Annexure 2.1

Quality Assurance and Quality Control

Each measurement consists of a value, precision, accuracy, and validity. So quality control/Quality assurance (QA/QC) is backbone of good quality acceptable data. Quality control (QC) and quality auditing establish the precision, accuracy, and validity of measured values. Quality assurance integrates quality control and quality auditing to determine these four attributes of each environmental measurement.[1]

Quality control: - It is the responsibility of the laboratory conducting the work. Quality control tasks generally include [2]:

- Efforts made of ensure the quality of the measurements is within established tolerance levels.
- Measurements and analytical performance checks needs to characterize data quality (i.e., detection limits, precision and accuracy); and
- Verification of comparability with related measurements and between operators/analysts.
- Quality control activities begin with the design of the measurement strategy and continue through the final validation of the database. These activities include:
- The development of standard operating procedures with comprehensive measurement performance checks.
- The inclusion of measurements for the estimation of accuracy, precision, and detection limits (i.e., to characterize data quality).
- Documentation of field and analytical activities.
- Data validation.

Quality assurance*:* - It is the responsibility of an independent auditor. The task of the auditor is to satisfy the following questions:

- Are the Documented procedures complete and accurate?
- Are the performance checks adequate so that a problem with the instrument will not go undetected?
- Are there laboratory/field practices that might adversely affect the quality of the data?
- Do the reported measures of data quality hold up to scrutiny?

To address these questions, the auditor (if nominated) identifies deviations from standard operation procedures, evaluates laboratory quality control procedures, looks for gaps in sampling and analytical performance checks, observes sample handling, and looks for the sources of contamination. In addition, the auditor often conducts a performance audit. Standards blanks, spiked samples, and sometimes previously analyzed samples are presented to the laboratory for blind analysis. The auditor uses these results to independently assess measurement accuracy, precision, and detection limits. These values are compared to the laboratory-reported values.

Standard Operating Procedure: - In order to ensure proper QA/QC process Standard operating procedures (SOP) are recommended to be developed which delineate step-by-step, the procedures to be followed for sample collection, analysis, substrate preparation, analysis or other activities critically related to the of the study objectives. One normally expects that the SOP will accurately reflect laboratory practice and the document shall be located where the measurement is being performed. During the development of SOP, one must attempt to identify all possible sources of bias and incorporate adequate performance checks to ensure that errors are effectively minimized.
Ideally SOP may include the following basic elements:

- A brief summary of the measurement method, its principles of operation, its expected accuracy and precision, and the assumptions, which must be met for it to be valid.
- A list of materials, equipment, reagents, and suppliers with specifications.
- Defining the responsibilities of individuals to be responsible for each part of the procedure.
- A general traceability path, the designation of primary standards or reference materials, tolerances for transfer standards, and a schedule for transfer standard verification.
- Start-up, routine, and shutdown operating procedures and an abbreviated checklist.
- Copies of data forms with examples of filled out forms.
- Routine maintenance schedules, maintenance procedures, and troubleshooting tips.
- Internal calibration and performance testing procedures and schedules.
- External performance auditing schedules.
- References to relevant literature and related standard operating procedures.

Quality Audit*:* - It is the second important component under QA/QC is the process management. The quality auditing function consists of systems and performance audits.

System Audits: - Systems audits start with a review of the operational and QC procedures to assess whether they are adequate to assure valid data that meet the specified levels of accuracy and precision. After reviewing the procedures, the auditor examines all phases of the measurement or data processing activity to determine that the procedures are being followed and the operational staff is properly trained. The systems audit is intended to be a cooperative assessment resulting in improved data, rather than a judgmental activity.

Performance Audits: - Performance audits establish whether the predetermined specifications are being achieved in practice. The performance audit challenges the measurement/analysis system with known standards traceable to a primary standard. For data processing, the performance audit consists of independently processing sections of the data and comparing the results. Performance objectives should be specified for the field or laboratory instruments on which performance audits are conducted. Audit findings are compared against these values to decide whether or not remedial action is needed.

QA/QC Requirements for Analytical Procedure: - Chemical analysis is a critical as well as most complex process in this project; hence QA/QC plays a very important role.

1. Parlor Blank Analysis: - One or two trip blanks are collected for each season. The objective of collecting trip blanks is to demonstrate the sample handling protocol.
2. Precision and Bias of Analytical Measurements: - This work provides an in-depth study of the analytical precision and bias for the measurements The knowledge of the measurements precision and bias can be used to evaluate an analytical method. It indicates the quality of the measurements and to what extent the measurements can be trusted.

Data Validation and Data Processing: -

1. Data Validation: - Data validation consists of procedures, which identify deviations from measurement assumptions, and procedures. For the data validation process three levels of validation are desirable which will result in the assignment of a rating to each measurement: (1) valid; (2) valid but suspect; or (3) invalid.

2. Data Processing: - Data processing and validation requires the following: (1) assigning of the identification (ID) codes to substrates; (2) field data recording of the IDs and their corresponding sampling sites, sampling dates, sampling times, sampling durations, sample flow rates, and deviations from normal sampling procedures; (3) laboratory instrument recording of analytical outputs; (4) Level I data validation, flagging, and editing of these individual data files; (5) merging field and laboratory data for sample sets; (6) Level II data validation, editing, flagging, and re-analysis; (7) calculation of ambient concentrations and precisions; and (8) formatting and reporting of concentrations, precisions, and data validation activities.

Quality assurance and Quality control (QA/QC) is an essential part of any monitoring system as it ensures that measurements meet defined and appropriate standards of quality, with a stated level of confidence.

References: -

1. Conceptual Guidelines for Common Methodology on Air Quality Monitoring, Inventory and Source Apportionment Studies for Indian Cities – Central Pollution Control Board, Delhi
2. Model Standard Operating Procedures (SOP) for sampling and analysis – Air Quality Monitoring, Emission Inventory & Source Apportionment Studies For Indian Cities - Central Pollution Control Board, Delhi

A) FRM Sampler Model 2000

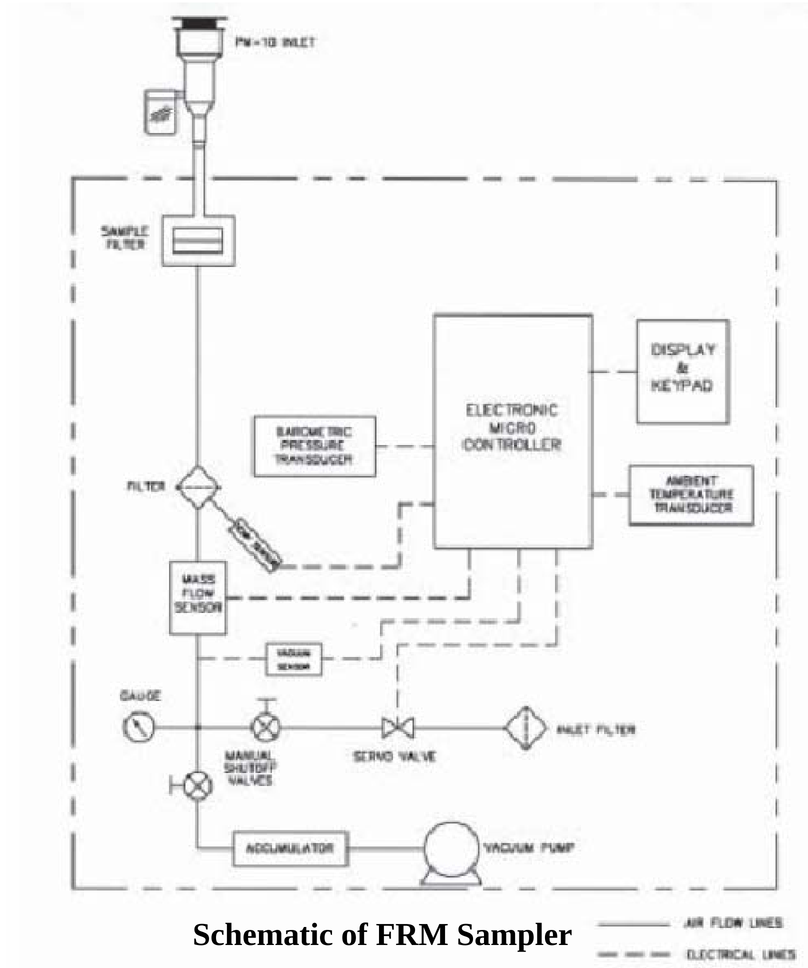
The Partisol-FRM Model 2000 $PM_{2.5}$ Air Sampler is designed to conform to the U.S. EPA Federal Reference Method for fine particulate $PM_{2.5}$ sampling. The Partisol-FRM Sampler contains the U.S. EPA-designed $PM_{2.5}$ WINS Impactor, which performs a 2.5 µm cut of the incoming particulate matter before the sample stream passes through a 47 mm filter. A modified R&P PM_{10} (1st stage) inlet is used at the entrance to the sampler to Provide a pre-cut at a 10 µm particle size and to protect the sample path against precipitation.

Technical Specification of the Partisol Sampler FRM 2000

Sample Flow	5 to 18 l/min
Filter Holders	47mm in a convenient filter cassette carrier
Filter Data Storage:	Includes temperature, pressure, flow, volume, status conditions, filter ID. Store up to 25 filter data records
Data Output:	Display screen, RS232
Operating Range	-40 to 50 °C. Conditions below -25 °C require optional insulating jacket.
Power Requirements	2.2A@120VAC, 1.1A@240VAC
Interval Data Storage:	Time date, temperature, pressure and flow rate stored every 5 minutes. Store up to 14 days of data.

Flow Schematic

The system flow schematic provides an overview of the hardware's flow and electronic connections The schematic shows a PM_{10} inlet that is followed by a down tube and WINS $PM_{2.5}$ Impactor. The WINS Impactor is located inside the sampler enclosure. A 47 mm Teflon filter is housed in a filter cassette that the user installs in a single-filter tray. The tray makes the easy exchange of filters possible in the sampler's filter exchange mechanism, and minimizes the chances of fingers coming into contact with the collection filter.



Schematic of FRM Sampler

Standard Operating Procedure

Leak Test

- Remove the PM10 head.
- Attach leak test adaptor
- Press F5 - setup - audit- leak checking
- Check whether ambient temperature & pressure are 27.3 and 754 mm of Hg. approx.
- Close the leak flow adopter valve (horizontal) (--)
- Do leak test
- Close vacuum valve at the bottom (vertical i.e. |). See the pressure is –15 inches of Hg.
- See the system pressure. It should be around 394 mm of Hg. If there is any leakage it will come to ambient pressure.
- It will indicate leak check is passed.
- Open the vacuum valves and leak adopter valve slowly otherwise it will damage the filter.

Flow Audit

- Remove the flow adapter. See that the casette is inside.
- Place the Calibrator on the top.
- Press Valve - Pump.
- Read the water column constant value and enter as FTS pressure in the edit mode
- If the flow shows 16.7 lpm the calibration is over
- Switch off pump and then valve.

Monitoring

- Go to Filter setup
- Always set up the current time and date (year/MM/Date)
- Set up the start time, close time, start date, closing date, duration 24 hours
- Press run/stop

Post Sampling Verification and Data Retrieval

Follow these steps to verify the sampling run and retrieve data from the unit:

- After the sampling run is complete, press the <RUN/STOP> key when in the Main screen to enter the Stop Mode.
- Remove the filter cassette in the carrier from the sampler by pulling on the handle of the filter exchange mechanism. Place the entire assembly in a metal transport container.
- Check the sampling run status on the Main screen. Note any status code other than "OK."
- Press <F3: Data> to view the filter data from the sampling run. Record data from the Filter Data screen onto a sampling run log sheet, if desired.
- If there were any status codes other than "OK," verify the validity of the sampling run from the output of the Filter Data screen. Press <F4: PwrDat> to view the Power Outage Data screen. Press the <ESC> key to return to the Filter Data screen.
- Download stored data from the sampling run onto a personal computer (PC). Connect the PC to the sampler with the 9 pin-to-9 pin RS232 connector cable.
- Use RP COMM to transfer data from the sampler to the PC.
- Ensure that the sampler is in the Browse Mode.
- When in the Filter Data screen, use the function keys <F1> to <F8> to move to the first record of the sampling run. Press the <F5> function key to access the <F10: Output> function key. All data from the current record displayed in the screen to the last record will automatically download from the sampler to the PC.
- Save the transferred data to the PC.

- Disconnect the RS232 cable.
- Press the <ESC> key twice to return to the Main screen.
- Perform any necessary scheduled maintenance.
- Insert a new filter cassette assembly with a 47 mm filter into the filter exchange mechanism. Push the handle to raise the platform and enclose the filter cassette in the sampling position.

Cautions

- Before transporting the instruments, remove the jar.
- Clean the PM_{10} impactor.
- Attach the leak test adapter.
- Clean the filter cartridge rings.
- Place 45 drops of silica oil on the 37 mm filter used for impaction of coarse particulate matter.
- Check the O rings for leakages, if necessary apply the high vacuum silicon grease

Data sheet for FRM Sampler

Site Name: ___________ Starting Time: ___________ Closing Time: ___________			Date: _________________ Starting Volume: __________ Closing Volume: __________		
Time	Flow (lpm)	Volume (m3)	Time	Flow (lpm)	Volume (m3)
2			3		
3			4		
4			5		
5			6		
6			7		
7			8		
8			9		
9			10		
10			11		
11			12		
12			1		
1			2		
2					

QA/QC for FRM Sampler

- During the period of the sampling FRM sampler was run on every sampling location for the 7 days continuously as per the protocol of the sampling at every site before starting the sampler it is checked for the correct power supply the proper mounting of the sampler on the mounting stand.

- It is also checked for the proper installation of the top accelerating assembly. All the routine maintenance of the cleaning part was done very systematically & as described in the operating manual of the system as well as guided by the service providers of the system. Similarly all the Do's and Don't regarding the system operation was followed.
- During the period of the sampling before set up the sampler for actual sampling it is first checked for the Leak test in both manner viz. External & internal leak test as there is possibility that the some parts of the filter path of the system get loose down in the process of the transportation.
- Similarly the Flow Audit test is also performed to ensure that the flow rate of the sampler must be within the permissible limit as mentioned in the instruction manual after completion of the each monitoring cycle, sampler was calibrated & checked for the primary maintenance.
- The data of routine performance verification of the sampler is noted down in to the field data note book along with the problem faced during the operation of the sampler as well as the trouble shouting occurred specially during the power fail & power fluctuation.
- The data retrieval is done as per mentioned in the SOP but even though the data of Flow rate & volume of air drawn by the sampler is generated on hourly basis by noting down in to the field data sheet along with the problem faced during the sampling.
- Since the calibration was performed with the FTS calibrator kit, it was calibrated against NIST traceable critical flow. Calibration period of the calibrator was within the over all sampling duration.

The data of routine performance verification of the sampler at sampling location is as follows :

Sampling site	**Date**	**Leak check Test Passed at**	**FTS Pressure shown in water column**	**FTS Flow shown**	**Flow audit passed**
Mulund	05/04/07	23 mmHg/min	5.52	16.6 lpm	yes
Remark		Ok	Ok	Ok	Ok
Dadar	25/04/07	22.1 mmHg/min	5.49	16.6 lpm	yes
Remark		Ok	Ok	Ok	Ok
Khar	25/05/07	15.0 mmHg/min	6.05	16.7 lpm	yes
Remark		Ok	Ok	Ok	Ok
Andheri	08/06/07	15.0 mmHg/min	6.08	16.7 lpm	yes
Remark		Ok	Ok	Ok	Ok
Colaba	28/04/07	11.0 mmHg/min	6.02	16.6 lpm	yes
Remark		Ok	Ok	Ok	Ok
Dharavi	15/04/07	18 mmHg/min	5.50	16.5	Yes
Remark Khar	 28/05/07	Ok 11.0 mmHg/min	Ok 6.02	Ok 16.6 lpm	Ok yes
Remark Khar	 18/05/07	Ok 12.0 mmHg/min	Ok 6.03	Ok 16.6 lpm	Ok yes

Routine Performance Verification FRM Sampler (Contd..)

Sampling site	Date	Leak check Test Passed at	FTS Pressure shown in water column	FTS Flow shown	Flow audit passed
Remark Colaba	10/10/07	Ok 13.0 mmHg/min	Ok 5.48	Ok 16.6 lpm	Ok yes
Remark Dharavi	22/10/07	Ok 11 mmHg/min	Ok 5.48	Ok 16.6	Ok Yes
Remark Mulund	29/10/07	Ok 8 mmHg/min	Ok 5.44	Ok 16.6 lpm	Ok yes
Remark Dadar	06/11/07	Ok 9.0 mmHg/min	Ok 5.54	Ok 16.6 lpm	Ok yes
Remark Mahul	20/11/07	Ok 13 mmHg/min	Ok 5.30	Ok 16.7 lpm	Ok yes

References:

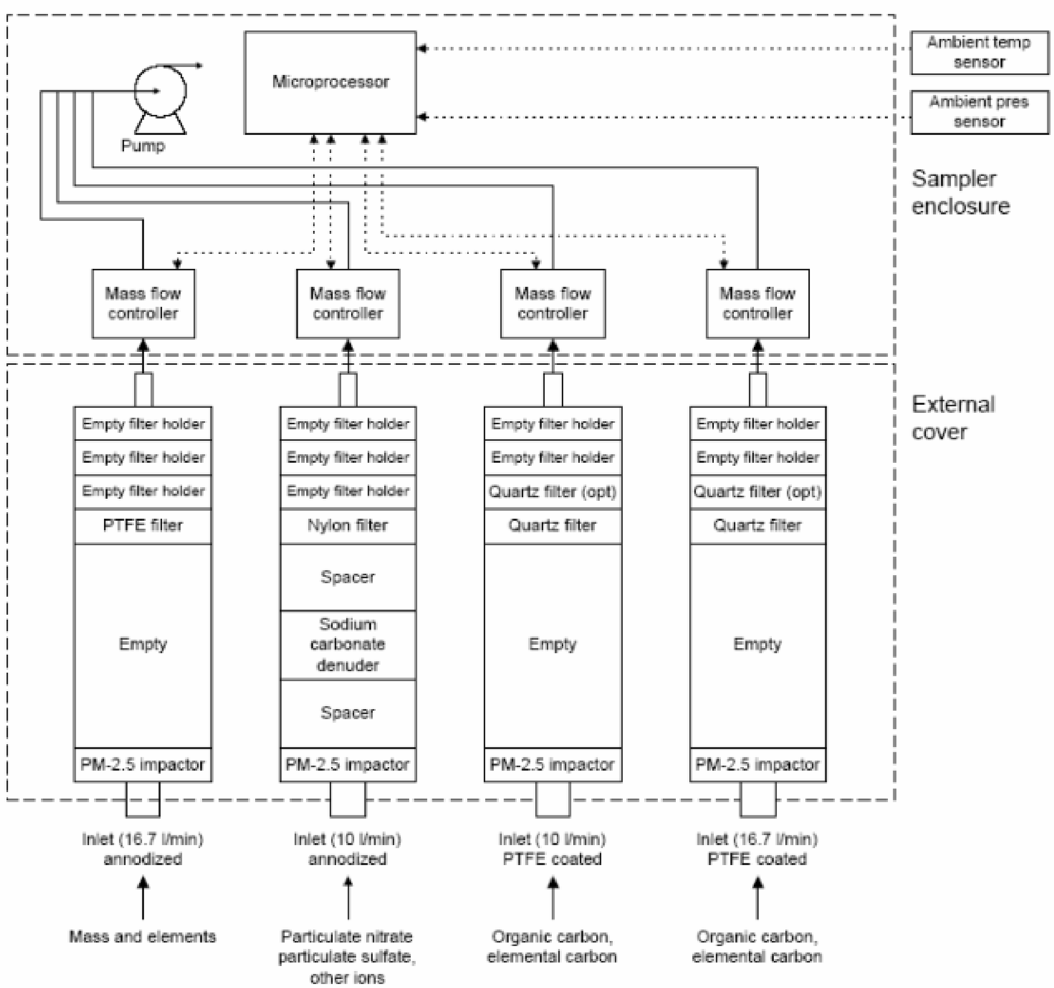
1. Operating manual Partisol FRM Model 2000 $PM_{2.5}$ Air sampler, Nov.2004 revision B
2. www.rpco.com
3. www.thermofisher.com

B) Speciation Sampler (Model 2300)

The Partisol® Model 2300 Speciation Sampler is a 4- or 12-channel sampling platform for particulate matter-related and gaseous species. The sampler is available in a basic 4-channel In these configurations, the unit is designed to house R&P's ChemCombTM Speciation Sampling Cartridges developed by Harvard University.

Technical Specification of the Partisol Sampler Speciation 2300

Sample Flow Control	4 mass flow controllers can be set individually between 5 and 18 l/min
Internal Data Storage	Up to 16 days or interval data, 32 days of input data and 50 filter data records
Data Input	3 averaged analog inputs, wind vane/anamometer connection
Operating Range	-30 to +50 °C
Power Requirements	15A@120VAC, 7.5A@240VAC



Schematic of Speciation Sampler

Standard Operating Procedure

Leak Check

- Go to Menu → Service mode → system maintenance → audit system check → leak check
- Put the plug on cartridge port (all four)
- See that the vacuum pressure is around 380.
- After leak check is over, leak check pass message should appear.

Flow Audit

- After leak check press audit
- It should ask to attach the FTS(flow transfer standard)
- Attach FTS on the cartridge port and the negative port to the manometer and then press DONE
- Read the FTS constant value in water column
- The value should be around 4.5 for 16.7 lpm
- Feed this value manually at FTS pressure
- The message should come standard deviation within range.

Cartridge Preparation (Assembly)

- Unlatch the top rim of the Chem. Comb cartridge and separate it from the body housing.
- Place the filter inside a plastic filter screen, face down on the top rim of the chem comb housing.
- Place plastic filter screen on top of the first filter.
- Slide the top rim of the Chem Comb housing down on top of the plastic filter screens.
- Latch both sides tightly.
- Place a small yellow cap on the hose connection.

Impactor Plate preparation

- Use PM_{10} impactor plate that fits inside the inlet of a Chem Comb cartridge.
- Clean the impactor plates and apply a small amount of Dow Corning high Vaccum grease to the indented reservoir area of the impactor plate.
- Use blunt end of plastic spatula to scrape of any excess grease off the impactor plate.
- Insert the impactor plate directly into the Chem Comb inlet for sampling.
- Check and clear the impactor plate regularly depending upon the dust deposition.

