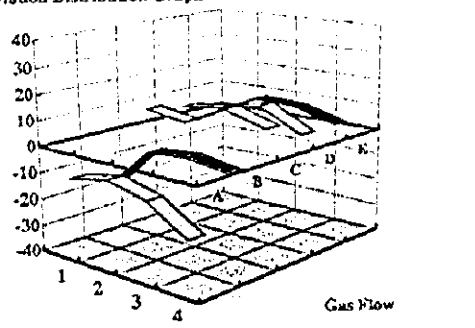


5. Temperature (℃) / Deviation

Temperature (℃) / Deviation

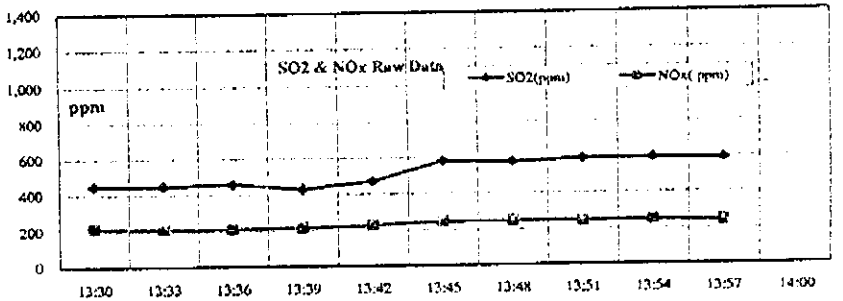
	1	2	3	4	5	6	Average
A	148.2 -11.8	150.0 -8.7	148.0 -12.2	142.4 -22.1			147.2
b	144.5 -18.4	153.5 -2.5	154.2 -1.3	152.8 -3.7			151.3
C	159.4 7.9	158.0 5.4	162.5 13.4	159.8 8.6			159.9
D	158.0 5.4	159.2 7.6	161.2 11.1	156.4 2.6			158.7
E	155.0 0.2	159.5 8.1	159.1 7.4	156.5 2.8			157.5
Average	153.0	156.0	157.0	153.6			154.9
				Standard Deviation =			5.7

Temperature Deviation Distribution Graph



Calculation Formula

$$\text{Deviation} = \frac{(\text{Velocity} - \text{Average Velocity}) \times 10}{\text{Standard Deviation}}$$



2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)		24		24
Gas Manometer (mm)	4	0.294	4	0.294
Pre.Weight (g)	129.886	124.867	126.673	126.823
Post.Weight (g)	131.306	124.940	128.104	126.873
Balance Weight (g)	1.42	0.07	1.431	0.05
Total Weight (g)	1.493		1.481	
Sucked Volume (L)	20		20	
Pv. (mmHg)	22.20		22.20	
Xw (%)	11.10%		11.02%	
Average Xw (%)	11.06%			

3. Soot Concentration

Suspected Value

	1	B-1	2	B-1
Temp. Average (℃)		22		22
Gas Manometer (mm)	10	0.735	5	0.368
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	26.07 L/min		18.3 L/min	
Collected Soot Amount	0.017 g		0.026 g	
Sucked Stack Gas V(L)	310	233	300	226
Pv. (mmHg)	19.64		19.64	
Soot Concentration	0.074 g/m3N		0.117 g/m3N	
Ave. Soot Concentration	0.095 g/m3N			
O2 Conversion Value	0.171 g/m3N		Ave.O2	9.28

6. SO2, NOx, & O2 Raw Data

	13:30	13:33	13:36	13:39	13:42	13:45	13:48	13:51	13:54	13:57	14:00	Ave.
SO2(ppm)	449	450	459	430	471	580	575	590	594	588		519
NOx(ppm)	217	213	214	218	229	248	249	247	251	244		233
O2 %	10.05	10.12	9.76	9.88	10.41	8.46	8.36	8.33	8.41	8.98		9.28
SO2(O2)	615	620	612	580	668	694	682	699	708	734		661
NOx(O2)	297	294	286	294	324	297	295	292	299	304		298