Installing the Chem Comb cartridge

- Open the Chem Comb shelter door.
- Align the groove of the collar on the chem comb with edges of the tray inside the shelter box.
- Slide the Chem Comb cartridge onto the tray.
- The inlet port on the chem comb should fit securely inside the hose connection.
- Manually secure the hose connection.
- Channel 1A is for Teflon and 1B is for Quartz.
- Close the shelter door and latch it.

Removing the Chem Comb cartridge

- Open the Chem Comb shelter door.
- Slide the Chem Comb cartridge out of the tray. The hose connection should disconnect easily.
- Close the shelter door and latch it.

Cartridge Disassembly

- Remove the yellow cap.
- Hold the cartridge assembly body in middle; loosen the filter pack clips with other hand. Exert a slight twisting and rocking motion on the cartridge.
- Lift the filter holder up and remove the filter with blunt forceps by holding it at the edges.
- Transfer it to labeled Petri slides. Take care not to split or tear the filter.

Monitoring

- Before monitoring check in sampling set up screen for time mode. To get into time mode go to sampling set up screen → sample definition type. Change basic to time mode.
- If the sampler is in samp mode press stop.
- Check current time and default time.
- From main menu → sampling set up → samp set
- Edit and set up the starting and closing time and starting and closing date. If required change the current time
- Press run/stop

Data Retrieval from Speciation Samplers

- Press < F3: Data> when in the main screen to access Filter Data Screen.
- Enter <F4: Pwr Data> to view additional data for the current record of interval data on the screen.

- Press <F4: Flit Dat> to return to Filter Data screen.
- Press <F5: Intv Dat> in the Filter Data Screen to view Interval Data Screen.
- <F5: Filt Dat> when in the interval data screen to return to the filter data screen.

Downloading Stored Data: -

- The Filter Data Screen and Interval data screen contains the <F10: output> key to download stored data through the sampler's RS 232 port to another serial device.
- After done mode, press stop. Attach the ends of the computer cable to RS 232 port of Partisol – speciation sampler and the RS 232 connector of a PC to link the two devices. (In Stop mode). Click on retrieval data icon. "Connected" is displayed. Storage pointer is used to select -----
  Filter Data / Interval Data / Input Data.
- Download. Open Excel, select downloaded files. Select all files. Do tab delimitation and comma.
- Switch off power button.
- Disconnect RS 232 cable.

Data sheet for Speciation Sampler

Site Name: __________________
Date: __________________

Starting Time: _____________ Starting Volume: __________
Closing Time: ______________ Closing Volume:__________

Time	Flow (lpm)	Volume (m^3)	Flow (lpm)	Volume (m^3)	Flow (lpm)	Volume (m^3)
	Ist channel (Tf)		2nd channel (Tf*)		3rd channel (Qz)	
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
1						
2						

QA-QC for Partisol Speciation sampler

- During the period of the sampling Partisol Speciation sampler was run on every sampling location for the 30 days continuously as per the protocol of the sampling. At every site before starting the sampler it is checked for the correct power supply the proper mounting of the sampler on the mounting stand.
- It is also checked for the proper installation of the top accelerating assembly all the routine maintenance of the cleaning part was done very systematically & as described in the operating manual of the system as well as the guided by the service providers of the system similarly all the Do's - Don't regarding the system operation was followed.
- During the period of the sampling before setting up the sampler for actual sampling it is first checked for the Leak test in both manner viz. External & internal leak test as there is possibility that some parts of the filter path of the system get loose down in the process of the transportation.
- Similarly the Flow Audit test is also performed to ensure that the flow rate of the sampler must be within the permissible limit as mentioned in the instruction manual after completion of the each monitoring cycle, sampler was calibrated & checked for the primary maintenance
- The data of routine performance verification of the sampler is noted down in to the field data note book along with the problem faced during the operation of the sampler as well as the trouble shooting occurred specially during the power fail & power fluctuation. The data retrieval is done as per mentioned in the SOP but even though the data of Flow rate & volume of air drown by the sampler is generated on hourly basis by noting down in to the field data sheet along with the problem faced during the sampling
- Since the calibration was performed with the FTS calibrator kit, it was calibrated against NIST traceable critical flow. Calibration period of the calibrator was within the over all sampling duration.

The data of routine performance verification of the sampler at sampling location is as follows

Sampling site /Date	Channels	Leak check Test Passed at mmHg/min	Flow Deviation in %	Remark/Flow audit passed
Colaba 2/11/2007	A	4.51	0.2	Flow within the range
	B	5.6	0.3	Flow within the range
	C	4.38	1.1	Flow within the range
	D	4.61	-	
Dadar 6/11/2007	A	4.83	0.4	Flow within the range
	B	2.91	-	-
	C	4	0.6	Flow within the range
	D	3.04	0.5	Flow within the range
Dharavi 31/03/07	A	3.37	1.6	Flow within the range
	B	4.8	2.7	Flow within the range
	C	4.61	-	-
	D	4.25	-	-

Routine Performance Verification (Contd...)

Sampling site /Date	Channels	Leak check Test Passed at mmHg/min	Flow Deviation in %	Remark/Flow audit passed
Khar 16/05/07	A	5.37	NAN	Flow within the range
	B	4.89	NAN	Flow within the range
	C	-	-	-
	D	-	-	-
Andheri 16/06/07	A	3.87	NAN	Flow within the range
	B	4.2	NAN	Flow within the range
	C	-	-	-
	D	-	-	-
Mahul 18/04/07	A	2.66	0.9	Flow within the range
	B	2.46	2	Flow within the range
	C	-	-	-
	D	-	-	-
Mulund 5/4/2007	A	3.72	1.5	Flow within the range
	B	2.87	3.1	Flow within the range
	C	-	-	-
	D	-	-	-

Collocation Sampling Of Speciation Partisol 2300 Sampler for 24 Hours

Collocation of the speciation sampler was carried out as the part of the field QA-QC so that to get an idea about the sampling performance of the all the individual unit & it is found to be a good collocation data it can be explained from the following summary data

	Concentration of PM_{10} ($\mu g/m^3$)	
Sampler sr. no.	**27/28-02-2007**	**1/3-03-2007**
2300A202610611	92	52
2300A202670611	85	50
2300A202650611	86	50
Coefficient of variation	4.3%	2.3%
Standard deviation	3.7	1.1
Average	87.66	50.66

References:

1. Operating manual Partisol Speciation Model 2300 PM 10 Air sampler, April 2005 revision A
2. www.rpco.com
3. www.thermofisher.com

C) QA/QC for Gravimetric Mass Analysis

Weighing of Filters for gravimetric mass analysis includes calibration of balance, pre weighing of filters after respective conditioning, receiving of filters after field exposure and weighing after conditioning.[1]

Filter Inspection

The filters were handled carefully by the supporting ring, with non-serrated forceps and by wearing vinyl gloves that are powder-free. Before any filter was placed in a Petri-slide, it was inspected visually for defects before the initial weighing. Specific filter defects to look for were the following [2]

- Pinhole – A small hole appearing as a distinct and obvious bright point of light when examined over a light screen.
- Separation of ring – Any separation or lack of seal between the filter and the filter border reinforcing the ring.
- Chaff or flashing – Any extra material on the reinforcing ring or on the heat seal area that would prevent an airtight seal during sampling.
- Loose material – Any extra loose material or dirt particles on the filter.
- Discoloration – Any obvious discoloration that might be evidence of contamination
- Other – A filter with any imperfection not described above, such as an irregular surfaces or other results of poor workmanship.
- A filter was discarded if any defects were identified.

Filter conditioning before sampling and after sampling

Filters accepted after visual inspections were placed in a Petri slide. The Petri slide lid was kept slightly ajar over the well such that it covers approximately three-fourths of the filter surface. Such a placement of the lid allows for out gassing of the filter while offering some protection from particle deposition. Teflon filters are equilibrated for 24 hrs at a constant relative humidity 40% (± 5%) and 20^{0}C temperature (±3^{0}C).

Calibration

Internal Calibration

- Open the draft shield door open for one minute to allow the balance-weighing chamber to equilibrate to room temperature.
- Press cal key for internal calibration of Balance.
- The liquid crystal display (LCD) should display “0.000 mg”.

External Calibration

- Open the draft shield door and place a 100 mg working reference standard calibration weight onto the microbalance pan with non-metallic forceps.
- Enter the date, temperature and relative humidity of the balance room, and mass readout in the quality control logbook assigned to the microbalance.
- Remove the calibration weight from balance.
- Similarly place a 200 mg working standard calibration weight onto the microbalance pan with non-metallic forceps.
- Enter the mass readout in the quality control logbook and then remove the calibration weight from balance.

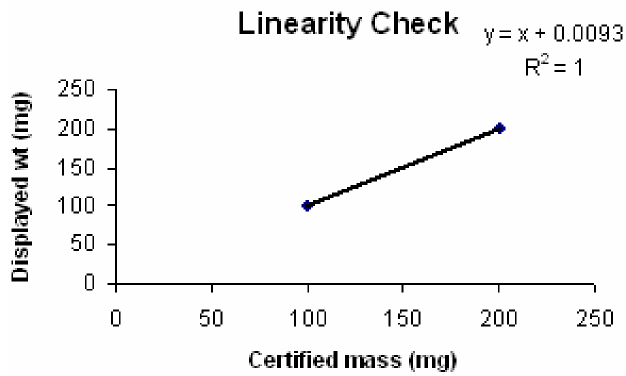
Pre-sampling and Post-sampling Weighing of Filter

- Gravimetric mass analysis was performed using single pan electronic balance (**Sartorius ME5**).
- The balance was cleaned with a fine brush.
- Before actual filter weighing filters ID, box number was note down in register.
- Before each filter weighing balance zero was checked (0.000mg)
- Using the filter handling forceps, filter to be weighed was placed on the radioactive Polonium-210(“Static Master”) antistatic strips for static charge neutralization for 30 seconds[1].
- Then filter was placed on balance pan. Displayed weight on LCD was noted down in register.
- Reweigh every filter and record weight in register.

Linearity Check.

- For Linearity Check two standard weights 100 mg and 200 mg were used.
- The displayed weight was recorded as the "y" value and the certified mass as the "x" value.
- Graph of 'y' value versus the 'x' value was plotted. R^2 was 1

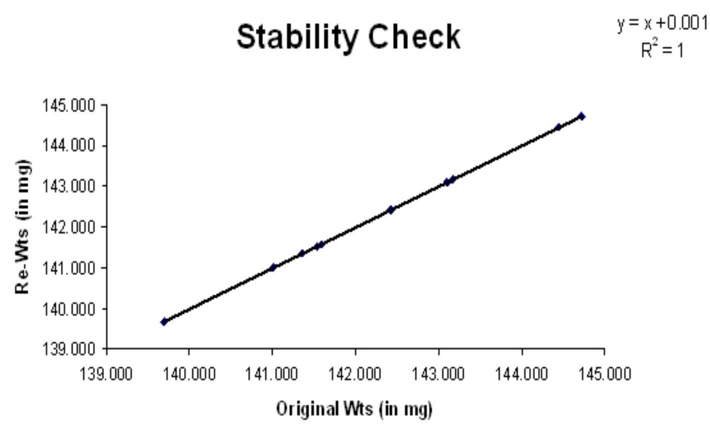
Certified weight	Displayed Weight
100 mg	100.004 mg
200 mg	199.999 mg



Stability Check

- 10 control filters were reweighed on the balance.
- Graph of re-weights versus the original weight was plotted.
- Standard deviation and the r^2 were also calculated.
- Standard deviation is less than 3 µg and R^2 is 1.

Sr.	Original weight (in mg)	Re-weight (in mg)
1	144.726	144.723
2	144.452	144.451
3	143.101	143.095
4	143.172	143.169
5	141.365	141.362
6	141.007	141.008
7	141.530	141.530
8	139.690	139.687
9	141.596	141.588
10	142.417	142.416



References

1. Standard Operating Procedure for the Determination of $PM_{2.5}$ Mass in Ambient Air by Gravimetric Analysis.-SOP MLD 055, California Environmental protection Agency Air Resources Board.
2. Conceptual Guidelines for Common Methodology on Air Quality Monitoring, Inventory and Source Apportionment Studies for Indian Cities – Central Pollution Control Board, Delhi

D) HV (Model 430) and RD (Model 460 NL) Sampler

- Monitoring of SPM & RSPM (PM_{10}) was carried out using the High volume sampler & Respirable dust sampler respectively.
- The monitoring of the SPM was carried out using Envirotech Instrument High volume sampler Model No 430 with the flow range from 0.9 to 1.5 m^3/min the design & working principle of the sampler is based as per the guidelines of the EPA method and National ambient air quality monitoring Program network
- Similarly the collection of the RSPM dust is carried out using Respirable dust sampler based on the cyclonic action. In this method, cyclonic action is used for fractionating the dust in to the two fraction viz. cyclone dust & PM_{10} or RSPM dust
- For the purpose of monitoring of RSPM Envirotech Instrument Respirable Dust High Volume sampler Model no 460NL is used. The flow range of the instrument is ranges from 0.9-1.5 m^3/min.
- Before sampling first check the water level in manometer. It must be zero.
- If it is below the zero level, fill water in the manometer glass tube with syringe/ injection. If water level is higher than the zero mark then remove water by means of the screw present at the left side of the sampler. Adjust the water level by moving it very gently in case of HVS or RSPM sampler.
- There should not be any air bubble inside the manometer tube or PVC tube connecting the manometer & blower.
- Check whether all the PVC tube connections are fitted tightly. Also check the dust collection container is properly cleaned & properly fitted at the bottom of cyclone chamber. Remove dust collection container after each sampling period & clean it properly or if needed replace it with another one clean container.
- Similarly clean cyclone chamber by means of a brush & clean cloth during every periodic maintenance

Calibration of the SPM and RDS – HVS samplers: -

Calibration of the SPM and RDS – HVS samplers was carried out using the Top Loading Orifice Calibrator. The specifications of the calibrator are as follows

Orifice – 28.58 mm dia (1.125 inch)

Resistance plate – 5 no. plate (18, 13,10,7 and 5 holes) (as per EPA Federal Reference Method)

Flow range – 500 – 2000 LPM (0.5 – 2.0 m^3/min)

U tube manometer – 40 cms/ 4.0 KPa Glass manometer on stand

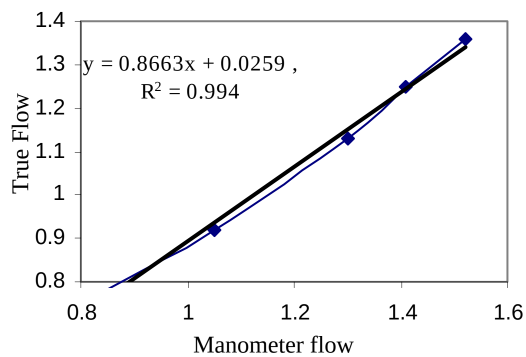
Calibration of the TLOC is carried out for the flow by FCRI certified TLOC calibrator with the report number CA 10360611127 dated on 9th December 2006.

Calibration of SPM and RDS samplers was carried out using the TLOC as per the calibration procedure and calibration graph provided with the instruction manual. Each sampler was calibrated in both ascending and descending sequence of the resistance plate to get the constant reading, calibration graph of both the samplers is as given below

Calibration Graph for High Volume Sampler

Manometer flow	True flow	Manometer flow	True flow	Manometer Flow	True flow
0.9	0.77	1.19	1.04	1.48	1.31
0.91	0.78	1.2	1.05	1.49	1.32
0.92	0.79	1.21	1.06	1.5	1.33
0.93	0.80	1.22	1.07	1.51	1.34
0.94	0.81	1.23	1.08	1.52	1.35
0.95	0.82	1.24	1.09	1.53	1.36
0.96	0.83	1.25	1.10	1.54	1.37
0.97	0.84	1.26	1.11	1.55	1.38
0.98	0.85	1.27	1.12	1.56	1.39
0.99	0.86	1.28	1.13	1.57	1.40
1	0.87	1.29	1.14	1.58	1.41
1.01	0.88	1.3	1.15	1.59	1.42
1.02	0.88	1.31	1.16	1.6	1.43
1.03	0.89	1.32	1.16		
1.04	0.90	1.33	1.17		
1.05	0.91	1.34	1.18		
1.06	0.92	1.35	1.19		
1.07	0.93	1.36	1.20		
1.08	0.94	1.37	1.21		
1.09	0.95	1.38	1.22		
1.1	0.96	1.39	1.23		
1.11	0.97	1.4	1.24		
1.12	0.98	1.41	1.25		
1.13	0.99	1.42	1.26		
1.14	1.00	1.43	1.27		
1.15	1.01	1.44	1.28		
1.16	1.02	1.45	1.29		
1.17	1.02	1.46	1.30		
1.18	1.03	1.47	1.31		

Date : 08Sep.2007
SPM : Envirotech APM-430
Serial No. 135-DTH-01



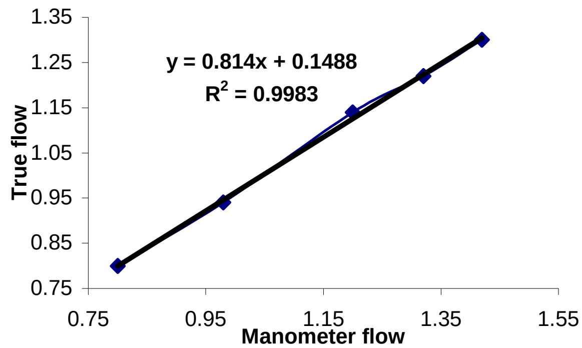
Manometer flow	True flow
1.52	1.36
1.41	1.25
1.3	1.13
1.05	0.92
0.85	0.78

Apparatus used: Top loading orifice calibrator Model PEM -TLOC-1 Manufactured by Poltech Instruments Traceable to FCRI certified Top loading Orifice calibrator, Model- TLOC-2, Sr. No 6 with report no CA 1036 0611 127 dated 9/12/06

Calibration Graph for Respirable Dust High Volume Sampler

Manometer flow	True flow	Manometer flow	True flow	Manometer Flow	True flow
0.9	0.88	1.19	1.12	1.48	1.35
0.91	0.89	1.2	1.13	1.49	1.36
0.92	0.90	1.21	1.13	1.5	1.37
0.93	0.91	1.22	1.14	1.51	1.38
0.94	0.91	1.23	1.15	1.52	1.39
0.95	0.92	1.24	1.16	1.53	1.39
0.96	0.93	1.25	1.17	1.54	1.40
0.97	0.94	1.26	1.17	1.55	1.41
0.98	0.95	1.27	1.18	1.56	1.42
0.99	0.95	1.28	1.19	1.57	1.43
1	0.96	1.29	1.20	1.58	1.43
1.01	0.97	1.3	1.21	1.59	1.44
1.02	0.98	1.31	1.22	1.6	1.45
1.03	0.99	1.32	1.22		
1.04	1.00	1.33	1.23		
1.05	1.00	1.34	1.24		
1.06	1.01	1.35	1.25		
1.07	1.02	1.36	1.26		
1.08	1.03	1.37	1.26		
1.09	1.04	1.38	1.27		
1.1	1.04	1.39	1.28		
1.11	1.05	1.4	1.29		
1.12	1.06	1.41	1.30		
1.13	1.07	1.42	1.30		
1.14	1.08	1.43	1.31		
1.15	1.08	1.44	1.32		
1.16	1.09	1.45	1.33		
1.17	1.10	1.46	1.34		
1.18	1.11	1.47	1.35		

Date : 08Sep.2007
SPM : APM460NL
Serial No. 331-DTL-2006



Manometer flow	True flow
0.8	0.8
0.98	0.94
1.2	1.14
1.32	1.22
1.42	1.3

Apparatus used: Top loading orifice calibrator Model PEM -TLOC-1 Manufactured by Poltech Instruments Traceable to FCRI certified Top loading Orifice calibrator, Model- TLOC-2,
Sr. No 6 with report no CA 1036 0611 127
dated 9/12/06

Glass fiber Filter conditioning and weighing: -

Prior to the sampling, filters are subjected to conditioning. The steps are as given below: -

- Filters are first checked for the pin hole by the visual observation.
- In next step, they the numbered by the numbering machine and the serial number of each filter paper were noted down into the lab register.
- Numbered paper were then heated at around 100–110^0 C for 1 hour in hot air oven. This removes the moisture content and the volatile binder material from the filter media. This step is strictly followed only for the unexposed filter papers.
- Transfer the papers to desiccators filled with self indicating silica gel as a desiccant. The desiccation is carried out for 24 hours so as to condition the filter paper.
- Weigh the filter papers and note down the initial weights along with the other details like sampling date, sampling site. Weighing is done as per the SOP of Afcoset balance.
- For the weighing of the exposed filter papers, first remove the papers from the polythene bag and keep in the desiccators for 24 hours. After conditioning, final weight is taken.
- After completion of gravimetric analysis, store the papers in the envelope provided with the information like name of the parameter, site name, filter paper numbers and sampling time.

AFCOSET Electronic Analytical Balance, calibration (Model No.ER 182A)

- Check that the balance is horizontal and that the weighing pan is clean.
- Connect power cable. Turn on and allow a warm up period of atleast 30 minutes.
- With the display reading “0.0000”. Press the “CAL” (calibration) key.
- The display will now show “CAL in” (in calibration mode) for about 1 second.
- This will be followed by “CAL…” do nothing but wait.
- The next display will be “CAL dn” (calibration weight down). At this time you should gently lower the calibration weight on to the weighing mechanism via the lever located on the right hand side of the balance.
- The display will be “CAL…” and again wait for few seconds.
- The next display will be “CAL up” (calibration weight up) and then gently lift the internal weight off the weighing mechanism via the lever referred in step 6.
- Again the display will be “CAL…” and wait for some time. Then display will change to “CAL End”
- The display will revert to “0.0000”. This ends the calibration and the balance is ready for weighing.