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 3 at Esfahan P/P	(1999/1/24, 10:00-14:30)
Fuel Type : Heavy Oil (20tons/h)	Output : 77MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	839	Pitot coef.		0.85	Density		0.789		
mmHg	629.5	Ethanol Temperature		10	γ 0=1.2kgf/m3N		1.3		
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	0	85		0.1	6.7		148.1	0.698	11.7
A-2	0	45	-40	0.1	3.6	-0.421	144.3	0.704	8.5
A-3	0	200		0.1	15.8		128.1	0.732	17.5
A-4	0	230		0.1	18.1		129.8	0.729	18.8
B-1	0	150		0.1	11.8		147.2	0.699	15.5
B-2	0	135	30	0.1	10.7	-0.392	144.9	0.703	14.6
B-3	0	40		0.1	3.2		128.0	0.733	7.8
B-4	0	80		0.1	6.3		132.5	0.724	11.1
C-1	0	65		0.1	5.1		147.3	0.699	10.2
C-2	0	70	-20	0.1	5.5	-0.409	147.9	0.698	10.6
C-3	0	100		0.1	7.9		133.2	0.723	12.4
C-4	0	165		0.1	13.0		129.4	0.730	15.9
D-1	0	135		0.2	21.3		139.9	0.711	20.6
D-2	0	270	30	0.1	21.3	-0.958	140.1	0.710	20.6
D-3	0	220		0.1	17.4		131.7	0.725	18.4
D-4	0	230		0.1	18.1		127.5	0.733	18.7
E-1	0	30		0.2	4.7		141.5	0.708	9.7
E-2	0	105	25	0.2	16.6	-0.590	138.1	0.714	18.1
E-3	0	150		0.2	23.7		129.0	0.731	21.4
E-4	0	280		0.1	22.1		125.2	0.737	20.6
Average					12.6	-0.554	136.7	0.717	15.1

= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) Deviation

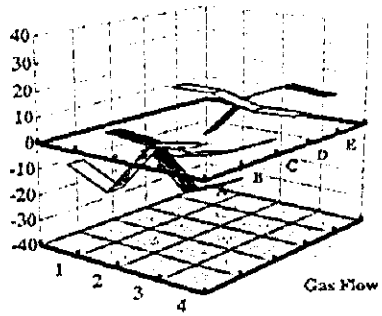
	1	2	3	4	5	6	Average
A	11.7	8.5	17.5	18.8			14.1
	-7.7	-14.8	5.1	8.0			
B	15.5	14.6	7.8	11.1			12.3
	0.8	-1.1	-16.2	-8.9			
C	10.2	10.6	12.4	15.9			12.3
	-10.9	-10.0	-6.0	1.7			
D	20.6	20.6	18.4	18.7			19.6
	12.1	12.1	7.2	7.9			
E	9.7	18.1	21.4	20.6			17.5
	-11.9	6.6	13.9	12.1			
Average	13.5	14.5	15.5	17.0			15.1
				Standard Deviation =			4.5

5. Temperature (℃) / Deviation

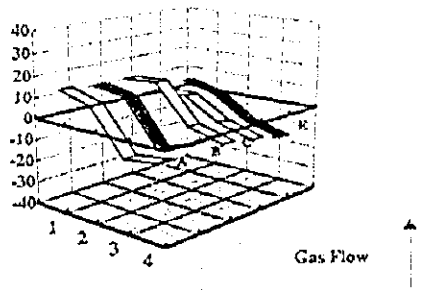
Temperature (℃) Deviation

	1	2	3	4	5	6	Average
A	148.1	144.3	128.1	129.8			137.6
	14.2	9.5	-10.7	-8.6			
B	147.2	144.9	128.0	132.5			138.2
	13.1	10.2	-10.8	-5.2			
C	147.3	147.9	133.2	129.4			139.5
	13.2	13.9	-4.3	-9.0			
D	139.9	140.1	131.7	127.5			134.8
	4.0	4.2	-6.2	-11.4			
E	141.5	138.1	129.0	125.2			133.5
	6.0	1.8	-9.5	-14.3			
Average	144.8	143.1	130.0	128.9			136.7
				Standard Deviation =			8.1