Calibration of Afcoset Balance

Balance Model No.	Model ER182 A
Max. Capacity	32 gm/180 gm
Readability	0.01/0.1 mg
Repeatability	0.1 mg (Std. dev.)
Non Linearity	+_ 0.03/02 mg
Sensitivity drift	+_ 2 degree C (10 degree C-30 degree C)
Stabilization Time	8 sec
Operating Temp.	5 degree C-40 degree C (41 degree F-104 degree F)

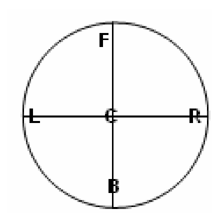
Environment conditions during the calibration: Temp. 32.5 +_ 0.2 degree C
Relative Humidity. : 60+_0.3%

I. Measuring Results:

Reference Test Wt. Measuring	10 gm Balance Display (gm)	1 gm Balance Display (gm)
1	10.0023	1.0009
2	10.0022	1.0009
3	10.0022	1.0009
4	10.0022	1.0009
5	10.0022	1.0009
6	10.0022	1.0009
7	10.0022	1.0009
8	10.0022	1.0009
9	10.0022	1.0009
10	10.0022	1.0009
Standard Division	3.16222E-05	0

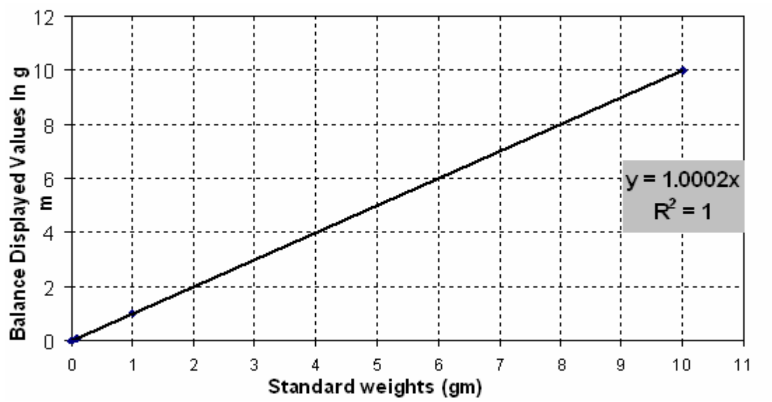
II. Linearity:

Sr No.	Denomination(gm)	Balance Display(gm)
1	0.01	0.0096
2	0.01	0.0096
3	0.1	0.0993
4	0.1	0.0993
5	1	1.0009
6	1	1.0009
7	10	10.0022
8	10	10.0022



III. Eccentricity Reff. Test Wt. =10 m

Reading Sequence	Center	Right	Front	Left	Back
C>R>F>L>B	10.0022	10.0022	10.0022	10.0023	10.0022
B>L>F>R>C	10.0022	10.0022	10.0022	10.0023	10.0022
Mean Reading	10.0022	10.0022	10.0022	10.0023	10.0022



Calibration graph of balance

Sampling of SPM & RSPM On 8 X 10" Glass Fiber Filters

- Collection of the SPM & RSPM was carried out on the lass fiber filter paper GF/A supplied by the Pall Life Sciences Type A/E-I with size 8 X 10 " **(**20.3X25.4 cm), with pore size 1 µm.
- First remove the filter from the polythene bag check the serial number stamped on the right hand corner of the glass fiber filter paper check the details provided on field data sheet select the proper filter to collect the appropriate dust sample viz. SPM & RSPM
- After checking the Filter paper number, sampling hours & parameters, mount the paper on the filter adapter assembly of respective sampler (i.e. SPM or RSPM) taking care that the rough surface of filter paper should be exposed to the ambient air
- Cover it with supporting frame. Tighten the wing nuts so that no air gap or leakage remains
- Switch on the instrument. Note down starting time & starting flow rate indicated in manometer in m^3/min.
- After each hour note down the flow rate in provided datasheet or field note book
- Data of the flow rate of the both the sampler is generated on the hourly basis since the sampling of the SPM & RSPM is carried out for 8 hour cycle so that during the total 24 hours sampling cycle 3 samples of each SPM & RSPM was collected
- After completion of each 8 hour cycle remove the filter very gently from the supporting ring with clean hand. Fold the filter in half lengthwise by handling it along its edge with exposed side inwards. Keep the exposed filter back to the polythene bag.
- Note the presence of insects on the deposit, loose particles, non-centered deposits, evidence of leaks & unusual meteorological conditions on the provided data sheet.

E) Analytical Procedure and Calibration for Gases

Criteria gaseous pollutants viz. SO_2, NO_2, NH_3 along with aldehyde were monitored and analyzed. The flow rate for sampling was 1 lpm and was adjusted by means of the previously calibrated Rotameter. For 24 hourly sampling of aldehyde Adjust the flow to 0.51 lpm.

Parameter	Name of tentative and recommended methods for ambient air sampling and analysis	Absorbing media	Chemicals and reagents	Wt. Of the chemicals to prepare 3 liters of absorbing media	Caution
SO_2	Modified West and Gaeke Method	TCM(potassium Tetra Chloromercurate) 0.04Molar	$HgCl_2$,KCl or NaCl and EDTA	32.58gm $HgCl_2$, 18gm KCl, 0.198 gm EDTA	Highly Poisonous if spilled on skin, flush off with water immediately
NO_2	Jacob Hochheiser method (Sodium Arsenite Method)	Alkaline Sodium Arsenite	Sodium Arsenite and NaOH	3 gm Sodium Arsenite and 12 gm NaOH	Arsenic Compounds are highly toxic and should be handled with extreme care.Avoid direct contact with skin and eyes. Specially avoid generating dust or breathing dust
NH_3	Nesselerisation Method	$0.1NH_2SO_4$	Sulphuric acid	6.9ml conc. H_2SO_4	For Conc. H2SO4 or any other acid handling use gloves. Avoid direct contact with skin or eyes. Because it is very deep burning sensation.
Aldehyde	MBTH Spectrophotometric method	0.05% MBTH Solution	MBTH 3-Methyl-2-Benzothiozone Hydrazones Hydrochloride	0.5 gm MBTH and dilute to 1literwith distilled water.	

Reagent Preparation

SO_2 Analysis

- *Sulfamic Acid (0.6 %)*: - Dissolve 0.6 gm of Sulfamic acid in 100 ml D/W.
- *Formaldehyde (0.2 %)*: - Dilute 5 ml Formaldehyde solution (36 – 38 %) to 1 L with D/W.
- *Purified Pararosaniline Stock Solution (0.2 %)*: - Dissolve 0.5 gm of specially purified PRA in 100 ml D/W. Keep it for 48 hours and filter the solution through Whatman No. 41 or 42.Solution is stable for 3 months if stored in refrigerator.
- *PRA Working Solution*: - 10 ml of stock PRA is taken in 250 ml volumetric flask. Add 15 ml Conc. HCl and make up the volume with D/W.

NO_2 Analysis

- *Hydrogen Peroxide Solution*: - Dilute 0.2 ml of 30 % H_2O_2 to 250 ml D/W.
- It can be stored for One month if refrigerated and must be protected from sunlight.
- *Sulfanilamide*: - Dissolve 20 gm of sulfanilamide in 200 ml D/W. Add with mixing 50 ml of 85 % Phosphoric Acid (H_3PO_4) and dilute to 1 L. It is stable for one month if refrigerated.
- *NEDA* [N- (1 *Napthyl*) – *Ethylene Diamine Dihydrochloride*]: - Dissolve 0.5 gm NEDA in 500 ml D/W. It must be protected from sunlight.

NH_3 Analysis

- *Nesselers* Reagent: - Use readymade Nesselers reagent available by Qualigens.
- Before use, make sure that it does not contain any precipitate. If necessary, remove the precipitate by filtration or decantation process.

Aldehyde Analysis: -

- Oxidizing *Reagent*: - Dissolve 1.6 gm of Sulfamic Acid and 1 gm $FeCl_3$ in pure D/W and dilute to 100 ml.

Parameter	Amount of absorbing media for sampling (ml)	Amount for analysis (ml)	Colour developing reagent	Time duration for reaction (min)	Colour developing reagent	Final Volume with D/W (ml)	Time Duration (min)	Wavelength (nm)
SO_2	30	10	1ml Sulphamic acid	10	2ml Formaldéhyde -2ml Pararosaniline Hydrochloride	25	30	560
NO_2	30	10	1ml H_2O_2	-	10ml Sulfanilamide -1.4ml NEDA	50	10	540
NH_3	20	20	2ml Nesslers reagent	-	-	30	30	425
Aldehyde	35	10	2ml Oxidizing reagent (Sulfamic acid +Ferric Chloride)	-	-	-	-	628

Note: In case of SO_2, NO_2, during the sampling period, some part of media gets evaporated. Hence to minimize the volume error in terms of concentration in further analysis of this parameter, make volume of sample to 30ml with distilled water. During the preparation of Blank, absorbing media taken out for SO_2, NO_2 and Aldehyde is10ml, while for NH_3 it is 20ml.

I) Sulphur Dioxide

Reagents –

- 0.1 N $K_2Cr_2O_7$ Solutions: - Dissolve 1.225 gm K_2Cr_2O7 in 250 ml D/W.
- 0.1 N $Na_2S_2O_3$ Solution: - Dissolve 12.5 gm $Na_2S_2O_3$ in 500ml D/W.
- 0.1 N I_2 Solution: - Dissolve 3.175gm Iodine and 10gm KI in 250ml D/W.

1) Standardization of 0.1N (approx) Thiosulphate against 0.1N $K_2Cr_2O_7$ solution: -

- Pipette out 10ml of 0.1N $K_2Cr_2O_7$ + pinch of KI.
- Keep it for 5mins in dark and then add 1ml Conc. H_2SO_4.
- Immediately titrate against 0.1N Thiosulphate solution till color changes from dark brown to light yellow.
- Add starch indicator and continue the titration till color changes from dark blue to colorless or light bottle green.

Normality of 0.1N (approx) Thiosulphate –

$$N_1V_1 = N2V2$$

$$0.1*10 = N2* B R$$

$$N_2 = \frac{0.1*10}{BR}$$

2) Standardization of 0.1N (approx) I_2 against standardize Thiosulphate solution-:

- 10ml of 0.1N I_2 +25ml of D/W → Titrate against standardized Thiosulphate till color changes from blue to colorless using starch indicator.
- Preparation of 0.01N I_2 from the standardize 0.1N (approx) I_2 solution.
- Preparation of 0.01N Thiosulphate from the standardize 0.1N (approx) Thio solution.
- Preparation of Starch Indicator: - Dissolve 0.4 gm of extra pure starch in boiling 20ml D/W till it gets completely dissolve. Add few drops of Chloroform so to avoid contamination the solution.
- Preparation of Sodium metabi –Sulphite solution (0.01Napprox):-Dissolve 0.30gm of MBS in 500ml recently boiled and cooled DDW.

Note: the preparation of MBS should be carried out just before standardization because of its high unstability towards temperature. For the preparation, always use cooled and boiled DDW.

3) Standardization of 0.01N (approx) MBS stock solution-

- The actual concentration of MBS solution should be determined by adding excess amount of 0.01N Iodine solution.
- Back titrate against standardize 0.01N Thiosulphate solution so that to get actual conc. of MBS solution in terms of SO2 on the basis of which working MBS solution will be prepared which will be conc. of 10 μg/ml.

Procedure of standardization of Sodium Metabi –sulphite (MBS)

Flask A: Pipette out 50ml of 0.01N Iodine solution + 25ml of D/W.

FlaskB: Pipette out 50ml of 0.01N Iodine solution + 25ml of MBS solution.

Wait for 5min in both the cases and titrate both the flask against standardized 0.01N Thiosulphate solution. Report constant burette reading. The end point of both the titration is from Violet Blue to colorless using starch indicator.

Concentration of sulfite solution:
The amount of SO_2 per ml in the STD stock solution is calculated as follows-

$$C\ (\mu g/ml) = \frac{(V1-V2)*N*K}{V}$$

Where, C: SO_2 conc. in μg/ml
V1: Volume of Thiosulphate for blank (Flask A, BR in ml)
V2: Volume of Thiosulphate for blank (Flask B, BR in ml)
N: Normality of Thiosulphate
K: 32000 meq. Wt of SO_2 per μg.
V: Vol. Of std Sulfite solution. (25ml)

Working Std. Soln of MBS (10μg/ml) from standardized Soln.:
Since, C= x μg/ml

$$\text{Working Std. Soln of MBS (10}\mu g/ml) = \frac{10x100}{C}$$

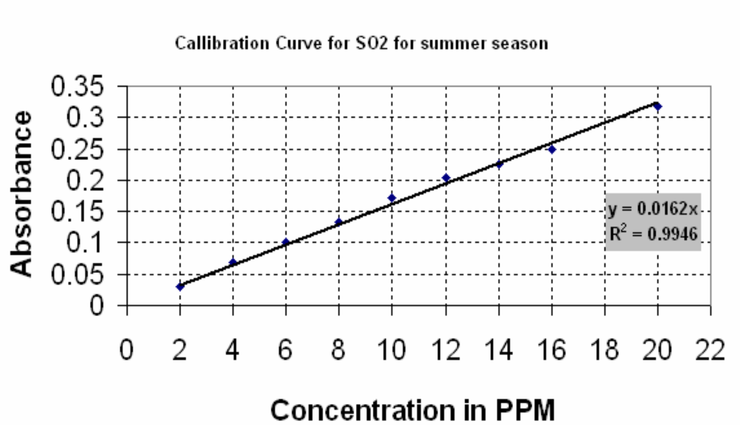
= -----------ml dilute to 100 ml

So that resulting solution will be **10 μg/ml of SO_2** in terms of Na -MBS
From this soln. Perform various dilutions like 0.2 to 2 ml
In 10 ml TCM solution so that resulting conc. As 2,4,6,8,10,12,14,16,18,20 μg
Take the absorbance or transmittance of all STDs. & plot the graph of Absorbance against conc. Find the calibration constant/slope of the straight line, which can be used in further calculation of SO_2 in $\mu g/m^3$

Calibration Graphs

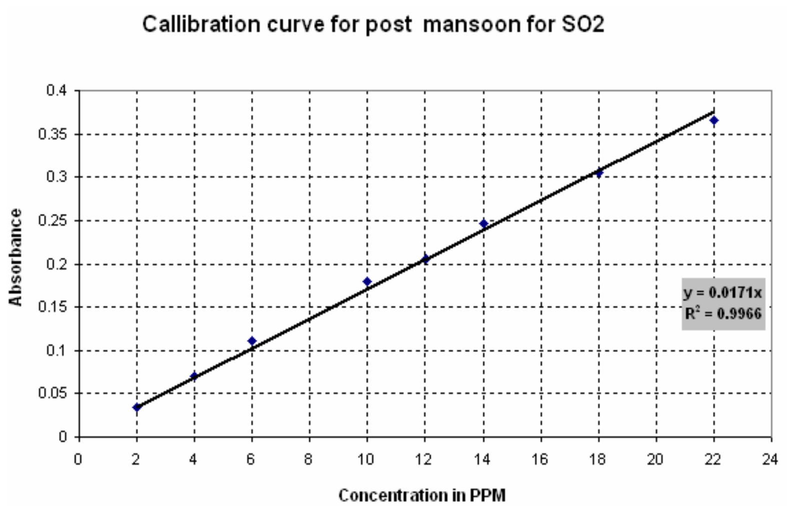
Date of Calibration: 28/05/2007
Parameter: SO_2
Season: SUMMER
Calibration Constant: 185.07

Sr.No.	Concentration (ppm)	Absorbance
1	2	0.031
2	4	0.068
3	6	0.1
4	8	0.134
5	10	0.172
6	12	0.205
7	14	0.226
8	16	0.25
9	20	0.318



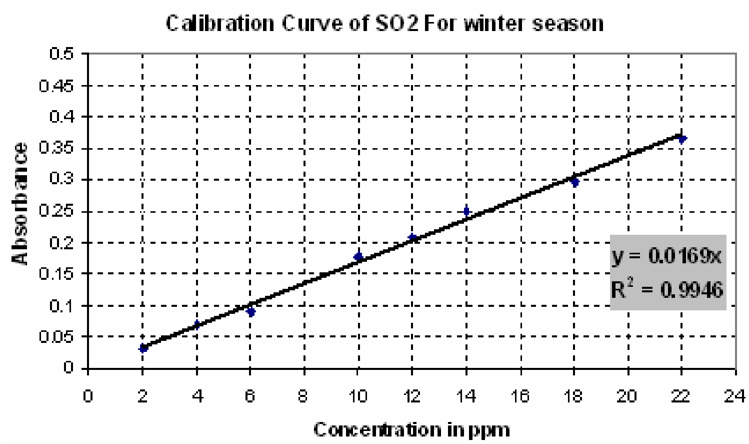
Date of Calibration: 28/09/2007
Parameter: SO_2
Season: Post monsoon
Calibration Constant: 175.38

Sr.No.	Concentration (ppm)	Absorbance
1	2	0.034
2	4	0.07
3	6	0.111
4	10	0.18
5	12	0.206
6	14	0.247
7	18	0.306
8	22	0.366
1	2	0.034



Date of Calibration: 28/11/2007
Parameter: SO_2
Season: Winter
Calibration Constant: 177.514

Sr.No.	Concentration (ppm)	Absorbance
1	2	0.032
2	4	0.069
3	6	0.091
4	10	0.178
5	12	0.208
6	14	0.251
7	18	0.297
8	22	0.366
1	2	0.032



II) Nitrogen Dioxide

- Prepare $NaNO_2$ stock solution of 1000 µg NO_2/ml – Dissolve 1.5 gm of desiccated $NaNO_2$ assay of 97 % or greater. In D/W and dilute to 1000 ml. Which result in 1 ml = 1000 µg NO_2^-
- $NaNO_2$ working standard A (1.0 µg NO_2/ml) – Pipette out 5 ml stock solution into 500 ml standard volumetric flask. Make up the volume with D/W. Which result in 1 ml= 10 µg NO_2^-
- $NaNO_2$ working standard B (1.0 µg NO_2/ml) – Pipette out 25 ml of std A in 250 ml volumetric flask Make up the volume with D/W. Which result in 1 ml= 1 µg NO_2^-
- Using this solution, prepare different dilutions.

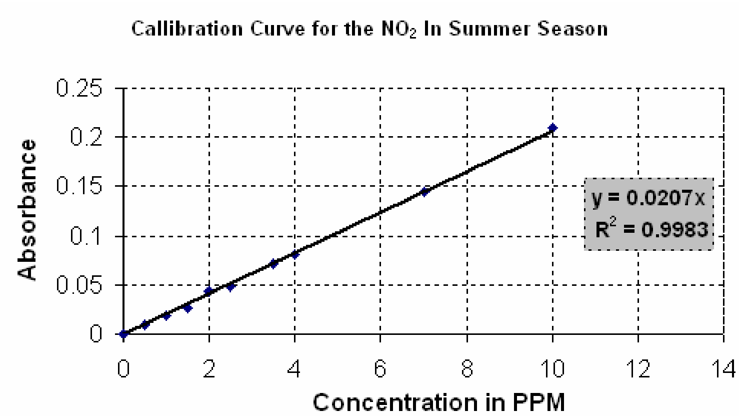
Preparation of Calibration Curve

- Take a series of impingers of 50 ml capacity. Label prepared calibration curve in the range of 1 to 20 µg NO_2.
- Take 10 ml of absorbing solution in each tube. Add 0, 1,2,........ml of std B into each labled impinger.
- Add all colour developing reagents viz. H_2O_2, sulfanilamide and NEDA.
- Make the final volume to 50 ml.
- Read on the spectrophotometer at 540 nm.
- Plot the graph of absorbance against concentration in µg/ml. It should be a straight line with best fitting the data to obtain the calibration curve.
- Calculate the calibration constant, which is used in further calculation.

Calibration Graphs

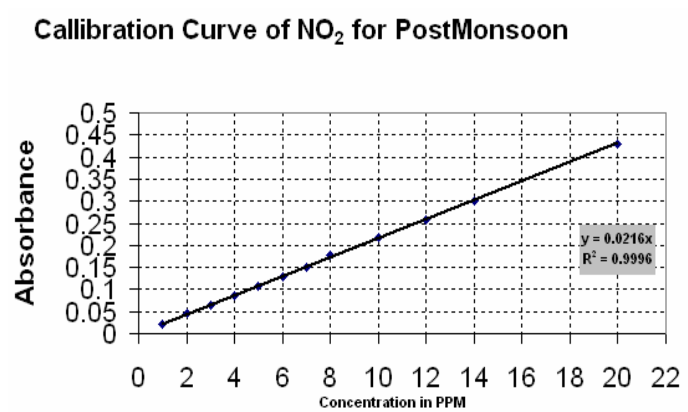
Date of Calibration: 13/03/2007
Parameter: NO_2, Season: Summer
Calibration Constant: $\frac{48.31 \times 3}{0.82} = 176.744$

Sr.No.	Concentration(ppm)	Absorbance
1	0	0
2	0.5	0.009
3	1	0.018
4	1.5	0.026
5	2	0.044
6	2.5	0.048
7	3.5	0.072
8	4	0.081
9	7	0.144
10	10	0.21



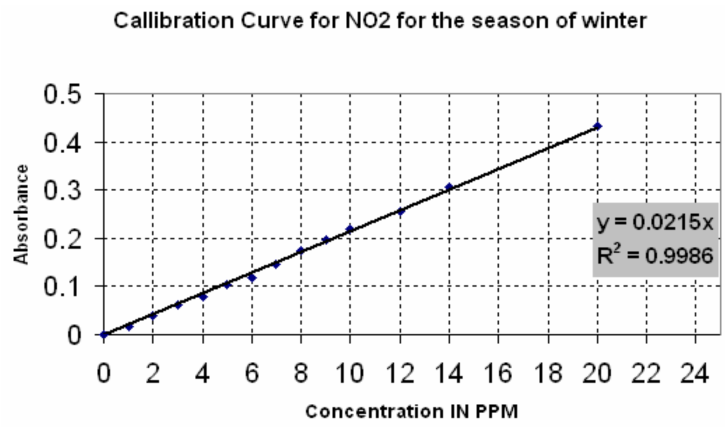
Date of Calibration : 21/09/07
Parameter : NO_2 , Season: Post Monsoon
Calibration Constant: $\frac{46.40 \times 3}{0.82} = 169.175$

Sr.No.	Concentration(ppm)	Absorbance
1	1	0.02
2	2	0.045
3	3	0.063
4	4	0.086
5	5	0.108
6	6	0.13
7	7	0.149
8	8	0.178
9	10	0.219
10	12	0.259



Date of Calibration : 22/11/07
Parameter : NO_2, Season: Winter
Calibration Constant: 46.50 x 3 = 170.164
0.82

Sr.No.	Concentration(ppm)	Absorbance
1	0	0
2	1	0.017
3	2	0.039
4	3	0.061
5	4	0.079
6	5	0.104
7	6	0.119
8	7	0.146
9	8	0.173
10	9	0.197
11	10	0.218
12	12	0.256
13	14	0.305
14	20	0.432



III) Ammonia

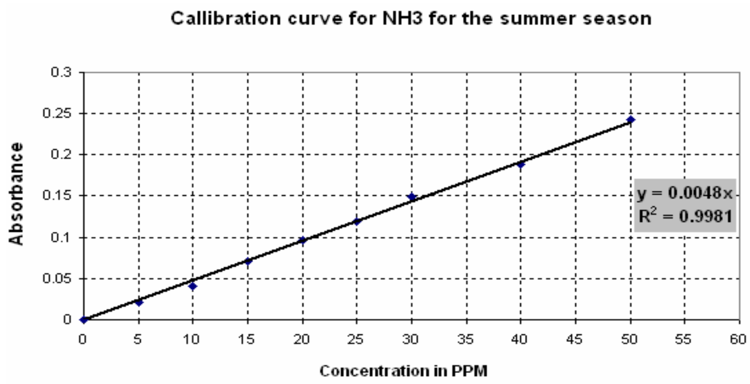
- Preparation of ammonia stock solution: - Weigh 3.13 gm NH_4Cl, (assay of 99.5 %).Desiccated for at least 24 hours. Dilute it 1000 ml with D/W., which will be result in 1ml = 1000 µg NH_4
- Pipette out 5 ml of this stock solution and dilute to 500 ml with D/W., which will be result in 1ml = 10 µg NH_4
- Using this solution, make different dilutions to prepare standard curve.

Preparation of calibration curve: -

- Label the impingers as 0, 5, 10, 15...µg concentration.
- Take 20 ml of absorbing solution and add 0, 0.5, 1.0, 1.5.... ml of working standard of ammonia. (10 µg/ml)
- Add 2 ml Nesseler's reagent and dilute it to 30 ml with D/W.
- Take absorbance or % T on spectrophotometer at 425 nm
- Plot a graph of absorbance against concentration in µg/ml. It should be a straight line.
- Calculate the calibration constant for use in further calculation

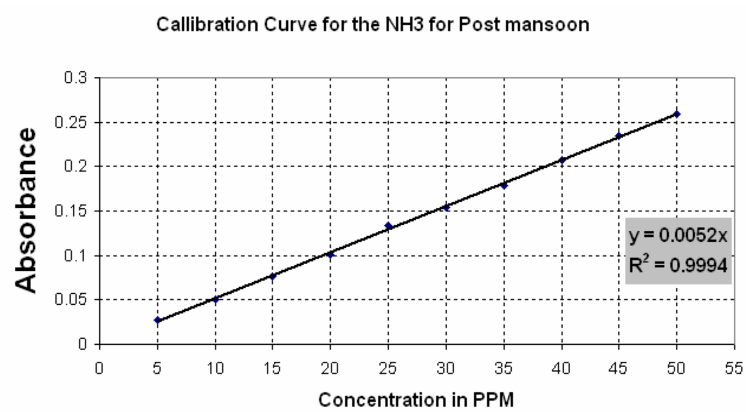
Date of Calibration : 13/03/2007
Parameter :NH_3, Season: Summer
Calibration Constant: 208.16

Sr.No.	Concentration	Absorbance
1	0	0
2	5	0.021
3	10	0.041
4	15	0.071
5	20	0.097
6	25	0.119
7	30	0.149
8	40	0.189
9	50	0.242



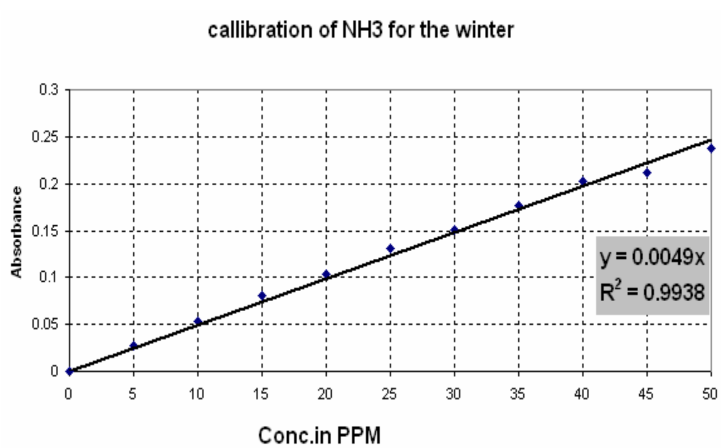
Date of Calibration : 24/09/2007
Parameter :NH_3, Season: Post Monsoon
Calibration Constant: 192.3077

Sr.No.	Concentration	Absorbance
1	5	0.027
2	10	0.05
3	15	0.076
4	20	0.101
5	25	0.133
6	30	0.154
7	35	0.179
8	40	0.207
9	45	0.234
10	50	0.259



Date of Calibration : 18/11/2007
Parameter :NH_3, Season: Winter
Calibration Constant: 204

Sr.No.	Concentration	Absorbance
1	0	0
2	5	0.027
3	10	0.054
4	15	0.081
5	20	0.104
6	25	0.131
7	30	0.151
8	35	0.177
9	40	0.202
10	45	0.212
11	50	0.238



IV) Aldehyde

Chemicals & solutions for calibration

- **Oxidizing agent** : 1.6 gm of sulphamic acid + 10 ml of $FeCl_3$ make the volume to 100 ml with double DW
- **Na-carbonate Buffer** : 40 gm of Na_2CO_3 + 10 ml of CH_3COOH acid make the volume to 500 ml with double DW
- **Sodium bisulfite 1 %**: 1 gm of Na-bisulfite make the volume to 100 ml with double DW
- **0.05% of MBTH absorbing solution** : 0.5 gm of MBTH dilute to 1000 ml with double DW
- **Formaldehyde Std ' A'** : 2.7 ml of 37 % Formaldehyde solution dilute to 1000 ml
- **0.1 N $K_2Cr_2O_7$ Solutions**: - Dissolve 1.225 gm $K_2Cr_2O_7$ in 250 ml D/W.
- **0.1N $Na_2S_2O_3$ Solution**: - Dissolve 12.5 gm $Na_2S_2O_3$ in 500ml D/W.
- **0.1N I_2 Solution**: - Dissolve 3.175gm Iodine and 10gm KI in 250ml D/W

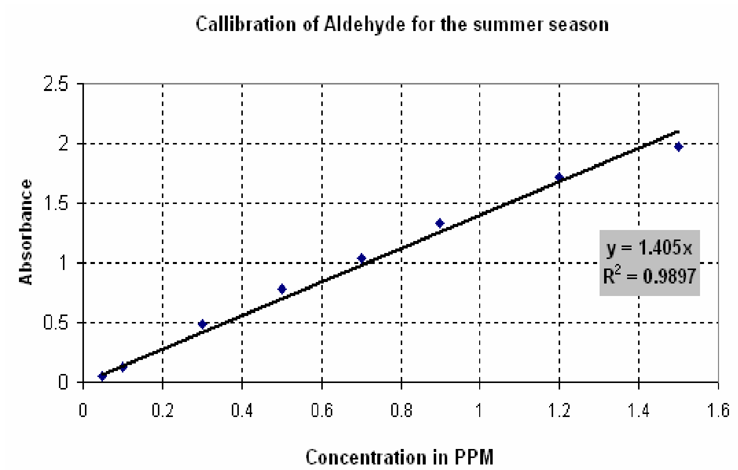
Preparation of Starch Indicator:- Dissolve 0.4 gm of extra pure starch in boiling 20ml D/W till it get completely dissolve add few drops of Chloroform so to avoid contamination the solution

Calibration

- Standardization of 0.1N (approx) Thiosulphate against 0.1N $K_2Cr_2O_7$ solution
- Standardization of 0.1N (approx) I_2 against standardize Thiosulphate solution
- Preparation of 0.01N I2 from the standardize 0.1N (approx) I_2 solution.
- Preparation of 0.05N Thiosulphate from the standardize 0.1N (approx) Thio solution.
- Estimation of strength of Aldehyde Std 'A'
- Flask A: pipette out 1 ml of distilled water + 10 ml of 1 % sodium bisulfite + starch
- Flask B: pipette out 1 ml of Aldehyde Std 'A' + 10 ml of 1 % sodium bisulfite
- + Starch
- Titrate against 0.1 N standardized Iodine solutions: colour change from colorless to dark blue
- Continue with same solution titrate against the 0.05 N sodium thiosulfate solutions:
- Colour change from blue to colorless
- Chill the flask in ice bath add 25 ml of Na- carbonate buffer
- Titrate the liberated sulfite with 0.01 N I_2 solution colour change from blue to colorless
- Note down the burette reading in this step to determine the strength of the 1 ml aldehyde STD A on this basis find the volume to prepare the aldehyde std B of strength 10 ug/ml which will be used to prepare the different concentration range
- Pipette out 0 to 30ml of STD B & dilute to 100 ml in STD vol. flask with MBTH absorbing media keep it for 1 hour transfer the 10 ml of each std flask to the 35ml capacity impinger add 2 ml of the oxidizing reagent to that read after 12 minutes on the wavelength 628.0 nm with spectrophotometer prepare the calibration curve find the calibration constant which will be used for the further calculation of unknown samples as given in the standard method

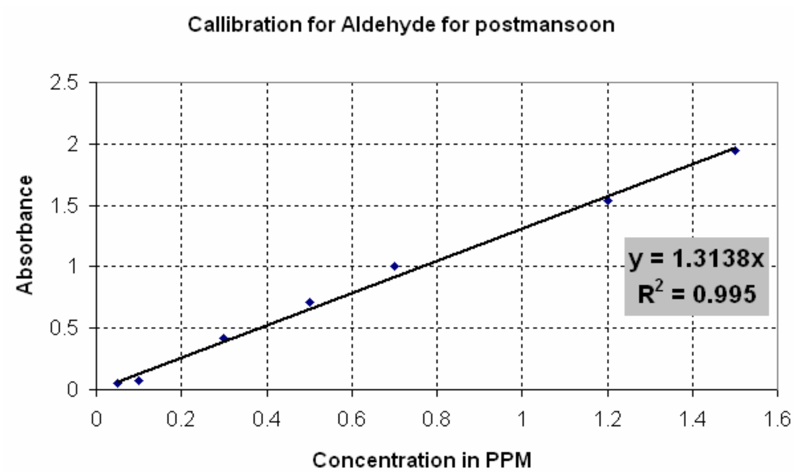
Calibration of gaseous pollutant Aldehyde
Date of Calibration: 07/03/2007
Parameter: Aldehyde, Season: Summer
Calibration Constant: 0.71

Sr.No.	Concentration	Absorbance
1	0.05	0.045
2	0.1	0.123
3	0.3	0.481
4	0.5	0.779
5	0.7	1.039
6	0.9	1.338
7	1.2	1.716
8	1.5	1.978



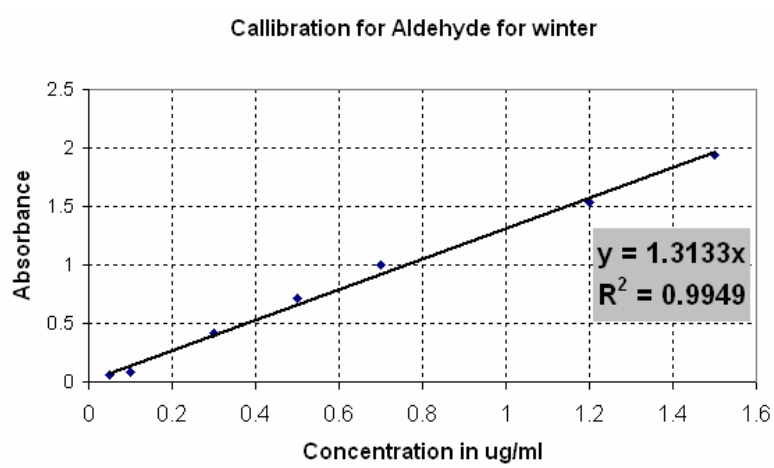
Calibration of gaseous pollutant Aldehyde
Date of Calibration: 04/10/2007
Parameter: Aldehyde, Season: Post Monsoon
Calibration Constant: 0.76

Sr.No.	Concentration	Absorbance
1	0.05	0.05
2	0.1	0.074
3	0.3	0.418
4	0.5	0.708
5	0.7	1.003
6	1.2	1.542
7	1.5	1.942



Calibration of gaseous pollutant Aldehyde
Date of Calibration: 06/12/2007
Parameter: Aldehyde, Season: Winter
Calibration Constant: 0.76

Sr.No.	Concentration	Absorbance
1	0.05	0.055
2	0.1	0.078
3	0.3	0.42
4	0.5	0.713
5	0.7	1.002
6	1.2	1.54
7	1.5	1.94



Reference -

1. Methods of Air Sampling and Analysis, Second Edition, Morris Katz, Editor, APHA Inter Society Committee.

V) UV-Vis Spectrophotometer

Technical Data UV-VIS single beam scanning spectrophotometer Model UV2100 make Chemito.

Wavelength Range	190 - 1100 nm (UV-VIS)
Wavelength Resolution	0.1 nm
Wavelength Accuracy	+/- 0.5 nm
Bandwidth :	2.0 nm
Scanning Speed	Fast, medium, slow
Photometric Range	-0.3 to 2.5 ABS
Source - A :	D2 lamp (190-400 nm),facility to change over between 340 nm & 400 nm
Source - B :	Tungsten halogen lamp (340 - 1100 nm)
Detector :	Silicon photodiode
Sample Compartment	Programmable 5 turret position for 10 mm light path square cuvette holder
Stray Light	<0.1% at 220 nm

- All the analysis of the Gaseous pollutants which are measured by the spectrophotometer method are carried out on UV-VIS single beam scanning spectrophotometer Model UV2100 make Chemito Analytical Instrument India
- The performance of the system was checked by the dichromate test method according to the method absorbance of the potassium Dichromate solution prepared by dissolving the 60.0gm of the desiccated potassium Dichromate salt in 0.01N H_2SO_4 prepared in pure distilled water measure at different wavelength in different sample compartment with the quartz cuvette of path length 10mm.

The acceptance criteria of the method for different wavelength are given below:

Wavelength (nm)	Absorbance	Acceptance criteria
235.0	0.747	0.738-0.756
257.0	0.861	0.852-0.870
313.0	0.291	0.282-0.300
350.0	0.636	0.624-0.648

Test Result found during performance test of the system

Wavelength (nm)	235.0	257.0	313.0	350.0	Remark
Absorbance value in Sample Position 1	0.752	0.868	0.291	0.649	Ok
Absorbance value in Sample Position 2	0.752	0.868	0.291	0.649	Ok
Absorbance value in Sample Position 3	0.753	0.868	0.291	0.648	Ok
Absorbance value in Sample Position 4	0.753	0.867	0.291	0.648	Ok
Absorbance value in Sample Position 5	0.753	0.868	0.291	0.648	Ok

This test was performed after every six month similarly the sample cuvettes of standard path length of 10 mm which was used for analysis are provided with the certificate of conformity according to that the pair of cuvettes. It was tested for % transmission at the wavelength of 420 nm and it is found to be at value 84.0 % similarly the cuvette have been measured at 200.0nm for T% and matched within 1.5%.

VI) CO Analyzer

Working principle of the CO analyzer is based on the NDIR spectroscopy method (Non Dispersive Infrared Spectroscopy). For the measurement of the CO concentration in ambient air was carried out using the Environment S.A. instrument CO analyzer Model No CO11M. This instrument is designated as Automated reference Method Number RECA-0995-108
Federal register Vol 60, page 54684,10/25/95.

Technical specification of the instrument is as follows

- Ranges: 0-10/ 25 / 50 /100 / 200 ppm or user selectable ranges
- Lower detectable limit (2s): 50 ppb
- Response time: automatic and programmable (minimum 30 sec)
- Zero drift: less than 0.1 ppm / 24 h less than 0.1 ppm / 7 days
- Span drift: less than 1% / 24 h less than 1% / 7 days
- Measurement Units either in ppm or mg/m3
- Sample flow rate approximately 1.6 liters/min

Calibration Steps

- Keeps the instrument running for 24 hours or at least a few days intermittently before carrying out the calibration
- Before calibration press Zero and Reference simultaneously. After this cycle is completed then instrument will automatically go to sample mode.
- For calibration attach the Teflon tube from sample inlet or span inlet of the instrument to the calibration gas cylinder. Check the pressure of the cylinder then with regulator adjusts the pressure to desired value.
- Press the sample mode or span mode according to your choice above.
- If Calibration is from Span mode then go to Mux Signal and keep the flow rate same as Sample flow rate.
- If the value shown on the monitor is not same as that of the calibration gas concentration i.e. 10.7 ppm then go to span under Main Menu and change the factor
- By adjusting the K test factor the value was 0.70

Do's and Don'ts

- Never press Sample mode when the instrument is in Zero Reference cycle.
- Check whether the instrument shows Zero when Zero is pressed.
- After Zero is reached press Sample.
- Change the primary filter paper (47mm Teflon filter with pore size 5 micron) fitted at the sample inlet after every 15-20 days or decide the frequency on the type of air samples used for analysis

- Before starting the system check for all the electric connection, power supply must be through the stabilizer so that less fluctuation in the measurement of the values
- For the steady result operate the system in 20-25 degree C.
- For the purpose of calibration of the CO analyzer use the Calibration gas as the mixture of Carbon monoxide balance with air the concentration of the CO gas is 10.7 ppm

Mixture Composition for CO Calibration Gas

Component	Ordered	Actual
Carbon monoxide	10.5 ppm	10.7 ppm
Air	Balance	Balance

Settled pressure	130 kg/cm^2
Minimized pressure for utilization	5 kg/cm^2
Preparation tolerance	± 20 %
Certification accuracy	± 2 %
Stability period	12 mounts

VII) HC Analyzer

Working principle of the HC analyzer is based on the FID detection method (Flame ionization detector). For the measurement of the Total hydrocarbon concentration in terms of the methane & non-methane hydrocarbons conc. in ambient air monitoring is carried out using the Environment S.A. instrument HC analyzer Model No HC51M

Technical specification of the instrument is as follows

- Programmable measurement ranges: 0-10 / 50 / 100 / 500 / 1,000 ppm, or user selectable
- Lower detectable limit: 0.05 ppm
- Response time: automatic or programmable
- Zero drift: 0.1 ppm / 7 days
- Span drift: < 1 % / 7 days
- Linearity: ± 1 % full scale
- Measurement Units either in ppm or mg/m^3
- Sample flow rate approximately 1.6 liters/min

- First check the power connection & power supply the power to the instrument must be through the stabilizer to avoid any power fluctuations & for steady operation of the system.
- First to start up the instrument check the cylinder pressure of the hydrogen cylinder
- Check the all the tubing connecting to the analyzer hydrogen cylinder & air compressor there should not be any leak then check the colour of the silica gel filled into the moisture trapper through which the air supplied from the air compressor to the system it should be always blue if it terns to pink then replace it with the blue one. It is to avoid the any damage to the system especially to the FID detector as the air required to ignite the flame is always moisture & oil free. After this primary inspection first on the instrument then turn on the air compressor & hydrogen cylinder

- Wait for the some time to auto ignition of the flame it can be checked from the synoptic screen after auto ignition wait for some time then go for the step of calibration as mentioned below

Calibration

- Check the sample flow rate and zero flow rate. They should be same.
- Connect the span gas cylinder to sample mode.
- Check whether the CH_4 and Non- Methane values are 11.88 ppm and 24.5 ppm
- If the values are different go to main menu→ span→factor and change the factor
- Go to synoptic and see the value.
- If the values are different change the factors until the values are same.
- For the purpose of calibration of the HC analyzer use the Calibration gas as the mixture of Methane & Propane balance with air. The concentration of the Methane & Propane gas is 11.88 ppm & 8.18 ppm

Do's and Don'ts

- Never press Sample mode when the instrument is in Zero Reference cycle.
- Check whether the instrument shows Zero when Zero is pressed.
- After Zero is reached press Sample.
- Change the primary filter paper (47mm Teflon filter with pore size 5 micron) fitted at the sample inlet after every 15-20 days or decide the frequency on the type of air samples used for analysis
- Before starting the system check for all the electric connection, power supply must be through the stabilizer so that less fluctuation in the measurement of the values
- For the steady result operate the system in 20-25 degree C.
- Check the cylinder pressure of the hydrogen cylinder if it is very low replace it with new one.

Standard calibration gas used for the routine calibration of both analyzer was provided with the certificate of analysis which helps to find & cross check the concentration values detected by the system & actual concentration value of calibration gas

Mixture Composition for HC Calibration Gas

Component	Ordered	Actual
Carbon monoxide	10.25 PPM	11.88 PPM
PROPANE	8.15 PPM	8.18 PPM
Air	Balance	Balance

Settled pressure	130kg/cm^2
Minimized pressure for utilization	5 kg/cm^2
Preparation tolerance	+/- 20 %
Certification accuracy	+/- 2 %
Stability period	12 mounts

VIII) Ambient Ozone Analyzer

Monitoring of the ambient ozone was carried out for each site during each season with the help of the Teledyne Ozone analyzer Model 400E UV Absorption Ozone Analyzer is a microprocessor-controlled analyzer that uses a system based on the Beer-Lambert law for measuring low ranges of ozone in ambient air. A 254 nm UV light signal is passed through the sample cell where it is absorbed in proportion to the amount of ozone present. Every three seconds, a switching valve alternates measurement between the sample stream and a sample that has been scrubbed of ozone. The result is a true, stable ozone measurement. Stored data are easily retrieved through the front panel, allowing operators to perform predictive diagnostics and enhanced data analysis by tracking parameter trends.

The instrument was calibrated prior to the sampling time the calibration of the instrument was carried out as per the SOP & the instruction provided in the user manual.

Start up

- Prior to the start up the system check for the proper & safe mounting of the instrument for the safety & proper handling
- After that do the all the electric connection as per the system requirement also check for the proper ear thing to avoid any major damage to the system
- Also do the proper connection of the sample inlet & exhaust connection on the rare panel of the system check for the any leak check
- Then switch on the system by turning on the main button present on the front panel of the system

Standard operating procedure of ozone analyzer

- Ozone monitoring in the ambient air is carried out using the online ozone monitor model no 400E make by the Teledyne the measurement principle of the ozone is based on the UV spectroscopy measurement in which a system is based on the Beer-Lambert law for measuring low ranges of ozone in ambient air.
- A 254 nm UV light signal is passed through the sample cell where it is absorbed in proportion to the amount of ozone present in the surrounding atmosphere the technical specification o the system Teledyne 400E is mentioned below.