Velocity Deviation Distribution Graph

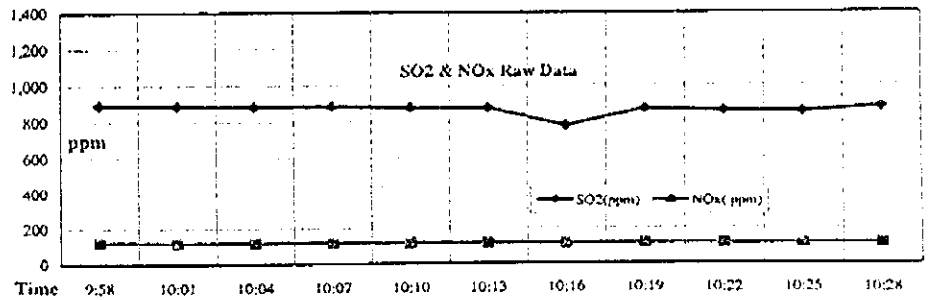


Temperature Deviation Distribution Graph



Calculation Formula

Deviation = (Velocity-Average Velocity) / Standard Deviation ×10



2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)		10.5		10.5
Gas Manometer (mm)	4	0.294	4	0.294
Pre.Weight (g)	122.966	124.524	126.921	128.799
Post.Weight (g)	124.150	124.545	128.091	128.817
Balance Weight (g)	1.1836	0.02	1.170	0.02
Total Weight (g)	1.204		1.188	
Sucked Volume (L)	20		20	
Pv. (mmHg)	9.35		9.35	
Xw (%)	8.70%		8.60%	
Average Xw (%)	8.65%			

3. Soot Concentration

	1	B-1	2	B-1
Temp. Average (℃)		10		10
Gas Manometer (mm)	10	0.735	5	0.368
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	16.17 L/min		16.17 L/min	
Collected Soot Amount	0.032 g		0.038 g	
Sucked Stack Gas V(L)	500	394	500	394
Pv. (mmHg)	9.04		9.04	
Soot Concentration	0.082 g/m3N		0.096 g/m3N	
Ave. Soot Concentration	0.089 g/m3N			
O2 Conversion Value	0.187 g/m3N		Ave.O2	11.02

6. SO2, NOx, & O2 Raw Data

	9:58	10:01	10:04	10:07	10:10	10:13	10:16	10:19	10:22	10:25	10:28	Avg.
SO2(ppm)	893	888	883	887	878	876	777	871	860	855	879	868
NOx(ppm	123	120	120	120	118	118	115	116	116	116	116	118
O2 %	10.81	10.91	10.96	10.76	10.76	11.01	11.41	11.14	11.23	11.26	10.98	11.02
SO2(O2)	1,315	1,320	1,319	1,299	1,286	1,315	1,215	1,325	1,320	1,317	1,316	1,305
NOx(O2)	182	178	179	175	172	177	180	177	178	178	174	177

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

Monitoring Results for Unit 4 at Esfahan P/P (1999/2/22, 10:00-16:00)
Fuel Type : Heavy Oil (the Q'ty/h was not confirmed) Output : 165MW

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	844	Pitot coef.		0.85	Density (g/cm3)		1	
mmHg	633.2	Water Temperature		20	γ 0=1.3kgf/m3N		1.3	
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Mano. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kgf/m3)	Velocity (m/s)
A-1	68	280		0.1	21.2		160.6	0.682	21.0
A-2	68	230	100	0.1	16.2	-0.625	166.9	0.672	18.5
A-3	51	140	115	0.1	8.9	-0.002	176.2	0.658	13.8
A-4	51	200		0.1	14.9		175.0	0.660	17.9
A-5									
A-6									
B-1	54	182		0.2	25.6		163.6	0.677	23.1
B-2	54	140	65	0.2	17.2	-0.752	165.3	0.674	19.0
B-3	54	130	100	0.2	15.2	-0.131	176.4	0.658	18.1
B-4	54	195		0.2	28.2		178.5	0.655	24.7
B-5									
B-6									
C-1	52	135		0.2	16.6		161.2	0.681	18.6
C-2	52	110	35	0.2	11.6	-0.866	163.7	0.677	15.6
C-3	45	140	115	0.2	19.0	0.020	180.2	0.652	20.3
C-4	45	160		0.2	23.0		180.2	0.652	22.3
C-5									
C-6									
D-1	39	190		0.2	30.2		166.4	0.673	25.2
D-2	39	180	100	0.2	28.2	-0.601	167.1	0.671	24.4
D-3	45	185	120	0.2	28.0	-0.385	174.0	0.661	24.5
D-4	45	225		0.2	36.0		174.8	0.660	27.8
D-5									
D-6									
E-1	54	172		0.2	23.6		169.5	0.668	22.4
E-2	54	190	110	0.2	27.2	-0.621	173.2	0.663	24.1
E-3	49	240	175	0.2	38.2	-0.176	179.2	0.654	28.8
E-4	49	230		0.2	36.2		178.1	0.655	28.0
E-5									
E-6									
Average					23.3	-0.238	171.5	0.665	21.9