The technical specification of the ozone analyzer model no 400E are as given below

Ranges	**:** 0-100 ppb to 0-10 ppm, user selectable. Dual ranges and auto-ranging supported
Units:	**:** ppb, ppm, µg/m^3, and mg/m^3
Lower Detectable Limit (LDL)	**:** < 0.6 ppb (RMS)
Sample Flow Rate	**:** 800-cm^3/min-±10%
Linearity:	**:** 1% of full scale
Operating Temperature	**:** Range: 5 - 40˚C (with EPA Equivalency)
Maximum Concentration	**:** 1.0 ppm
Minimum Concentration	**:** 0.050 ppm
Resolution	**:** 0.5 ppb
Repeatability (7 days)	**:** 1% of reading
Initial accuracy	**:** ±5% of target
Approvals	**:** USEPA EQOA-0992-087 MCERTS certified Sira MC050070/00 EN14625 Approved, CE and others

Start Up

- The system prior to the operation must be checked for the proper mounting place, the safety and easy handling before start up the system checked for the proper local electric supply it should be as per the requirement for the operation of the system also check for the proper earthing to avoid any major damage to the system
- After checking all the power connection switch on the system by switching the main power button located on the main panel of the instrument
- The display should immediately display a single horizontal line at the far left corner of the display it will take 20-30 seconds
- Click the button below the icon **CLR**
- The system will take around 30 minutes for warm up after that the system is ready to take the reliable O_3 measurement

Data Retrieval

- Press the button below the icon **SET UP.**
- Then next sub Menu will open the press the button below **DAS.**
- Next page will show the VIEW icon at the extreme end of the display.
- It is the data available mode.
- It will show the latest concentration of the sampling day.

Calibration

Since the systems have the self generating ozone system hence the calibration of the system is carried out by the self generated ozone

- For the calibration follow the steps given below
- Press the button below **CAL**
- Then press the button below the **CONC** it will open the next sub menu which show the icon **SPAN & O3 GEN**
- By pressing the above two keys the concentration of the O_3 generator or span gas concentration can be changed
- After setting the concentration range press the button below **EXIT** till get to main menu
- After that press the button below **CALZ**
- Wait for 10 minutes until zero display
- If the concentration deviation is more from zero then press **zero** button **& ENTER** then the conc. Will be set to zero
- **EXIT** to main menu
- Press the **CALS**
- Wait for 10 minutes until **SPAN** display
- **Exit** to main menu as the message of **SPAN** get displayed
- Check the offset & slope value they should be near to 1 if not so repeat the all the steps

In the routine maintenance change the inlet filter paper, which resist the particulate matter to enter in to the measurement area that is optical bench. The frequency of changing the paper is dependent on the type of location as well as the data recorded by the system also check the connection of the Teflon pipe at the rare panel of the system after every shifting from the one sampling location to another one mounting location should be at proper height & location.

F) Weather Monitoring Station Model AWSDL/2

Installation of weather monitoring station at sampling location

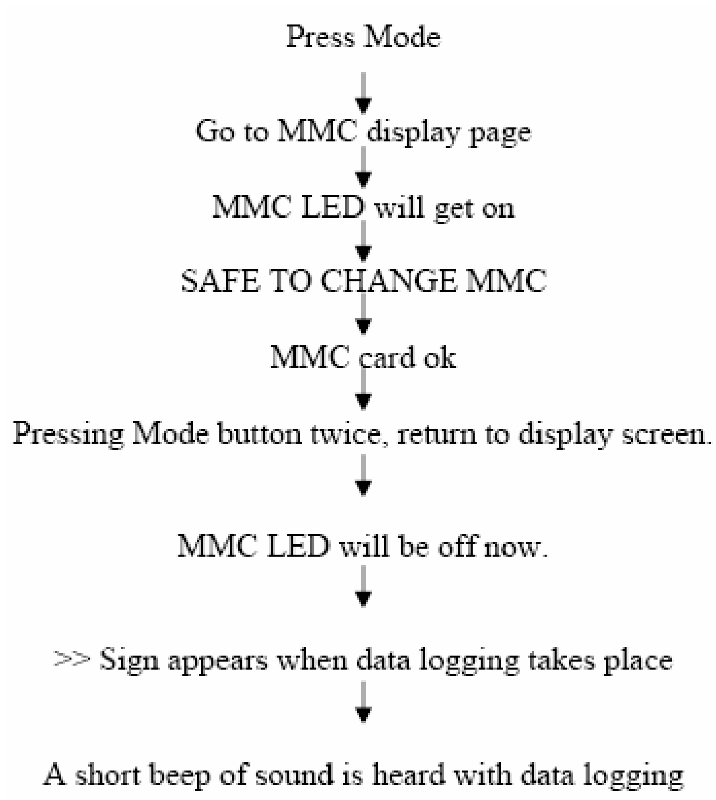
- For installing the weather monitoring station select the proper location which will be open to move the wind with obstacle free place mount. The wind speed wind direction temperature sensors on the metal pipe clip the pipe with the strong support.
- The height of the pipe should be adjusted that there will be no any obstacle to move the wind so that correct met data will be collected to represent the general meteorology of the sampling location. In case of installation of the wind direction sensor first choose the proper place.

- Then with the help of magnetic compass check the main four directions according to hat adjust the alphabets namely N, S, E, & W of the wind direction sensor. Connection of all the signal cable of all the sensors, power supply and centralize connection unit must be properly followed as per the guidelines given in the instruction manual
- Solar panel & storage battery & data logger box must be installed in the proper way on the strong & safe platform.
- Check the power supply & fluctuations.
- Start the data loger system to collect the data.

Data Logger Features –

Logging Memory

- MMC card based 256 MB/1 GB
- Replaceable MMC cards
- Data storage in FAT 32 file format that is readable in any computer.
- MMC LED signifies that it is safe to insert or remove the MMC card. If the MMC Led is not ON, it is not recommended to access the MMC card.
- Accessing the card while the LED is OFF may lead to permanent damage of MMC drive of the data logging system.



Replacing MMC card

Press Mode button once -------→ MMC LED is ON------→ Replace MMC card-----→ Beep is heard if MMC card inserted properly.

Data retrieval from MMC card

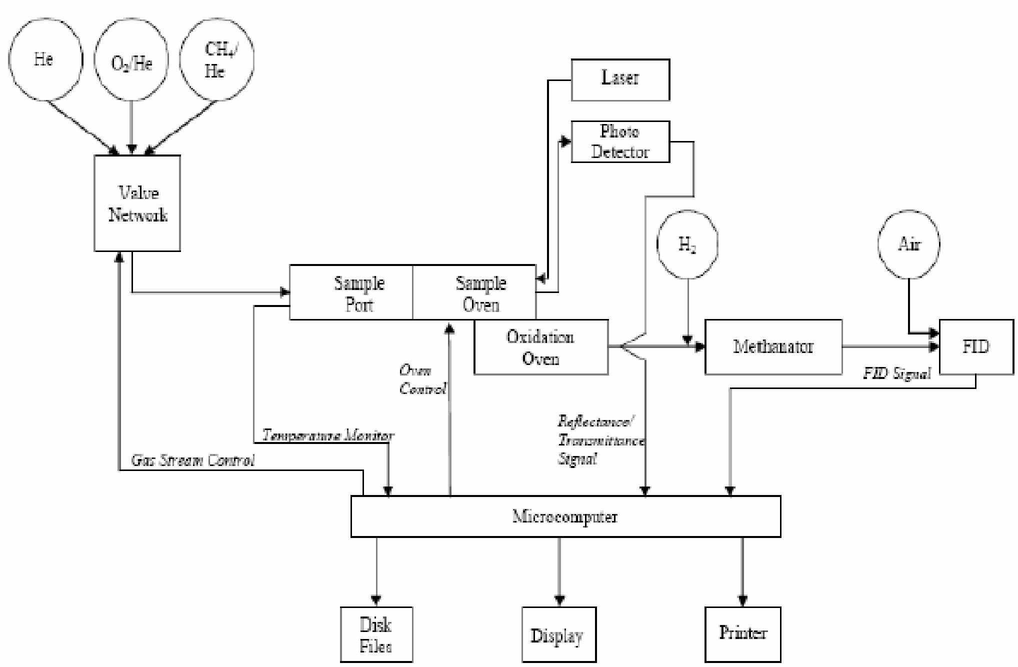
- Data read out with the help of the card reader after removing the card connect it to pc with the help of card reader device copy the all files.
- The data for each day is stored in the excel data sheet with file name with respect to the date at which the data was collected
- In excel sheet the data is recorded as per the time interval set to record the data
- Save the all files on the PC or Laptop clear the card so that it will be ready to reinstall into the data logger system.

G) QA - QC for EC/OC analysis

Ambient particulate matter is a combination of primary as well as secondary aerosol mass. It is important to have particulate characterization data to use receptor model for source apportionment study[1] The various components analyzed for particulate characterization includes elements, ions, elemental and organic carbon etc. This helps in better understanding in proportional contribution of different sources synergistically affecting the PM_{10} concentration at receptor end.

Two classes of carbon were measured in ambient aerosol samples collected on quartz-fiber filters: (1) organic, volatilized, or non-light absorbing carbon and (2) elemental or light-absorbing carbon. The Thermal/Optical Reflectance (TOR), Thermal/Optical Transmittance (TOT), and Thermal Manganese Oxidation (TMO) methods have been most commonly applied in aerosol studies for the analysis of organic and elemental carbon. Desert Research Institute's Thermal/Reflectance Optical Carbon Analyzer, (Model 2001 A, Protocol Improve A) was used for the analysis. The analysis is based on liberating carbon compounds at different temperatures. The sample boat having a punch of 0.5-cm^2 area is passed through oxygenator having heated MnO_2 at 900^0 C. Here, volatilized carbon compounds get converted to CO_2. Methanator having hydrogen enriched Nickel catalyst reduces CO_2 to CH_4 at 425^0C. The CH_4 concentration is detected using FID detector at 125^0 C. CH_4 concentration is equivalent to elemental and organic carbon present in the sample. The results are noted in terms of reflectance based upper split values for regular OC, regular EC and TC in µg/filter.

DRI Model 2001 Thermal/Optical Carbon Analyzer Schematic Diagram



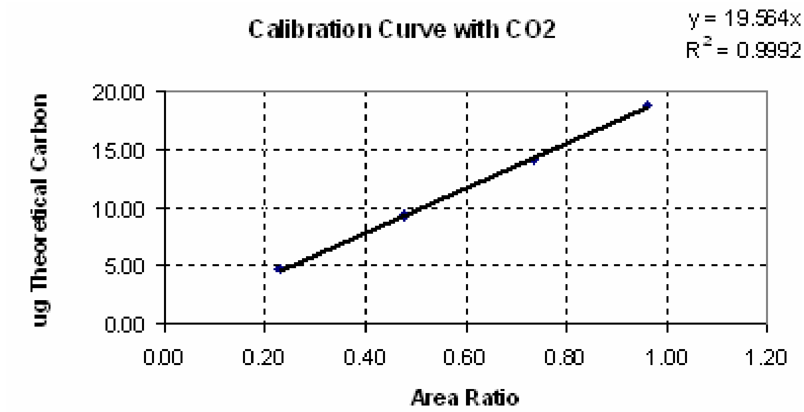
Quality assurance and Quality control (QA/QC) is an essential part of any monitoring system, it is a programme of activities that ensures that measurements meet defined and appropriate standards of quality, with a stated level of confidence[1] Following QA/ QC procedures were adopted in case of EC/OC analysis: -

- **Gas cylinder pressure**: - The pressure in all the gas cylinders was checked before starting the analysis and at the end of the day when analysis was over. It was always checked that internal cylinder pressure is not less than 10 kg/cm^2 and outlet cylinder pressure is not less than 2 kg/cm^2.
- **Leak Check**: - Leak check was performed every day prior to starting the analysis to check whether any gas leak exists.
- **Bake Oven**: - Bake oven was performed twice every day after performing the leak check in order to avoid any errors due to contamination.
- **Instrument calibration**: - 3 types of calibration procedures were adopted.
  i. **Auto calibration**: - Auto calibration was done at the beginning of the day before starting the analysis by using *cmdAutocalibcheck* command. It was always checked that the calibration peak area is within 10 % of the external calibration peak area.[1]
  ii. **End of the run calibration peak**: - It occurs automatically at the end of each analysis. It was checked that calibration peak area counts are always greater than 20,000.[1]
  iii. **External calibration**: - External calibration was performed every six months using various volumes of CO_2 gas, ranging from 100 µl to 1000 µl.

Figure 1: External Calibration of OC/EC Analyzer

STANDARD = 5% CO_2 IN HELIUM
ROOM TEMP = 27 DEG C,
AMBIENT PRESSURE =733 mm

SR. NO	VOL OF CO2 IN µl	CO_2 AREA	CH_4 AREA	AREA RATIO	THEORITICAL µg OF CARBON
2	200	6149	26,698	0.23	4.70
3	400	12666	26,575	0.48	9.41
4	600	19662	26,809	0.73	14.11
5	800	25745	26,828	0.96	18.82
6	800	25745	26,828	0.96	18.82



- **System Blank**: - System blank was performed to insure that the system is not introducing bias in the carbon results and to insure that the laser signal is not temperature dependent. The Total Carbon value was always less than 1 µg/filter

Analysis ID : systemblank-1.OEC
Sample ID : systemblank
Punch area : 1.000 cm2
Deposit area : 1.000 cm2

Analysis Start : 01/18/08 10:44 Calculation : 01/18/08 11:02
Analysis Stop : 01/18/08 11:01

Reflectance	VOC	Regular OC	HighTemp OC	Regular EC	HighTemp EC	TC	
Lower Split :	.00	.02	.02	.00	.00	.02	ug C/cm2
	.00	.02	.02	.00	.00	.02	ug C/filter
Regular split :	.00	.02	.02	.00	.00	.02	ug C/cm2
	.00	.02	.02	.00	.00	.02	ug C/filter
Upper Split :	.00	.02	.02	.00	.00	.02	ug C/cm2
	.00	.02	.02	.00	.00	.02	ug C/filter

Figure 2: System Blank Data

- **Punch location**: - The punch for analysis was always taken from the centre of the filter paper in order to get a representative sample.
- **Cleaning of punching tool and forcep**: - The punching tool and forcep used was cleaned thoroughly after each sample in order to avoid any contamination.
- **Instrument Blank**: - The prefired quartz filters were analyzed for OC, EC and TC values in µg/cm^2 to check the efficiency of the firing procedure adopted for the quartz filters. The acceptance criteria for the blank filters are as follows [3]:

Table 1: Acceptance criteria for instrument blank

Component	*Acceptance values (μg/cm²)*
OC	Less than 1.5
EC	Less than 0.5
TC	Less than 2.0

Table 2: OC, EC and TC values for blank filters

Sample ID	*OC (μg/cm²)*	*EC (μg/cm²)*	*TC (μg/cm²)*
Blank 1	0.126	0	0.126
Blank 2	0.127	0	0.092
Blank 3	0.047	0	0.047
Blank 4	0	0	0
Blank 5	0.031	0	0.031
Blank 6	0	0	0
Blank 7	0	0	0

- **Conclusion**: - As seen in **Table 2**, OC, EC and TC values µg/cm² are within the acceptance criteria for the instrument blank (**Table 1**). This shows good efficiency in the firing procedure for the quartz filters.

- **Reproducibility Testing**: - Replicates of analyzed samples were performed at the rate of one per group of ten samples. The replicate was selected randomly and run immediately after a group of ten is completed. The µg/cm² values for OC, EC, and TC were compared with the original run. Acceptance criteria for the various concentration ranges are given in the following table[2].

Table 3: Acceptance criteria for reproducibility testing

Total Carbon Concentration Range	*Acceptance Criteria*
Values > 10 µg/cm²	Less than 10 % RPD
5 -10 µg/cm²	Less than 15 % RPD
Values < 5 µg/cm²	Within 0.75 µg/cm²

Table 4: Reproducibility of results

Sample ID	*Date*	*TC(μg/cm²)*	**Relative Percent Difference**
Mu_S_Sp_Dha_6	14/15.3.07	91.785	0.972
Mu_S_Sp_Dha_6_R	14/15.3.07	90.892	
Mu_S_Sp_Col_6	30/31.3.07	25.930	8.010
Mu_S_Sp_Col_6_R	30/31.3.07	23.853	
Mu_PM_Sp_Dad_7	28/29.10.07	80.425	1.188
Mu_PM_Sp_Dad_7_R	28/29.10.07	79.468	

Sample ID	*Date*	*TC(μg/cm²)*	**Relative Percent Difference**
Mu_PM_Sp_Dad_9	30/31.10.07	91.499	1.596
Mu_PM_Sp_Dad_9_R	30/31.10.07	92.984	
Mu_PM_Sp_Dad_14	4/5.11.07	77.031	5.155
Mu_PM_Sp_Dad_14_R	4/5.11.07	73.060	
Mu_W_Sp_Dad_7	16/17.1.07	111.238	2.427
Mu_W_Sp_Dad_7_R	16/17.1.07	108.538	
Mu_PM_FRM_Col_1	10/11.10.07	34.068	1.745
Mu_PM_FRM_Col_1_R	10/11.10.07	33.473	
Mu_W_Sp_And_21a	11/12.2.08	36.815	2.569
Mu_W_Sp_And_21a_R	11/12.2.08	35.869	
Mu_W_Sp_Dha_30a	19/20.2.08	34.924	0.932
Mu_W_Sp_Dha_30a_R	19/20.2.08	34.598	
Mu_W_Sp_Dha_30c	19/20.2.08	26.368	4.139
Mu_W_Sp_Dha_30c_R	19/20.2.08	25.277	
Mu_W_Sp_Dad_29a	7/8.2.08	18.389	8.869
Mu_W_Sp_Dad_29a_R	7/8.2.08	20.179	
Mu_W_Sp_Dad_29c	7/8.2.08	25.867	7.301
Mu_W_Sp_Dad_29c_R	7/8.2.08	27.904	

- **Conclusion**: - As seen in **Table 4**, in case of all the repeated samples, individual TC values are greater than 10 μg/cm^2 and the percent difference is less than 10%. This shows good reproducibility as per the first criteria in **Table 3.**
- **Data Validation**: - Data validation was performed by manually checking the tabular and thermogram after the analysis was performed. The following items were checked on the tabular data [3]: - (**Figure 2, 3**)
  - Filter ID
  - Punch area of the filter
  - Deposit area of the filter
  - Calibration peak area
  - Initial and final FID baseline counts - It was within 3 counts.
  - The lower laser split time and the upper laser split time - It was within 10 seconds.

Analysis ID	: Mu_PM_Col_2_111007-1.OEC
Sample ID	: Mu_PM_Col_2_111007
Punch area	: 0.500 cm^2
Deposit area	: 12.560 cm^2

Calibration peak area:	24824 millivolt-seconds	
Initial FID baseline:	27	millivolts
Final FID baseline:	28	millivolts

Reflect Split Time Laser		FID Split Time	
Lower split:	592 sec	556 millivolts	617 sec
Regular split:	593 sec	559 millivolts	618 sec
Upper split:	599 sec	558 millivolts	624 sec

Figure 3: Data Validation

Analysis ID	: Mu_PM_And_Sp_22c_111207-1.OEC
Sample ID	: Mu_PM_And_Sp_22c_111207
Punch area	: 0.500 cm^2
Deposit area	: 12.560 cm^2

Calibration peak area:	25672 millivolt-seconds	
Initial FID baseline:	28	millivolts
Final FID baseline:	30	millivolts

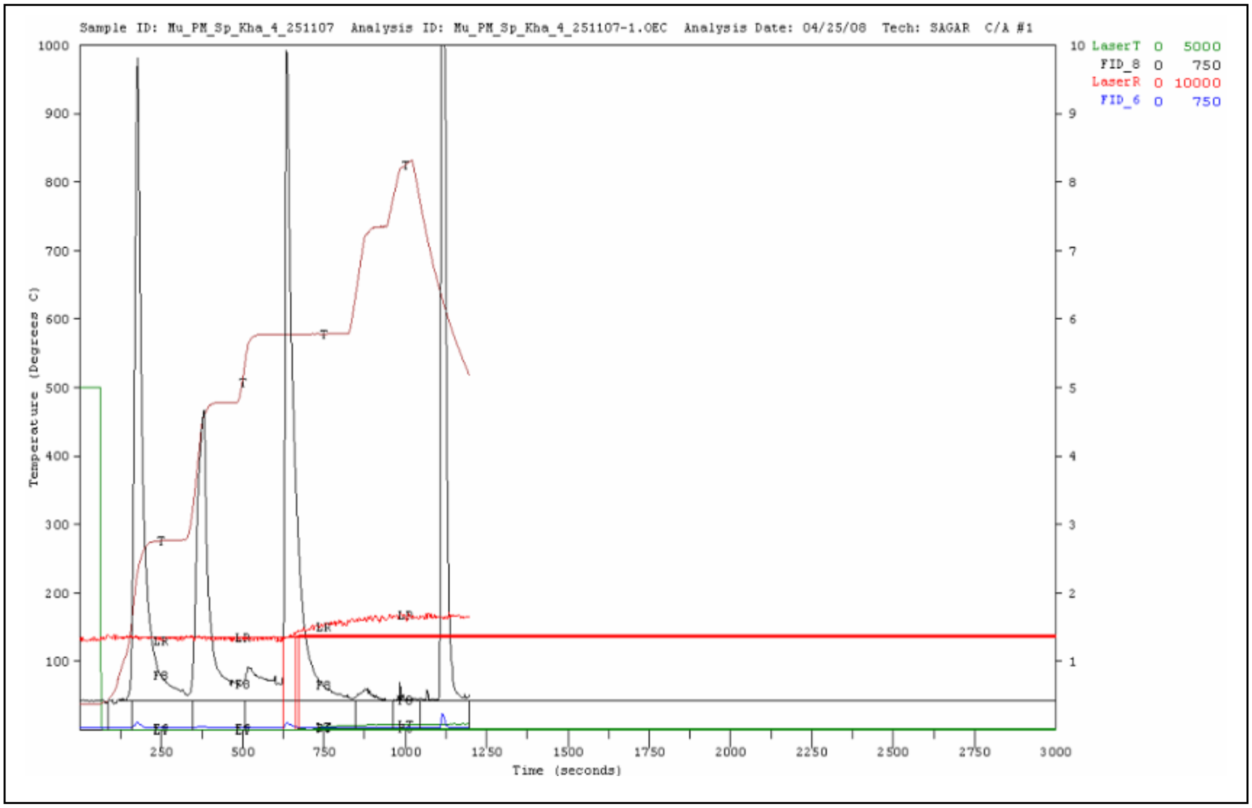
Reflect Split Time Laser		FID Split Time	
Lower split:	586 sec	559 millivolts	611 sec
Regular split:	591 sec	558 millivolts	616 sec
Upper split:	591 sec	558 millivolts	616 sec

Figure 4: Data Validation

The thermographs were checked for the following: - **(Figure 4)**

- Initial FID baseline - It was found to be flat.
- The dip in the laser signal below the initial laser line until oxygen is introduced at 550 ^{0} C.
- The laser signal at the end of the analysis - It was found to be flat.