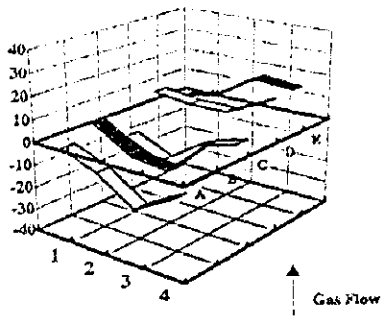
= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	21.0	18.5	13.8	17.9			17.8
	-2.2	-8.3	-19.4	-9.7			
B	23.1	19.0	18.1	24.7			21.2
	3.0	-7.0	-9.2	6.7			
C	18.6	15.6	20.3	22.3			19.2
	-8.0	-15.2	-3.8	1.1			
D	25.2	24.4	24.5	27.8			25.5
	8.0	6.0	6.2	14.2			
E	22.4	24.1	26.8	28.0			25.8
	1.1	5.3	16.5	14.6			
Average	22.1	20.3	21.1	24.1			21.9
						Standard Deviation =	4.2

Velocity Deviation Distribution Graph

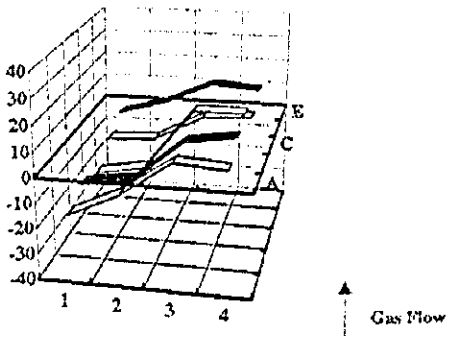


5. Temperature (℃) / Deviation

Temperature (℃) / Deviation

	1	2	3	4	5	6	Average
A	160.6	166.9	176.2	175.0			169.7
	-16.4	-6.9	7.1	5.3			
B	163.6	165.3	176.4	178.5			171.0
	-11.9	-9.3	7.4	10.5			
C	161.2	163.7	180.2	180.2			171.3
	-15.5	-11.7	13.1	13.1			
D	166.4	167.1	174.0	174.8			170.6
	-7.7	-6.6	3.8	5.0			
E	169.5	173.2	179.2	178.1			175.0
	-3.0	2.6	11.6	9.9			
Average	164.3	167.2	177.2	177.3			171.5
						Standard Deviation =	6.6

Temperature Deviation Distribution Graph



Calculation Formula

$$\text{Deviation} = \frac{(\text{Velocity} - \text{Average Velocity})}{\text{Standard Deviation}} \times 10$$

2. Water Content

	1	D-2	2	D-2
Temp. Average (℃)		10		10
Gas Manometer (mm)	2	0.147	2	0.147
Pre.Weight (g)	125.185	121.234	124.150	122.883
Post.Weight (g)	125.234	122.590	124.210	124.622
Balance Weight (g)	0.05	1.36	0.06	1.74
Total Weight (g)	1.41		1.80	
Sucked Volume (L)	20		20	
Pv. (mmHg)	9.04		9.04	
Xw (%)	9.94%		12.38%	
Average Xw (%)	11.16%			

3. Soot Concentration

	1	C-3	2	C-3
Temp. Average (℃)		8		9
Gas Manometer (mm)	4	0.294	4	0.294
Nozzle Diameter	6 mm		6 mm	
Qm (Equal Velocity A)	14.3 L/min		14.3 L/min	
Collected Soot Amount	0.037 g		0.032 g	
Sucked Stack Gas V(L)	400	320	400	318
Pv. (mmHg)	7.88		8.45	
Soot Concentration	0.117 g/m3N		0.100 g/m3N	
Ave. Soot Concentration	0.109 g/m3N			
O2 Conversion Value	g/m3N		Ave.O2 ######	

* 6. SO2, NOx, & O2 Raw Data

	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	0:00	Avg.
SO2(ppm)												######
NOx(ppm)												######
O2(%)												######
SO2(O2)												######
NOx(O2)												######

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

* SO2, NOx and O2 monitoring was not taken due to the fact that standard gases were not delivered in time to meet the monitoring.

Monitoring Results for Unit 4 at Esfahan P/P	(1998/6/6, 10:30-18:00)
Fuel Type : Heavy Oil (71tons/h)	Output : 320MW (Max.)

1. Dynamic, Real & Static Pressure, and Temperature & Velocity Raw Data

Pa	844	Pitot coef.	0.85	Density	0.777			
mmHg	633.2	Ethanol Temperature	8	γ0=1.3kg//m3N	1.3			
Point	Zero (mm)	D.ps. (mm)	T.ps. (mm)	Manо. Incl.	Real ps. (mm)	S.ps. (mm)	Temp. ℃	γ (kg//m3)	Velocity (m/s)
A-1	13	210		0.3	51.0		185.2	0.647	33.4
A-2	13	180		0.3	43.2		187.8	0.643	30.9
A-3	13	130	180	0.3	30.3	1.570	191.1	0.639	25.9
A-4	13	120		0.3	27.7		193.8	0.635	24.9
A-5	13	165		0.3	39.4		192.2	0.637	29.6
A-6	13	220		0.3	53.6		189.5	0.641	34.4
B-1	13	250		0.3	61.4		178.6	0.656	36.4
B-2	13	255		0.3	62.7		187.9	0.643	37.2
B-3	13	155	185	0.3	36.8	1.322	191.0	0.639	28.6
B-4	12	125		0.3	29.3		193.8	0.635	25.6
B-5	12	125		0.3	29.3		195.0	0.633	25.6
B-6	12	210		0.3	51.3		193.9	0.635	33.8
C-1	13	220		0.3	53.6		189.9	0.640	34.4
C-2	13	180		0.3	43.2		190.2	0.640	30.9
C-3	13	160	200	0.3	38.1	1.538	194.6	0.634	29.2
C-4	12	145		0.3	34.4		195.2	0.633	27.8
C-5	12	120		0.3	28.0		195.0	0.633	25.0
C-6	12	160		0.3	38.3		192.5	0.637	29.2
D-1	11	220		0.3	54.1		191.5	0.638	34.7
D-2	11	220		0.3	54.1		193.5	0.635	34.7
D-3	11	190	210	0.3	46.4	1.327	194.0	0.634	32.2
D-4	15	185		0.3	44.0		193.0	0.636	31.3
D-5	15	215		0.3	51.8		191.8	0.638	33.9
D-6	15	240		0.3	58.3		190.2	0.640	35.9
E-1	11	180		0.3	43.8		190.1	0.640	31.1
E-2	11	255		0.3	63.2		195.2	0.633	37.6
E-3	11	260	245	0.3	64.5	1.030	196.2	0.631	38.0
E-4	10	275		0.3	68.6		193.9	0.634	39.1
E-5	10	270		0.3	67.3		189.0	0.641	38.6
E-6	10	240		0.3	59.6		184.4	0.648	36.1
Average					47.6	1.357	191.3	0.638	32.2

= The Representative Point

4. Velocity (m/s) / Deviation

Velocity (m/s) / Deviation

	1	2	3	4	5	6	Average
A	33.4	30.9	25.9	24.9	29.6	34.4	29.8
	2.8	-3.1	-14.4	-16.9	-6.0	5.1	
B	36.4	37.2	28.6	25.6	25.6	33.8	31.2
	9.7	11.4	-8.4	-15.3	-15.2	3.7	
C	34.4	30.9	29.2	27.8	25.0	29.2	29.4
	5.1	-2.9	-7.0	-10.2	-16.5	-6.9	
D	34.7	34.7	32.2	31.3	33.9	35.9	33.8
	5.7	5.8	-0.1	-2.0	4.0	8.5	
E	31.1	37.6	38.0	39.1	38.6	36.1	36.8
	-2.4	12.4	13.4	16.0	14.6	9.0	
Average	34.0	34.3	30.8	29.7	30.5	33.9	32.2
						Standard Deviation =	4.4