Figure 4: Thermograph



References:

1. Conceptual Guidelines for Common Methodology on Air Quality Monitoring, Inventory and Source Apportionment Studies for Indian Cities – Central Pollution Control Board, Delhi

2. Standard Operating Procedure for the Determination of Organic, Elemental and Total Carbon in Particulate Matter Using a Thermal/Optical Transmittance Carbon Analyzer – OC/EC Laboratory, Environmental & Industrial Sciences Division, Research Triangle Institute, Research Triangle Park, North Carolina.

3. DRI Standard Operating Procedure – Thermal/Optical Reflectance Carbon Analysis of Aerosol Filter Samples. DRI SOP 2 – 204.6, Revised June, 2000

H) QA/QC for Ion Analysis

Aerosol particles play important roles in the atmosphere. Aerosol ions refer to chemical compounds, which are soluble in water. Water soluble fraction of atmospheric aerosol contains many important compounds, which can change the size, composition, number and lifetime of aerosol owing to their hygroscopic nature.[1]

Filter Extraction

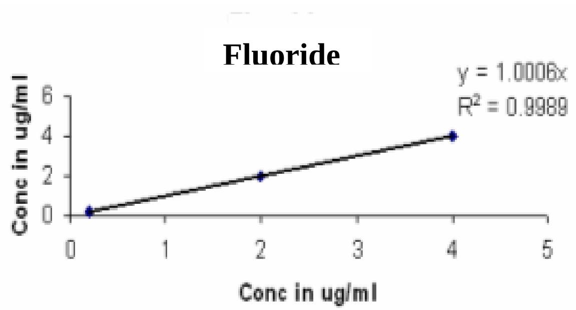
100 µl ethanol is added to the filters, these filters were then extracted in 50ml deionized water by sonicating for one hour, shaking for one hour, and storing overnight in a refrigerator. It was filtered through 0.45 µ pore size Millipore filter and then analyzed by **Dionex ICS-3000 Ion chromatography** system comprised of a suppressor column, analytical column, and a conductivity detector.

QA/QC is backbone of good quality acceptable data. QA comprises of quality control, quality auditing whereas QC is planned to prevent, identify, correct and define the consequence of difficulties, which might affect the precision and accuracy. Following QA/ QC procedures were adopted for ion analysis:-

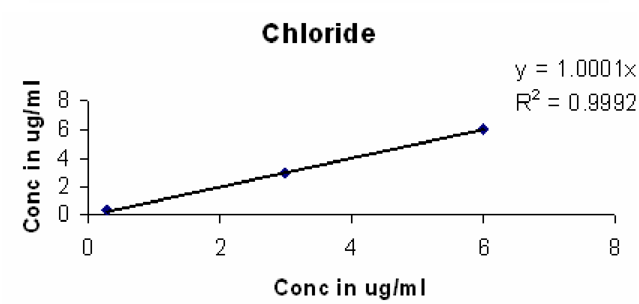
- **Calibration**

The instrument is calibrated using high purity graded chemicals (Merck). Dry chemicals used for the preparation of calibration standards.

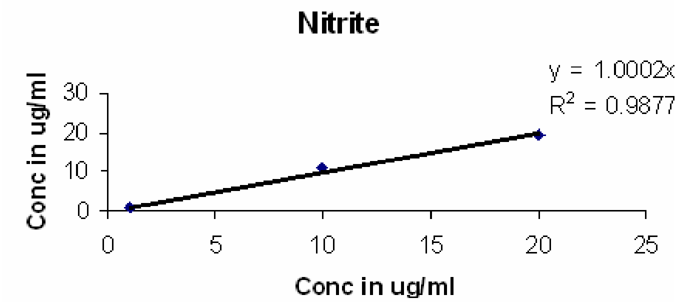
A. Calibration of Anion



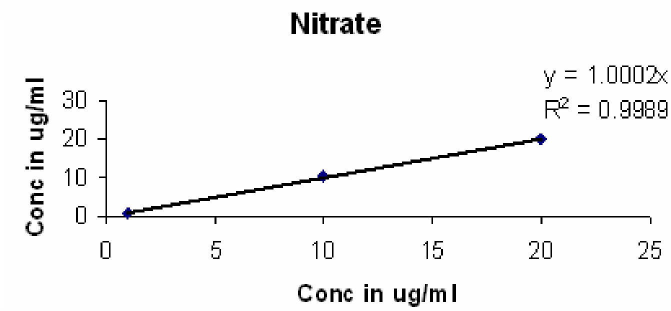
Std Conc (ug/ml)	F (ug/ml)
0.2	0.16
2	1.93
4	4.04



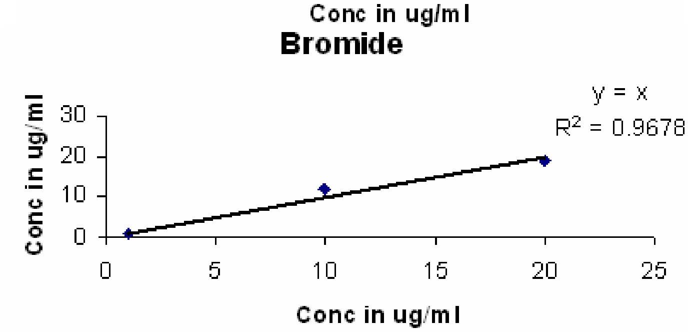
Std Conc (ug/ml)	CL (ug/ml)
0.3	0.31
3	2.9
6	6.05



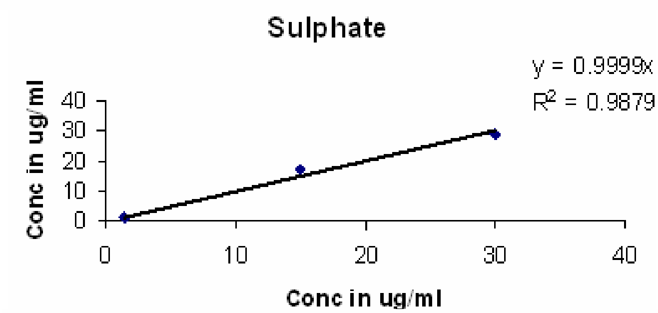
Std Conc (ug/ml)	NO2 (ug/ml)
1	1.01
10	11.29
20	19.36



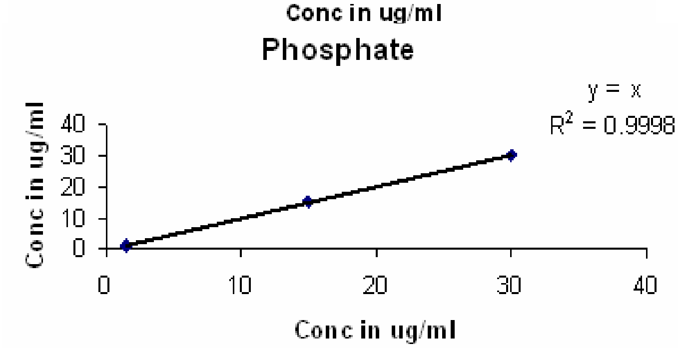
Std Conc (ug/ml)	NO3 (ug/ml)
1	0.88
10	10.38
20	19.82



Std Conc (ug/ml)	Br (ug/ml)
1	0.99
10	12.06
20	18.97



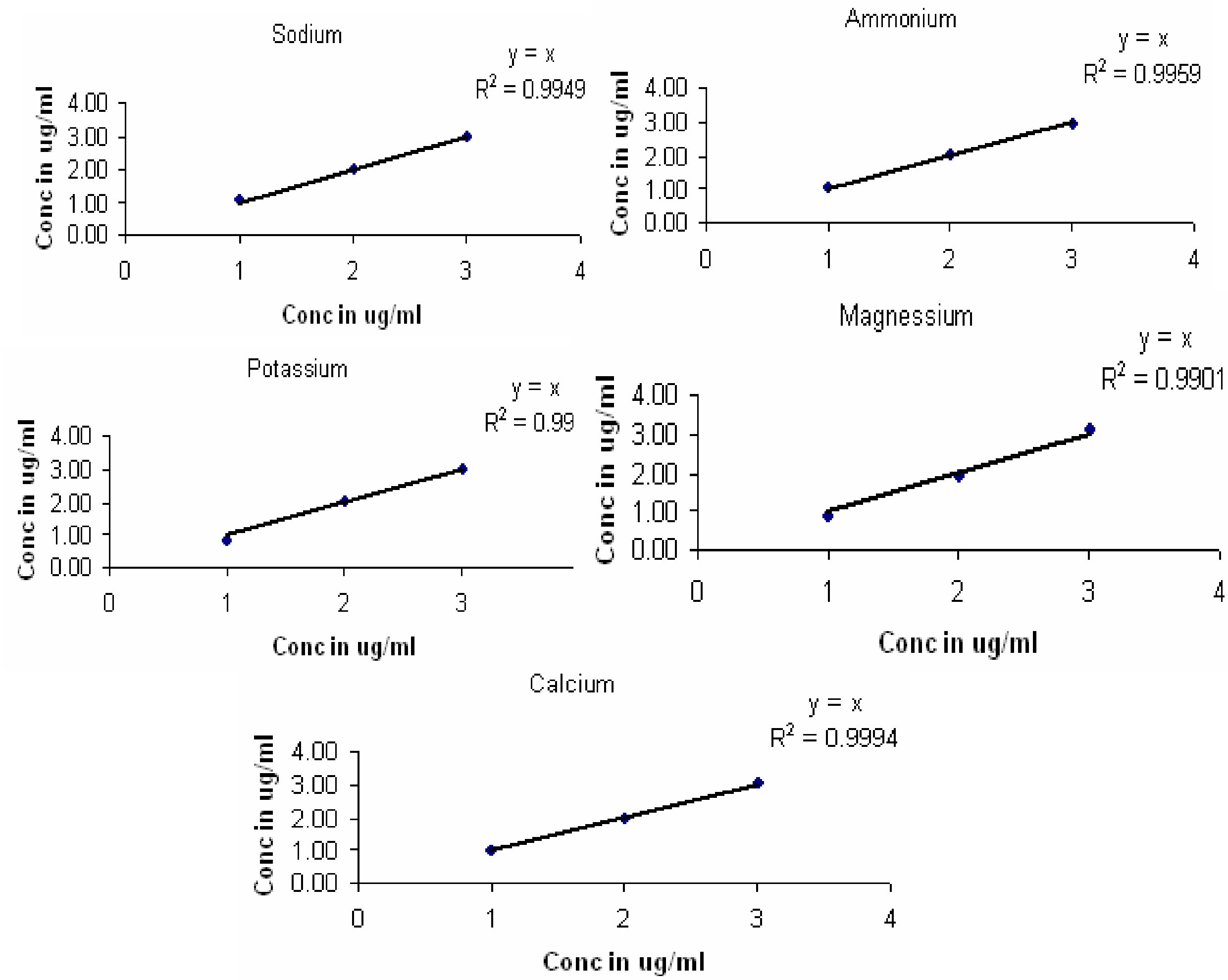
Std Conc (ug/ml)	SO4 (ug/ml)
1.5	1.36
15	16.93
30	29.04



Std Conc (ug/ml)	PO4 (ug/ml)
1.5	1.23
15	15.09
30	29.97

Fig 2. Calibration of Cation

Std Conc.(ug/ml)	Na	NH4	K	Mg	Ca
1	1.09	1.06	0.86	0.92	1.01
2	2.00	2.04	2.05	1.91	1.97
3	2.97	2.95	3.01	3.09	3.02



- **Limit of Detection (LOD)**

The LOD is described as the lowest concentration an analyst can quantify with a certain confidence level. The limit of detection for the method is determined by analyzing a low standard seven times. The table below lists the current verified LOD values.[2]

Table 1. Verified LOD

	F	Cl	NO_3	SO_4
Low Standard Used	1 ppm	1 ppm	1 ppm	1 ppm
Standard Deviation	0.043	0.028	0.052	0.067
Verified LOD	0.136	0.089	0.165	0.211

Deionized water Blank and filter blanks were analyzed with each set of extracted filters. Blank levels are monitored to assure that sampling processing technique are not affecting sample result.[2]

Table 2. DI Blank and Filter Blank for Anion

Sample ID	F	Cl	NO_2	SO_4	Br	NO_3	PO_4
DI blank	0.03	0	0.02	0.05	0	0	0
Filter Blank	0.04	0.48	0.08	0.28	0	0	0

Table 3. DI Blank and Filter Blank for Cation

Sample ID	Na	NH_4	K	Mg	Ca
DI blank	0	0	0	0	0
Filter Blank	0.63	0	0.24	0.08	0.26

References

1. Chemical characterization of water-soluble components of PM_{10} and $PM_{2.5}$ atmospheric aerosols in five locations of Nanjing, China Gehui Wang, Hui Wang, Yajuan Yu, Shixiang Gao, Jianfang Feng, Songting Gao, Liansheng Wang

2. Standard Operating Procedure for the Analysis of Anions and Cations in $PM_{2.5}$ Speciation samples by Ion Chromatography.-SOP MLD 064, California Environmental Protection Agency Air resource Board.

I) QA/QC for Elemental analysis

The area of toxic air pollutants has been the subject of interest and concern for many years. Recently, the use of receptor models has documented the need for elemental composition of atmospheric aerosols into components as a means of identifying their origins. The assessment of human health impacts, major control actions by federal, state and local governments is based on this data[1] Instrumental neutron activation analysis (INAA), atomic absorption spectrophotometry (AAS), inductively coupled plasma with atomic emission spectroscopy (ICP - AES) or with mass spectroscopy (ICP - MS), photon induced x – ray fluorescence (XRF), and proton induced x – ray emission (PIXE) have all been applied to elemental measurements of aerosol samples[2].

The advent of inductively coupled plasma spectroscopy has improved the speed and performance of metal analysis in many applications. ICP spectroscopy is capable of quantitatively determining multi - elements at ppb level simultaneously. The basis of the measurement of atomic emission by ICP–AES. Samples are nebulized and the aerosol that is produced is transported to the plasma torch where excitation occurs. Characteristic atomic – line emission spectra are produced by a radio frequency ICP. The spectra are dispersed by a grating spectrometer and the intensities of the line are monitored by a photo multiplier tubes. The photo currents from the photo multiplier tubes are processed and controlled by a computer system. The intensity of these photo currents is directly proportional to the concentration of analyte of interest.

Filter Extraction: - The samples collected on Teflon filter can be either extracted by either hot acid procedure or by microwave extraction. Here, the extraction was performed in clean and labeled 100 ml beaker by adding 5 ml aqua regia (15 ml GR grade concentrated HCl and 5 ml of GR grade concentrated HNO_3). Refluxing was done for 4–5 hours at 90^0C without allowing the sample to get dry. It was allowed to cool. The beaker was rinsed with Deionised (DI) Water and the final volume of 25 ml was made by DI water[3]. The sample is then analyzed on ICP–AES (Model - Horiba Jobin – Yvon, Ultima 2000).

Operating Conditions

Temperature of the instrument lab	$20\ ^0$C
Inert gas used	Argon
Line pressure for plasma	6 – 7 Kg/cm^2
Line pressure for purge	1 – 2 Kg/cm^2
Sample uptake flow rate	1 ml/min

Quality assurance and Quality control (QA/QC) is an essential part of any monitoring system, it is a programme of activities that ensures that measurements meet defined and appropriate standards of quality, with a stated level of confidence. Following QA/ QC procedures were adopted in case of Elemental analysis

- **Cleaning of glassware**: -All the labware used for the analysis was thoroughly cleaned. All the glassware was kept in the ultrasonicator for 30 minutes. It was then soaked for 4 hours in 10% V/V nitric acid; rinsed 3 times with deionized water and then oven dried.[1]
- **Preparation of reagents**: - Aqua regia used for extraction was prepared using GR grade concentrated HCl and GR grade HNO_3 with high purity. Also the standards used for the calibration were prepared using deionised water.
- **Initial Calibration**: - Initial calibration was done at the beginning of the analysis. *Accu standards* are used for the preparation of the standards.
  Accu std 1: Ce, Lu, Sm, Sc, Th & Y
  Accu std 2: Al, As, Ba, Cd, Ca, Cr, Co, Cu, Ga, In, Fe, Mg, Mn, Ni, K, Se, Ag, Na, Sr, V & Zn.
  Accu std 3: Sb, Hf, Pd, Sn
  Accu std 4: Mo, P, Si, Ti, W, Zr
  Accu std 5: Hg

Four point calibration was done.

- For elements in A1, A3 & A5, concentration range used was 100, 200, 500 and 1000 ppb.
- For elements in A2 and A4 the concentration range selected for calibration was 2000 and 5000 ppb; because mostly the elements present in A2 and A4 (example: Ca, Na, K, P) are in high concentration in the samples.

- **Initial Calibration Verification (ICV)**: - The ICV standard of 500 ppb was analyzed immediately after initial calibration. The acceptance criterion for ICV is that the measured should be within 90 – 110 % of the actual concentration[1]. If the result was not within the range, the calibration was done again.
- **Precautions to avoid contamination**: - After analysis of every sample or standard, the tubing and the nebulizer was washed with deionised water and then the tube is gently wiped off using the tissue paper in order to prevent carryover from the previous sample or standard. It also helped in avoiding the contamination.
- **Pressure check**: - Normally, the pressure of each Argon cylinder is 120 Kg/cm^2 During the analysis, when the pressure dropped to 10 Kg/cm^2, the cylinder was not used so as to avoid any impurities present at the bottom of the cylinder and also to prevent the damage to the instrument. This helps to avoid the false results.

References-

1. Compendium Method IO – 3.4: - Determination of metals in ambient particulate matter using Inductively Coupled Plasma (ICP) Spectroscopy, Compendium of Methods for the determination of Inorganic Compounds in Ambient Air, Center for Environmental Research Information, US EPA, June 1999
2. Model Standard Operating Procedures (SOP) for sampling and analysis – Air Quality Monitoring, Emission Inventory & Source Apportionment Studies For Indian Cities - Central Pollution Control Board, Delhi
3. Compendium Method IO – 3.1: - Selection, Preparation and Extraction of filter material. Compendium of Methods for the determination of Inorganic Compounds in Ambient Air, Center for Environmental Research Information, US EPA, June 1999

Annexure 2.2

Observed Concentrations of Ambient Air

Table AC_S.1: Observed Concentrations of Ambient Air Quality at Colaba (Summer)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
1	22/23.3.07	180	67	111		4	24	55					
2	23/24.3.07	*	*	110									
3	25/26.3.07	170	64	76		5	13	10					
4	26/27.3.07	438	194	118		4	32	56					
5	27/28.3.07	231	76	110		4	21	35					
6	28/29.3.07	239	81	105		9	36	33					
7	30/31.3.07	125	52	93		4	9	15					
8	31/1.3/4.07	141	62	83		4	12	54					
9	1/2.4.07	173	56	88		4	9	38		10			
10	2/3.4.07	261	70	151		5	23	64					
11	3/4.04.07	192	79	103		5	28	29					
12	4/5.04.07	235	128	124		5	94	159					
13	5/6.04.07	160	62	93		4	21	43					
14	19/20.4.07	163	49	102		4	18	74					
15	20/21.4.07	147	38	105		7	10	46					
16	22/23.4.07	86	26	50		4	10	31			1.2	21.45	22.65
17	23/24.4.07	162	43	60	29	5	11	31					
18	24/25.4.07	156	36	102		6	15	21					
19	25/26.4.07	173	48	119		6	11	29					
20	26/27.4.07	163	36	89	16	9	16	59					
21	27/28.4.07	134	38	85	41	4	18	51					
22	28/29.4.07	139	35	93		4	14	23					
23	29/30.4.07	114	22	69		7	10	31	5.07				
24	30/1.4/5.07	91	21	66		6	11	11					
25	2/3.5.07	89	21	61		4	11	68					
26	3/4.5.07	77	17	63		9	16	62	2.19				
27	4/5.5.07	98	22	58		5	12	72					
28	5/6.5.07	109	26	80		4	12	35	3.55				
29	6/7.5.07	110	25	83		4	9	52	3.54	26			
30	7/8.5.07	110	28	81		4	11	56	0.25				
31	8/9.5.07	104	24	77		6	9	57			1.05	8.45	9.5

* Sampler not working at specified flow rate

Table AC_S.2 : Concentration of EC, OC and TC in PM_{10} at Colaba Site (Summer)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
22/23-3-07	35.2	17.1	52.3	2.1
23/24-3-07	26.2	7.9	34.1	3.3
25/26-3-07	21.5	5.9	27.4	3.6
26/27-3-07	15.8	5.5	21.2	2.9
27/28-3-07	12.5	3.9	16.4	3.2
28/29-3-07	11.3	3.0	14.3	3.8
30/31-3-07	10.5	3.1	13.6	3.4
31/1-3/4-07	6.5	2.4	8.9	2.8
1/2-4-07	11.6	3.1	14.7	3.7
2/3-4-07	12.0	3.9	15.9	3.1
3/4-4-07	13.0	5.5	18.5	2.4
4/5-4-07	21.4	5.6	27.0	3.8
5/6-4-07	9.5	3.4	12.9	2.8
19/20-4-07	9.7	1.9	11.5	5.2
20/21-4-07	8.1	1.9	10.0	4.3
22/23-4-07	5.4	1.2	6.6	4.6
23/24-4-07	7.2	2.2	9.4	3.3
24/25-4-07	8.2	3.3	11.6	2.5
25/26-4-07	9.3	2.4	11.6	3.9
26/27-4-07	5.1	2.1	7.2	2.5
27/28-4-07	5.1	2.1	7.2	2.5
28/29-4-07	8.5	2.2	10.7	3.8
28/29-4-07	7.3	1.6	8.9	4.6
28/29-4-07	8.8	0.9	9.7	9.7
29/30-4-07	8.7	1.2	9.9	7.3
29/30-4-07	6.3	1.2	7.5	5.4
29/30-4-07	4.7	0.8	5.5	5.8
30/1-4/5-07	7.1	1.5	8.6	4.8
30/1-4/5-07	5.8	0.7	6.5	8.6
30/1-4/5-07	7.3	0.9	8.2	8.0
2/3-5-07	11.3	1.4	12.7	7.8
2/3-5-07	9.4	1.2	10.6	7.8
2/3-5-07	10.5	1.3	11.8	7.9
3/4-5-07	9.7	1.9	11.6	5.3
3/4-5-07	7.9	0.9	8.8	9.1
3/4-5-07	6.6	2.3	8.9	2.8
4/5-5-07	9.0	2.0	11.0	4.4
4/5-5-07	11.8	2.4	14.2	4.8
4/5-5-07	9.3	2.0	11.3	4.7
5/6-5-07	8.5	1.9	10.4	4.5
5/6-5-07	13.2	1.9	15.0	7.0
5/6-5-07	10.6	1.3	11.9	8.3
6/7-5-07	9.8	1.0	10.8	9.6
6/7-5-07	5.5	0.9	6.4	6.3
6/7-5-07	8.4	1.4	9.8	6.2
7/8-5-07	10.5	1.2	11.7	8.5
7/8-5-07	7.1	1.2	8.4	5.7
7/8-5-07	11.3	1.5	12.8	7.3
8/9-5-07	9.2	1.0	10.2	9.7
8/9-5-07	7.9	0.9	8.8	8.3
8/9-5-07	10.5	1.2	11.7	8.7