5. Temperature (℃) / Deviation

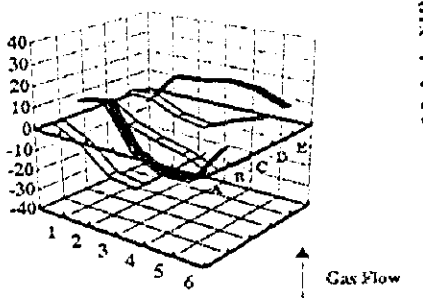
Temperature (℃) / Deviation

	1	2	3	4	5	6	Average
A	185.2	187.8	191.1	193.8	192.2	189.5	189.9
	-16.1	-9.3	-0.6	6.5	2.3	-4.8	
B	178.6	187.9	191.0	193.8	195.0	193.9	190.0
	-33.4	-9.0	-0.9	6.5	9.6	1.3	
C	189.9	190.2	194.6	195.2	195.0	192.5	192.9
	-3.8	-3.0	8.6	10.2	9.6	3.1	
D	191.5	193.5	194.0	193.0	191.8	190.2	192.3
	0.4	5.7	7.0	4.4	1.2	-3.0	
E	190.1	195.2	196.2	193.9	189.0	184.4	191.5
	-3.2	10.2	12.8	6.7	-6.1	-18.2	
Average	187.1	190.9	193.4	193.9	192.6	190.1	191.3
						Standard Deviation =	3.8

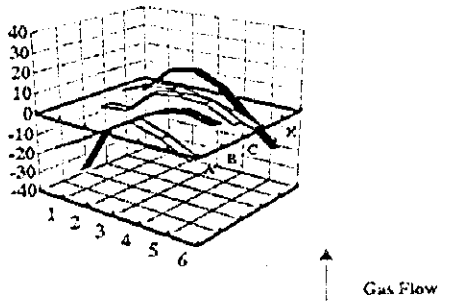
Calculation Formula

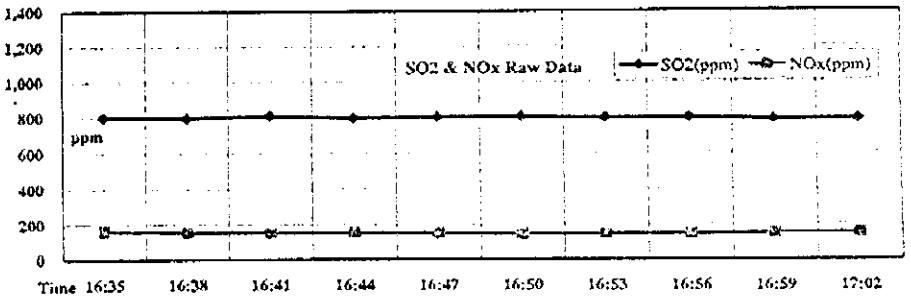
Deviation = (Velocity-Average Velocity) / Standard Deviation ×10

Velocity Deviation Distribution Graph



Temperature Deviation Distribution Graph





6. SO2, NOx, & O2 Raw Data

	16:35	16:38	16:41	16:44	16:47	16:50	16:53	16:56	16:59	17:02	Avg.
SO2(ppm)	802	798	809	797	802	803	796	798	785	786	798
NOx(ppm)	160	156	155	153	151	146	148	147	151	154	152
O2 (%)	12.50	12.53	12.61	12.61	12.59	12.50	12.52	12.72	12.68	12.59	12.59
SO2(O2)	1,415	1,413	1,446	1,425	1,430	1,417	1,408	1,446	1,415	1,402	1,422
NOx(O2)	283	277	276	274	269	257	262	266	271	275	271

Note: SO2(O2) & NOx(O2) = SO2 & NOx values based on O2=6%

2. Water Content

	1	C-2	2	C-2
Temp. Average (℃)	33-33	33	33-33	33
Gas Manometer (mm)	4	0.294	4	0.294
Pre.Weight (g)	125.065	123.712	121.624	124.522
Post.Weight (g)	126.219	123.790	122.799	124.59
Balance Weight (g)	1.15	0.08	1.18	0.07
Total Weight (g)	1.23		1.24	
Sucked Volume (L)	20		20	
Pv. (mmHg)	37.57		37.57	
Xw (%)	9.88%		9.96%	
Average Xw (%)	9.92%			

3. Soot Concentration

	1	D-3	2	D-3
Temp. Average (℃)	33-34	33.5	34-34	34
Gas Manometer (mm)	6	0.441	6	0.441
Nozzle Diameter	4 mm		4 mm	
Qm (Equal Velocity A)	15.3 L/min		15.3 L/min	
Collected Soot Amount	0.059 g		0.1129 g	
Sucked Stack Gas V(L)	300	209	300	208
Pv. (mmHg)	38.64		39.74	
Soot Concentration	0.282 g/m3N		0.542 g/m3N	
Ave. Soot Concentration	0.412 g/m3N			
O2 Conversion Value	1.028 g/m3N		Ave.O2	12.59