Concentration of EC, OC and TC in $PM_{2.5}$ at Colaba Site (Summer)

Date	OC(µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
28/29-3-07	6.7	3.8	10.6	1.8
1/2-4-07	4.7	3.0	7.8	1.6
3/4-4-07	7.1	3.5	10.6	2.0

Table AD_S.1 : Observed Concentrations of Ambient Air Quality at Dadar (Summer)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
1	19/20.04.07	622	146	132		4	24	84					
2	21/22.4.07	266	105	165		4	36	52					
3	23/24.4.07	500	154	166		5	32	69					
4	24/25.4.07	431	111	204		5	33	13					
5	25/26.4.07	445	124	162		4	60	32					
6	26/27.4.07	461	82	133	47	11	50	89					
7	27/28.4.07	375	93	145	31	4	35	20					
8	28/29.4.07	366	131	89	33	4	37	76					
9	29/30.4.07	302	89	104	27	7	40	39					
10	30/31.4/5.07	319	70	108		5	44	5					
11	2/3.5.07	292	79	101	47	4	42	73		20			
12	3/4.5.07	335	80	103		8	20	64					
13	4/5.5.07	249	51	105		5	26	39					
14	5/6.5.07	251	60	130		4	42	58					
15	6/7.5.07	385	107	146		4	39	83			0.9	3.62	4.52
16	7/8.5.07	393	149	145		7	34	73					
17	8/9.5.07	408	137	136		6	38	70					
18	9/10.5.07	367	101	104		5	34	54					
19	10/11.5.07	250	74	107		5	24	40		93			
20	11/12.5.07	758	74	102		15	28	59					
21	12/13.5.07	260	66	95		5	20	73					
22	13/14.5.07	202	65	68		5	35	297	3.35				
23	15/16.5.07	214	88	81		11	19	47	3.10				
24	16/17.5.07	217	73	92		5	24	68	3.18				
25	17/18.5.07	213	54	76		4	18	103	1.03				
26	18/19.5.07	197	72	118		6	16	5	1.09				
27	19/20.5.07	210	47	49		7	11	5	3.19				
28	20/21.5.07	200	49	92		6	20	17	1.87				
29	21/22.5.07	221	63	107		7	19	15			0.94	4.75	5.68

Table AD_S.2 : Concentration of EC, OC and TC in PM_{10} at Dadar Site (Summer)

Date	OC (μg/m^3)	EC (μg/m^3)	TC (μg/m^3)	OC/EC Ratio
21/22-4-07	13.90	8.43	22.32	1.65
23/24-4-07	17.40	4.00	21.40	4.35
24/25-4-07	17.38	7.31	24.69	2.38
25/26-4-07	22.79	6.01	28.80	3.79
26/27-4-07	16.81	8.08	24.89	2.08
27/28-4-07	15.10	4.62	19.73	3.27
28/29-4-07	16.83	3.74	20.57	4.50
29/30-4-07	11.28	2.65	13.98	4.26
30/1-4/5-07	14.66	6.91	21.57	2.12
2/3-5-07	15.37	4.42	19.78	3.48
3/4-5-07	13.78	7.26	21.03	1.90
4/5-5-07	13.88	4.77	18.65	2.91
5/6-5-07	17.51	5.18	18.90	3.38
6/7-5-07	14.75	3.54	18.29	4.16
7/8-5-07	14.95	6.93	21.88	2.16
8/9-5-07	14.32	4.66	18.98	3.07
9/10-5-07	14.33	7.28	21.60	1.97
10/11-5-07	27.26	4.72	31.98	5.77
11/12-5-07	17.16	3.94	21.09	4.36
11/12-5-07	14.73	5.18	19.90	2.84
11/12-5-07	20.62	5.83	26.45	3.54
12/13-5-07	15.34	4.88	20.22	3.14
12/13-5-07	16.22	4.73	20.95	3.43
12/13-5-07	19.39	4.92	24.31	3.94
13/14-5-07	14.15	4.59	18.74	3.08
13/14-5-07	15.80	7.85	23.65	2.01
15/16-5-07	15.84	6.55	22.39	2.42
15/16-5-07	13.23	7.33	20.56	1.81
15/16-5-07	15.25	7.32	22.57	2.08
16/17-5-07	16.90	6.67	23.57	2.54
16/17-5-07	14.71	6.32	21.03	2.33
16/17-5-07	22.70	8.39	31.10	2.70
17/18-5-07	18.39	7.20	25.59	2.55
17/18-5-07	13.02	6.91	19.93	1.88
17/18-5-07	33.78	7.72	41.50	4.37
18/19-5-07	18.37	5.14	23.51	3.58
18/19-5-07	13.36	2.00	15.36	6.69
18/19-5-07	21.87	6.47	28.34	3.38
19/20-5-07	20.09	6.32	26.41	3.18
19/20-5-07	12.85	7.18	20.03	1.79
19/20-5-07	13.34	5.52	18.86	2.42
20/21-5-07	23.26	10.80	34.05	2.15
20/21-5-07	12.35	6.01	18.36	2.05
20/21-5-07	12.26	2.90	15.16	4.23
21/22-5-07	26.68	13.03	39.71	2.05
21/22-5-07	9.19	5.19	14.38	1.77
21/22-5-07	8.89	3.72	12.61	2.39
23/24-5-07	17.42	7.08	24.50	2.46
23/24-5-07	11.91	5.50	17.42	2.17
23/24-5-07	10.66	6.09	16.75	1.75
24/25-5-07	17.88	5.55	23.43	3.22
24/25-5-07	16.13	5.15	21.28	3.13
24/25-5-07	17.89	5.58	23.47	3.21

Concentration of EC, OC and TC in $PM_{2.5}$ at Dadar Site (Summer)

Date	OC (μg/m^3)	EC (μg/m^3)	TC (μg/m^3)	OC/EC
21/22-4-07	12.2	8.1	20.4	1.5
2/3-5-07	6.7	5.7	12.4	1.2
3/4-5-07	4.9	3.3	8.2	1.5

Table A_Dh_S.1 : Observed Concentration of Ambient Air Quality at Dharavi (Summer)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
1	8/9.3.07	*	*	212									
2	9/10.3.07	*	*	242	88								
3	10/11.3.07	521	288	204		4	47	78					
4	12/13.3.07	334	122	160	43	4	28	16					
5	13/14.3.07	395	88	179		5	28	14					
6	14/15.3.07	547	172	273		24	62	86					
7	15/16.3.07	696	248	295		6	41	134					
8	16/17.3.07	698	251	300	120	9	76	105					
9	19/20.3.07	353	117	150	44	4	31	62					
10	20/21.3.07	293	57	91		4	25	54		40	1.97	1.19	3.17
11	21/22.3.07	311	56	183		4	28	58					
12	22/23.3.07	341	85	162		4	37	60					
13	23/24.3.07	362	127	167		4	38	51					
14	25/26.3.07	333	229	105		5	32	29					
15	26/27.3.07	186	81	184		4	60	85					
16	27/28.3.07	462	188	175		4	46	105					
17	28/29.3.07	434	172	110		10	29	135					
18	30/31.3.07	279	92	128		4	17	75					
19	31/1.3/4.07	290	100	110		4	20	53					
20	1/2.04.07	373	93	171		6	27	41					
21	2/3.04.07	599	144	223		4	30	53					
22	3/4.04.07	442	179	191		7	39	38					
23	4/5.04.07	630	196	214		5	73	135	1.91				
24	5/6.04.07	389	143	129		10	42	59	5.16				
25	6/7.04.07	241	58	110		5	33	64	4.22				
26	7/8.04.07	246	63	140		5	12	36	0.87				
27	8/9.04.07	335	112	184		4	17	51	1.08				
28	9/10.04.07	400	103	172		8	27	46					
29	10/11-04.07	362	89	172		7	33	57	1.13	22	1.94	1.22	3.16
30	11/12.4.07	370	84	169		8	40	37					

* Sampler was not working at the specified flow

Table A_Dh_S.2 : Concentration of EC, OC and TC in PM_{10} at Dharavi Site (Summer)

Date	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)	OC/EC Ratio
8/9-3-07	39.9	7.6	47.5	5.3
9/10-3-07	41.8	7.0	48.9	5.9
10/11-3-07	36.4	6.3	42.7	5.8
12/13-3-07	35.3	10.2	45.5	3.5
13/14-3-07	20.4	8.2	28.6	2.5
14/15-3-07	40.2	7.0	47.2	5.8
15/16-3-07	74.8	9.5	84.3	7.9
16/17-3-07	65.0	9.4	74.3	6.9
19/20-3-07	23.7	8.9	32.6	2.7
20/21-3-07	15.9	4.1	20.0	3.9
21/22-3-07	13.2	5.6	18.9	2.3
22/23-3-07	17.9	6.1	24.1	2.9
23/24-3-07	27.1	5.3	32.4	5.1
25/26-3-07	27.7	5.3	32.8	5.2
26/27-3-07	26.0	8.7	34.7	3.0
27/28-3-07	32.3	7.0	39.3	4.6
28/29-3-07	20.8	12.0	32.8	1.7
30/31-3-07	15.5	7.7	23.1	2.0
31/1-3-07	10.6	7.2	17.8	1.5
1/2-4-07	12.2	7.1	19.3	1.7
2/3-4-07	34.9	22.7	57.6	1.5
2/3-4-07	28.4	18.2	46.6	1.6
3/4-4-07	16.3	5.3	21.6	3.1
3/4-4-07	27.7	4.3	32.0	6.4
3/4-4-07	44.8	24.3	69.1	1.8
4/5-4-07	20.5	10.1	30.6	2.0
4/5-4-09	34.9	22.7	57.6	1.5
5/6-4-07	22.6	4.5	27.1	5.0
5/6-4-07	24.5	5.3	29.8	4.6
5/6-4-07	19.8	5.0	24.8	4.0
6/7-4-07	34.9	22.7	57.6	1.5
6/7-4-07	32.1	4.5	36.6	7.1
7/8-4-07	31.9	4.9	36.8	6.5
7/8-4-09	47.8	7.1	55.0	6.7
8/9-4-07	31.3	7.2	38.6	4.3
8/9-4-07	36.6	5.4	42.0	6.8
8/9-4-07	34.1	6.7	40.8	5.1
9/10-4-07	29.7	13.8	43.6	2.1
9/10-4-07	33.4	13.0	46.5	2.6
9/10-4-07	24.5	13.9	38.4	1.8
10/11-4-07	22.3	12.1	34.4	1.8
10/11-4-07	28.0	15.3	43.4	1.8
11/12-4-07	23.5	11.2	34.7	2.1
11/12-4-07	30.4	10.8	41.2	2.8
11/12-4-07	24.4	12.9	37.3	1.9

Concentration of EC, OC and TC in $PM_{2.5}$ at Dharavi (Summer)

Date	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)	OC/EC Ratio
10/11-3-07	19.6	10.0	29.6	2.0
13/14-3-07	11.3	7.1	18.5	1.6
15/16-3-07	36.4	17.5	53.9	2.1

Table A_K_S.1: Observed Concentration of Ambient Air Quality at Khar (Summer)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
1	16/17.5.07	180	33	56		4	14	55					
2	17/18.5.07	160	36	78		4	20	53					
3	18/19.5.07	136	42	64		4	10	23					
4	19/20.5.07	138	49	57		8	6	28					
5	20/21.5.07	129	58	58		8	18	17					
6	21/22.5.07	120	45	50		7	14	16					
7	22/23.5.07	143	36	54		5	13	15					
8	23/24.5.07	123	44	62		6	17	5		34			
9	25/26.5.07	176	128	83		4	12	24					
10	26/27.5.07	185	123	69		4	9	172					
11	27/28.5.07	200	117	94		7	19	63					
12	28/29.5.07	168	124	72	14	6	10	13					
13	29/30.5.07	173	108	78	15	6	13	27					
14	30/31.5.07	201	52	87		4	11	39		27	1.78	1.23	3.02
15	31/1.5/6.07	*	*	92					0.70				
16	1/2.6.07	137	52	52		4	18	49	0.78				
17	2/3.6.07	204	80	92		4	21	66	0.41				
18	3/4.6.07	168	71	59		5	9	61					
19	4/5.6.07	117	60	50		7	9	21	0.55	18			
20	5/6.6.07	113	56	42		6	9	62					
21	6/7.6.07	86	49	50		4	10	23					
22	7/8.6.07	87	42	48		4	9	23	0.31				
23	8/9.6.07	106	53	42		4	10	20	0.32				
24	9/10.6.07	99	47	58		4	11	41					
25	10/11.6.07	167	85	51		4	10	19	0.44				
26	12/13.6.07	133	47	63		5	16	69	0.40				
27	13/14.6.07	122	42	41		6	12	25	0.29				
28	14/15.6.07		65	47		4	20	67	2.24		1.83	1.21	3.045
29	15/16.6.07		88	56		5	34	23					
30	17/18.6.07	*	*	54									

* Sampler not working at the specified flow, Blanks –Machine problem

Table A_K_S.2 : Concentration of EC, OC and TC in PM_{10} at Khar Site (Summer)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
16/17-5-07	9.4	2.8	12.2	3.4
17/18-5-07	14.2	1.9	16.1	7.4
18/19-5-07	10.1	2.7	12.9	3.7
19/20-5-07	9.1	1.8	11.0	5.0
20/21-5-07	5.6	0.6	6.1	9.7
21/22-5-07	8.4	2.2	10.6	3.8
22/23-5-07	8.6	1.7	10.3	5.1
23/24-5-07	9.2	1.9	11.1	4.8
25/26-5-07	11.3	1.6	12.9	6.9
26/27-5-07	9.4	2.1	11.5	4.4
27/28-5-07	12.1	1.9	14.0	6.3
28/29-5-07	10.1	1.1	11.3	9.0
29/30-5-07	7.6	1.2	8.7	6.6
30/31-5-07	8.6	0.9	9.5	9.6
1/2-6-07	8.5	2.8	11.3	3.0
2/3-6-07	19.4	5.1	24.5	3.8
3/4-6-07	11.8	4.0	15.8	3.0
4/5-6-07	10.5	2.2	12.7	4.8
5/6-6-07	6.7	1.0	7.7	6.5
6/7-6-07	11.6	3.1	14.7	3.8
6/7-6-07	17.4	3.7	21.1	4.7
6/7-6-07	4.7	0.4	5.1	11.6
7/8-6-07	11.7	1.2	13.0	9.5
7/8-6-07	13.5	2.0	15.5	6.8
7/8-6-07	8.6	1.2	9.8	7.1
8/9-6-07	8.1	1.4	9.6	5.7
8/9-6-07	8.4	1.4	9.9	5.9
8/9-6-07	7.7	0.8	8.5	10.0
9/10-6-07	10.7	2.8	13.5	3.8
9/10-6-07	8.8	1.9	10.7	4.7
9/10-6-07	8.2	1.8	10.0	4.5
12/13-6-07	10.8	2.3	13.0	4.7
12/13-6-07	10.2	1.7	11.9	5.8
12/13-6-07	10.2	1.5	11.7	7.0
13/14-6-07	7.5	1.7	9.2	4.5
13/14-6-07	5.8	1.5	7.3	4.0
13/14-6-07	7.2	1.5	8.7	4.8
14/15-6-07	8.8	1.5	10.2	5.9
14/15-6-07	10.7	1.3	12.0	8.1
14/15-6-07	10.9	0.9	11.8	12.6
15/16-6-07	19.8	5.8	25.6	3.4
15/16-6-07	16.4	4.0	20.4	4.1

Concentration of EC, OC and TC in $PM_{2.5}$ at Khar (Summer)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
25/26-5-07	7.0	2.4	9.4	3.0
27/28-5-07	7.8	2.0	9.8	4.0
31/1-5/6-07	6.6	0.8	7.4	8.5
1/2-6-07	5.3	2.3	7.6	2.4
2/3-6-07	13.6	6.0	19.5	2.3

Table A_A_S.1 : Observed Concentrations of Ambient Air Quality at Andheri (Summer)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
1	24/25.5.07	349	166	123		4	12	106					
2	25/26.5.07	205	96	90		4	9	251					
3	26/27.5.07	225	119	81		4	9	353					
4	27/28.5.07	265	163	108		8	12	63					
5	28/29.5.07	284	140	96		6	11	10					
6	29/30.5.07	296	134	114		6	18	43					
7	30/31.5.07	358	131	128		4	13	84					
8	31/1.5/6.07	287	142	113		13	39	57	0.95				
9	2/3.6.07	435	173	144		19	32	66	0.40				
10	3/4.6.07	341	143	111		6	28	52		13	3.82	5.98	9.8
11	4/5.6.07	347	145	65		7	29	47	3.91				
12	5/6.6.07	131	49	*		5	16	93					
13	6/7.6.07	127	60	59		4	13	28					
14	7/8.6.07	116	41	53		4	9	50					
15	8/9.6.07	124	42	48		4	11	31	0.44				
16	9/10.6.07	239	96	58		4	11	40					
17	10/11.6.07	136	76	50		4	12	14	0.35				
18	11/12.6.07	148	79	64		4	11	43					
19	12/13.6.07	169	66			6	17	120	1.23				
20	13/14.6.07	163	40			5	20	41	0.24				
21	14/15.6.07	230	90	88		4	9	98	2.47				
22	15/16.6.07	460	163	85		6	37	81					
23	16/17.6.07	676	223	77		14	28	98					
24	17/18.6.07	229	92	113		9	14	44					
25	18/19.6.07	185	97	48	29	6	16	77					
26	19/20.6.07	130	69	58	25	4	12	49					
27	20/21.6.07	222	142	69	28	57	37	142					
28	21/22.6.07	252	150	63		10	21	92		49	3.76	5.96	9.74

* Sampler was not working at the specified flow

Table A_A_S2 : Concentration of EC, OC and TC in PM_{10} at Andheri Site (Summer)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
24/25-5-07	15.4	2.3	17.6	6.8
25/26-5-07	9.9	1.6	11.5	6.2
26/27-5-07	9.2	1.7	10.9	5.3
27/28-5-07	9.4	1.4	10.8	6.8
28/29-5-07	10.2	2.5	12.7	4.1
29/30-5-07	13.8	3.8	17.4	3.6
30/31-5-07	14.9	3.2	18.0	4.7
31/1-5-07	16.7	9.0	25.7	1.9
1/2-5-07	11.2	4.4	15.6	2.5
2/3-6-07	28.6	7.1	35.7	4.0
3/4-6-07	23.0	8.1	31.1	2.8
4/5-6-07	12.2	3.9	16.0	3.1
6/7-6-07	9.9	3.5	13.4	2.8
7/8-6-07	11.0	3.1	14.1	3.6
8/9-6-07	10.1	1.9	12.0	5.2
9/10-6-07	9.6	1.4	11.0	6.7
10/11-6-07	7.5	1.7	9.2	4.4
11/12-6-07	8.0	1.3	9.2	6.3
14/15-6-07	29.6	12.6	42.2	2.3
14/15-6-07	13.4	6.0	19.4	2.2
14/15-6-07	34.2	12.7	46.9	2.7
15/16-6-07	23.1	5.3	28.4	4.4
15/16-6-07	16.7	6.2	22.9	2.7
15/16-6-07	30.0	7.2	37.1	4.2
16/17-6-07	24.9	4.8	29.7	5.2
16/17-6-07	17.2	10.7	27.9	1.6
16/17-6-07	30.3	11.2	41.5	2.7
17/18-6-07	19.3	5.3	24.6	3.7
17/18-6-07	29.5	12.5	42.0	2.3
18/19-6-07	17.3	6.2	23.5	2.8
18/19-6-07	15.4	6.1	21.6	2.5
18/19-6-07	16.2	2.2	18.4	7.4
19/20-6-07	17.3	2.6	19.9	6.6
19/20-6-07	7.0	1.8	8.8	3.8
19/20-6-07	18.6	4.0	22.6	4.7
20/21-6-07	12.7	2.8	13.2	4.4
20/21-6-07	3.3	0.4	3.6	8.8
20/21-6-07	26.1	6.5	32.6	4.0
21/22-6-07	15.9	4.2	20.1	3.8
21/22-6-07	19.1	10.9	30.0	1.8
21/22-6-07	7.6	1.0	8.6	7.4

Concentration of EC, OC and TC in $PM_{2.5}$ at Andheri Site (Summer)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
21/22-6-07	19.0	4.8	23.8	4.0

Table A_M_S.1 : Elemental Concentrations at Mahul Site (Summer)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
1	18/19.4.07	289	198	97		6	25	94					
2	19/20.4.07	299	108	130		4	24	147					
3	22/23.4.07	201	90	99		4	24	57					
4	23/24.4.07	335	124	102		5	15	94					
5	24/25.4.07	310	140	161		6	34	76					
6	25/26.4.07	331	178	181		5	38	71					
7	26/27.4.07	298	138	123		10	35	99					
8	27/28.4.07	241	62	114		4	18	87					
9	28/29.04.07	253	87	122		4	24	79					
10	29/30.4.07	232	128	117		10	31	80					
11	30/1.4/5.07	184	118	82		7	25	58					
12	2/3.5.07	288	142	111		4	25	125		33	0.98	24.6	25.5
13	3/4.5.07	203	102	78		9	24	81					
14	4/5.5.07	190	67	90		5	20	82					
15	5/6.5.07	216	95	94		4	22	62					
16	6/7.5.07	226	130	113		28	17	66					
17	7/8.5.07	231	149	108		17	29	94					
18	8/9.5.07	235	146	92		8	17	74					
19	9/10.5.07	219	156	89		5	13	92					
20	10/11.5.07	171	81	89		5	11	65					
21	11/12.5.07	160	78	83	23	6	14	149					
22	12/13.5.07	161	82	83	18	5	10	86					
23	13/14.5.07	121	*	72		4	10	791					
24	15/16.05.07	640	118	109		6	17	43	2.92				
25	16/17.5.07	116	54	62		4	13	75	2.87				
26	17/18.5.07	148	73	63	13	4	13	105	2.79				
27	18/19.5.07	126	87	74	14	5	11	5	0.68				
28	19/20.5.07	209	168	84		8	12	5	0.50				
29	20/21.5.07	290	178	55		23	25	291	1.89	23	0.91	17.5	18.4

* Sampler was working at specified flow

Table A_M_S.2 : Concentration of EC, OC and TC in PM_{10} at Mahul Site (Summer)

Date	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)	OC/EC Ratio
18/19-4-07	16.4	4.1	20.5	4.0
19/20-4-07	13.3	3.0	16.3	4.4
22/23-4-07	9.0	3.8	12.9	2.4
23/24-4-07	13.8	6.4	20.2	2.1
24/25-4-07	15.3	4.3	18.5	3.6
25/26-4-07	16.7	4.8	21.4	3.5
26/27-4-07	10.7	3.9	14.6	2.7
27/28-4-07	11.7	4.8	16.5	2.4
28/29-4-07	10.2	4.4	14.6	2.3
29/30-4-07	12.2	5.0	17.3	2.4
30/1-4/5-07	10.6	3.7	14.3	2.8
2/3-5-07	13.1	3.2	16.3	4.1
3/4-5-07	9.2	2.3	11.5	4.0
4/5-5-07	9.5	3.9	13.4	2.5
5/6-5-07	9.0	3.5	12.5	2.6
6/7-5-07	10.0	2.1	12.2	4.7
7/8-5-07	8.3	2.8	11.1	2.9
8/9-5-07	7.3	2.8	10.1	2.6
9/10-5-07	7.7	1.6	9.4	4.7
10/11-5-07	10.4	2.8	13.2	3.8
10/11-5-07	13.2	5.0	18.2	2.6
10/11-5-07	12.4	3.1	15.5	4.0
11/12-5-07	11.0	1.9	12.9	5.9
11/12-5-07	13.2	2.9	16.1	4.5
11/12-5-07	12.3	1.9	14.2	6.3
12/13-5-07	7.9	2.1	10.0	3.8
12/13-5-07	6.5	1.6	8.1	4.1
13/14-5-07	6.6	1.4	8.0	4.6
13/14-5-07	5.6	1.4	7.0	4.0
15/16-5-07	10.6	3.0	13.6	3.5
15/16-5-07	21.2	5.3	26.4	4.0
15/16-5-07	17.1	3.8	20.9	4.5
16/17-5-07	13.2	3.5	16.7	3.7
16/17-5-07	15.6	4.0	19.6	3.9
16/17-5-07	18.2	4.5	22.8	4.0
17/18-5-07	12.9	3.0	15.9	4.3
17/18-5-07	15.7	5.6	21.4	2.8
17/18-5-07	14.5	6.1	20.5	2.4
18/19-5-07	19.3	7.4	26.7	2.6
18/19-5-07	10.8	2.7	13.5	3.9
18/19-5-07	13.5	3.8	17.3	3.5
19/20-5-07	16.8	5.2	22.0	3.3
19/20-5-07	7.9	1.4	9.3	5.5
19/20-5-07	12.5	3.9	16.4	3.2
20/21-5-07	7.5	4.3	11.8	1.7
20/21-5-07	7.3	2.9	10.2	2.5
20/21-5-07	12.6	5.5	18.1	2.3

Concentration of EC, OC and TC in $PM_{2.5}$ at Mahul (Summer)

Date	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)	OC/EC
13/14-5-07	7.7	1.6	9.3	4.9
16/17-5-07	4.3	1.5	5.8	3.0
19/20-5-07	3.7	3.6	5.7	1.0

Table A_Mu_S.1 : Observed Concentration of Ambient Air Quality at Mulund (Summer)

Sr. No.	Date	SPM (µg/m^3)	RSPM (µg/m^3)	PM_{10} (µg/m^3)	$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_X (µg/m^3)	NH_3 (µg/m^3)	CO (mg/m^3)	Formaldehyde (µg/m^3)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)
3	8/9.03.07	338	146	176		4	59	80					
4	9/10.03.07	422	182	236		7	91	149					
5	10/11.3.07	432	238	228		4	47	73					
6	12/13.3.07	286	179	146		4	42	137					
7	13/14.3.07	315	197	99		4	71	20					
8	14/15.3.07	380	309	208		8	67	32					
9	15/16.3.07	458	310	218		6	68	76					
10	16/17.3.07	452	193	65		7	77	62					
11	19/20.3.07	291	112	121		4	41	28					
12	20/21.3.07	230	79	116		4	25	43					
13	21/22.3.07	258	91	133		4	29	51					
14	22/23.3.07	265	123	117		4	37	47					
15	23/24.3.07	353	253	191		4	49	51		7			
16	25/26.3.07	352	267	90		5	53	27					
17	26/27.3.07	385	265	217		10	155	103			1.88	12.9	14.75
18	27/28.3.07	382	250	169		9	45	99					
19	28/29.3.07	*	254	178		8	45	69					
20	30/31.3.07	332	117	168		4	36	114					
21	31/1.3/4.07	280	121	90		4	39	73					
22	1/2.4.07	365	161	181		4	33	14					
23	2/3.4.07	395	244	254		10	45	61					
24	3/4.4.07	626	315	197		6	47	35					
25	4/5.4.07	445	323	244		5	64	108	2..69				
26	5/6.4.07	377	203	179	63	5	36	65	5.13				
27	6/7.4.07	257	98	178		4	52	80	4.65				
28	7/8.4.07	*	*	185	60				0.83				
29	8/9.4.07	240	109	131		4	25	42	1.28	37	2.09	22.65	24.7
30	9/10.4.07	319	111	135	64	5	31	28	0.63				
31	10/11.4.07	249	128	177		4	35	40	0.99				
32	11/12.4.07	370	110	160		5	24	17					

* Sampler was not working at specified flows

Table A_Mu_S.2 : Concentration of EC, OC and TC in PM_{10} at Mulund Site (Summer)

Date	OC (μg/m^3)	EC (μg/m^3)	TC (μg/m^3)	OC/EC Ratio
8/9-3-07	33.65	12.24	45.89	2.7
9/10-3-07	39.27	6.86	46.13	5.7
10/11-3-07	36.11	12.45	48.56	2.9
12/13-3-07	19.57	6.93	26.50	2.8
13/14-3-07	25.96	7.44	33.40	3.5
14/15-3-07	39.31	13.41	52.73	2.9
15/16-3-07	49.71	7.44	57.15	6.7
16/17-3-07	53.80	7.32	61.13	7.3
19/20-3-07	24.89	9.98	34.87	2.5
20/21-3-07	15.43	3.55	18.99	4.3
21/22-3-07	14.65	4.96	19.62	3.0
22/23-3-07	23.90	7.63	31.53	3.1
23/24-3-07	40.44	6.97	47.40	5.8
25/26-3-07	36.93	13.61	50.54	2.7
26/27-3-07	45.74	15.12	60.86	3.0
27/28-3-07	37.47	12.91	50.38	2.9
28/29-3-07	8.67	2.67	11.34	3.2
30/31-3-07	21.45	9.92	31.37	2.2
31/1-3/4-07	1.78	0.66	2.44	2.7
1/2-4-07	44.42	8.30	52.71	5.4
2/3-4-07	53.20	7.82	61.02	6.8
2/3-4-07	53.28	8.71	61.99	6.1
3/4-4-07	35.33	12.41	47.75	2.8
3/4-4-07	71.06	19.08	90.14	3.7
3/4-4-07	28.12	4.48	32.60	6.3
4/5-4-07	68.41	23.51	91.93	2.9
4/5-4-07	64.65	27.01	91.65	2.4
4/5-4-07	31.38	9.25	40.63	3.4
5/6-4-07	50.52	9.59	60.11	5.3
5/6-4-07	31.83	8.04	39.87	4.0
5/6-4-07	28.61	4.72	33.33	6.1
6/7-4-07	44.73	10.54	55.28	4.2
6/7-4-07	10.29	2.35	12.64	4.4
6/7-4-07	44.82	15.70	60.52	2.9
7/8-4-07	28.62	6.94	35.56	4.1
7/8-4-07	14.80	3.42	18.22	4.3
7/8-4-07	20.83	5.31	26.15	3.9
8/9-4-07	26.11	4.80	30.91	5.4
9/10-4-07	24.74	4.46	29.20	5.5
9/10-4-07	24.53	13.13	37.66	1.9
9/10-4-07	20.64	3.64	24.29	5.7
10/11-4-07	32.27	7.37	39.64	4.4
10/11-4-07	36.92	13.18	50.10	2.8
10/11-4-07	36.33	7.80	44.13	4.7
11/12-4-07	25.55	5.62	31.17	4.5
11/12-4-07	29.34	10.59	39.93	2.8
11/12-4-07	61.05	17.01	78.06	3.6

Concentration of EC, OC and TC in $PM_{2.5}$ (Summer)

Date	OC (μg/m^3)	EC (μg/m^3)	TC (μg/m^3)	OC/EC Ratio
6/7-4-07	11.4	6.7	18.1	1.7
8/9-4-07	19.5	10.1	29.6	1.9
10/11-4-07	17.5	8.8	26.3	2.0

Table A_C_P.1 : Observed Concentrations of Ambient Air Quality at Colaba (Post Monsoon)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	10/11.10.07	213	145	150	152		4	17	45						
2	11/12.10.07	296	208	146	147		9	22	152			2	0.13	2.13	
3	12/13.10.07	275	179	138	142		6	29	93						
4	13/14.10.07	159	82	114	116		12	33	35						
5	14/15.10.07	163	70	107	110		12	28	31						
6	15/16.10.07	250	100	125	125		9	25	22						
7	16/17.10.07	185	102	151	152		13	31	73						
8	17/18.10.07	204	146	156	159		5	17	22						
9	18/19.10.07	263	153	116	118		12	25	39		8.8	2.04	0.38	2.51	
10	19/20.10.07	205	146	127	128		15	34	55						
11	1/2.11.07	130	101	63	65		5	13	43						
12	2/3.11.07	164	115	138	140		16	32	63						
13	3/4.11.07	160	111	102	101		15	35	27						
14	4/5.11.07	153	96	117	107		14	41	38						
15	5/6.11.07	139	70	89	90		18	25	13						
16	6/7.11.07	125	83	88	90		5	16	24			2.15	0.52	2.59	
17	7/8.11.07	141	63	87	88		6	14	77						
18	12/13.11.07	217	134	171	168	71	15	31	41						
19	13/14.11.07	205	134	162	158	52	15	43	39						
20	14/15.11.07	343	218	229	222	56	14	58	103						
21	17/18.12.07	204	122	153	164		16	70	26	2.32					19.9
22	18/19.12.07	190	117	114	146		27	36	41	4.5					27.3
23	19/20.12.07	242	135	158	157		5	65	49	3.85					25.4
24	20/21.12.07	291	145	186	183		21	76	38	2.8	29.1	2.16	1.09	3.25	
25	21/22.12.07	156	120	132	133		6	56	18						28.4
26	22/23.12.07	220	149	193	196		22	54	125	3.02					36.3
27	23/24.12.07	208	165	198	197		20	56	84	1.97					40.6
28	24/25.12.07	227	177	196	204		19	74	70	2.08					41.7

- Sampler not working at specified flow rate

Table A_C_P.2 : Concentration of EC, OC and TC in PM_{10} at Colaba Site (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
10/11-10-07	32.1	7.4	39.5	4.3
11/12-10-07	19.7	16.9	36.6	1.2
12/13-10-07	24.3	4.8	29.2	5.0
13/14-10-07	25.9	4.7	30.6	5.5
14/15-10-07	21.2	4.4	25.6	4.8
15/16-10-07	21.6	4.4	26.0	5.0
16/17-10-07	28.5	6.1	34.6	4.6
17/18-10-07	35.7	6.6	42.3	5.4
18/19-10-07	19.9	4.7	24.6	4.2
19/20-10-07	28.7	4.0	32.7	7.1
1/2-11-07	11.6	2.1	13.7	5.5
2/3-11-07	16.4	11.1	27.5	1.5
3/4-11-07	24.6	5.3	29.9	4.7
5/6-11-07	19.5	5.1	24.6	3.8
6/7-11-07	16.8	3.8	20.6	4.4
7/8-11-07	11.6	3.1	14.7	3.8
12/13-11-07	32.2	9.7	41.9	3.3
13/14-11-07	38.7	8.0	46.8	4.8
13/14-11-07	35.7	7.4	43.1	4.8
13/14-11-07	32.9	8.8	41.8	3.7
14/15-11-07	46.6	9.6	56.2	4.9
14/15-11-07	35.1	7.8	42.9	4.5
14/15-11-07	31.1	5.3	36.3	5.9
18/19-12-07	21.5	4.3	25.9	5.0
18/19-12-07	27.0	7.1	34.2	3.8
18/19-12-07	36.3	6.2	42.5	5.9
19/20-12-07	30.3	4.7	35.0	6.4
19/20-12-07	40.5	18.9	59.3	2.1
19/20-12-07	29.1	7.5	36.6	3.9
20/21-12-07	35.2	7.2	42.4	4.9
20/21-12-07	41.8	19.0	60.8	2.2
20/21-12-07	43.0	14.1	57.0	3.1
21/22-12-07	26.8	4.6	31.4	5.9
21/22-12-07	25.9	4.0	29.9	6.5
21/22-12-07	37.9	8.3	46.1	4.6
22/23-12-07	33.9	7.3	41.2	4.7
22/23-12-07	44.3	11.2	54.9	4.0
22/23-12-07	39.2	23.5	62.7	1.7
23/24-12-07	34.2	9.5	43.7	3.6
23/24-12-07	48.1	15.0	63.1	3.2
23/24-12-07	37.7	17.0	54.7	2.2
24/25-12-07	46.7	22.5	69.2	2.1
24/25-12-07	31.0	9.8	40.8	3.2
24/25-12-07	48.1	20.3	68.4	2.4

Concentration of EC, OC and TC in $PM_{2.5}$ (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
10/11-10-07	10	8	18	1.3
11/12-10-07	10	12	27	0.8
15/16-10-07	12	8	20	1.6
16/17-10-07	11	9	21	1.2

Table A_D_P.1 : Observed Concentrations of Ambient Air Quality at Dadar (Post Monsoon)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	22/23.10.07	440	181	252	251		14	66	151						
2	23/24.10.07	405	209	226	227		17	70	102	1					
3	24/25.10.07	361	240	197	202		13	47	138	1.13		1.16	4.43	5.59	
4	25/26.10.07	418	197	218	221		18	48	235		19.4				
5	26/27.10.07	377	170	200	202		14	48	121	1.005					
6	27/28.10.07	400	194	213	217		24	91	149	0.93					
7	28/29.10.07	408	186	240	239		12	57	138	0.95		1.95	1.21	3.165	
8	29/30.10.07	503	227	416	418		11	90	120	2.25					
9	30/31.10.07	311	136	204	212		30	32	33						
10	31/1.10.07	260	81				5	48	50	1.035					
11	1/2.11.07	204	95	118	125		7	55	67						
12	2/3.11.07	289	143	132	167		14	68	90						
13	3/4.11.07	*	148	108	131		9	58	44						
14	4/5.11.07	*	142	128	164		8	59	96			2.03	1.06	3.08	
15	5/6.11.07	*	125	245	210		12	53	133						
16	6/7.11.07	*	131	143	102		5	58	42						25.7
17	7/8.11.07	*	132	146	150		5	63	71						13.0
18	12/13.11.07	*	202	315	298	134	29	92	99						10.1
19	13/14.11.07	302	166	279	265	103	18	74	70						13.0
20	14/15.11.07	350	189	287	281	98	11	32	31		45.3	2.23	1.02	3.26	15.5
21	15/16.11.07	366	234	246	243		27	69	97						13.0
22	16/17.11.07	343	259	217	216		17	84	158						10.4
23	17/18.11.07	318	272	193	179		21	67	123						
24	18/19.11.07	296	222	176	178		19	79	139						
25	19/20.11.07	313	219	187	208		14	66	79						

* Sampler not working at specified flow rate

Table A_D_P.2 : Concentration of EC, OC and TC in PM_{10} at Dadar Site (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
22/23-10-07	56.9	9.1	66.0	6.3
23/24-10-07	52.0	9.1	61.2	5.7
24/25-10-07	37.5	7.1	44.5	5.3
25/26-10-07	53.2	12.9	66.2	4.1
26/27-10-07	37.8	10.2	48.0	3.7
27/28-10-07	38.4	10.5	48.8	3.7
28/29-10-07	50.5	12.5	63.0	4.0
29/30-10-07	84.4	26.3	110.7	3.2
30/31-10-07	41.5	7.9	49.4	5.2
1/2-11-07	22.8	15.9	38.7	1.4
2/3-11-07	33.3	9.1	42.4	3.7
3/4-11-07	29.4	8.5	37.9	3.5
4/5-11-07	35.0	9.5	44.5	3.7
5/6-11-07	32.8	15.9	48.7	2.1
6/7-11-07	14.8	9.0	23.8	1.6
7/8-11-07	17.7	11.1	44.4	1.6
12/13-11-07	49.6	14.4	41.6	3.4
13/14-11-07	38.5	11.3	49.8	3.4
13/14-11-07	48.0	15.9	64.0	3.0
13/14-11-07	31.2	10.3	41.5	3.0
14/15-11-07	52.4	30.7	83.1	1.7
14/15-11-07	54.6	15.1	69.8	3.6
14/15-11-07	44.8	21.7	66.5	2.1
15/16-11-07	54.1	15.5	69.5	3.5
15/16-11-07	48.3	15.0	63.3	3.2
15/16-11-07	44.6	13.0	57.7	3.4
16/17-11-07	41.2	12.2	53.4	3.4
16/17-11-07	44.1	11.2	55.3	3.9
16/17-11-07	30.4	6.8	37.1	4.5
17/18-11-07	39.7	10.7	50.4	3.7
17/18-11-07	32.8	8.3	41.1	3.9
17/18-11-07	42.6	13.1	55.8	3.2
18/19-11-07	13.8	1.6	15.4	8.6
18/19-11-07	39.4	7.9	47.4	5.0
18/19-11-07	33.1	6.0	39.0	5.5
19/20-11-07	36.6	9.8	46.4	3.7
19/20-11-07	39.9	11.9	51.8	3.3
19/20-11-07	33.2	9.1	42.4	3.6

Concentration of EC, OC and TC in $PM_{2.5}$ at Dadar (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
10/11-10-07	15.9	9.5	25.4	1.7
11/12-10-07	13.9	11.2	25.1	1.2
15/16-10-07	25.7	9.0	34.8	2.8
16/17-10-07	18.6	11.6	30.1	1.6

Table A_Dh_P.1 : Observed Concentrations of Ambient Air Quality at Dharavi (Post Monsoon)

Sr. No.	Date	SPM (µg/m^3)	RSPM (µg/m^3)	PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)	SO_2 (µg/m^3)	NO_X (µg/m^3)	NH_3 (µg/m^3)	CO (mg/m^3)	Formaldehyde (µg/m^3)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	6/7.10.07	484	263	245	248		6	47	56						
2	7/8.10.07	426	128	212	211		5	34	99			2.123	1.137	3.260	
3	8/9.10.07	394	104	191	188		15	48	103						
4	9/10.10.07	304	101	185	187		6	42	32						
5	10/11.10.07	384	173	217	216		8	48	69						
6	11/12.10.07	506	221	251	254		13	75	78						
7	12/13.10.07	489	202	247	245		13	67	98						
8	13/14.10.07	642	275	257	259		9	63	41		34.9	2.03	0.895	2.925	
9	14/15.10.07	384	219	225	217		11	58	30						
10	15/16.10.07	584	242	280	277		19	67	44						
11	16/17.10.07	602	179	275	265		17	58	85						
12	17/18.10.07	532	227	244	238		10	48	44	2.67					
13	18/19.10.07	541	259	232	228		17	56	61	3.50					
14	19/20.10.07	461	241	227	225		14	57	86	2.89		2.09	0.94	3.03	
15	20/21.10.07	491	224	246	244		19	59	49	2.77					
16	21/22.10.07	601	250	281	276		24	47	79	3.87					
17	22/23.10.07	542	189	251	246		14	47	57	1.45					57.5
18	23/24.10.07	491	193	201	199		21	52	48	4.50					23.0
19	24/25.10.07	518	196	256	228	94	13	49	65						21.7
20	25/26.10.07	533	226	266	269	96	19	48	100						26.4
21	26/27.10.07	517	183	252	261	84	16	51	76		87.5	2.195	0.855	3.05	33.3
22	27/28.10.07	555	206	253	277		14	66	86						30.5
23	28/29.10.07	407	230	265	278		53	43	48						35.3
24	29/30.10.07	637	222	315	328		16	65	42						
25	30/31.10.05	504	201	241	258		24	33	34						

* Sampler not working at specified flow rate

Table A_Dh_P.2: Concentration of EC, OC and TC in PM_{10} at Dharavi Site (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
6/7-10-07	38.7	4.7	43.4	8.2
7/8-10-07	27.3	4.4	31.6	6.2
8/9-10-07	29.0	5.1	34.1	5.7
9/10-10-07	29.8	7.2	37.0	4.1
10/11-10-07	38.7	6.7	45.3	5.8
11/12-10-07	63.6	5.8	69.4	10.9
12/13-10-07	60.3	7.2	67.5	8.4
13/14-10-07	60.1	5.0	65.1	12.0
14/15-10-07	54.3	6.6	60.9	8.3
15/16-10-07	66.6	7.3	73.9	9.1
16/17-10-07	68.5	8.9	77.4	7.7
17/18-10-07	64.8	5.9	70.7	10.9
18/19-10-07	52.9	5.1	58.0	10.5
19/20-10-07	58.1	6.9	65.0	8.4
20/21-10-07	68.0	5.8	73.8	11.7
21/22-10-07	19.7	4.7	24.4	4.2
22/23-10-07	67.0	4.9	71.9	13.8
23/24-10-07	51.8	6.9	58.7	7.5
24/25-10-07	63.5	10.6	74.1	6.0
24/25-10-07	82.0	17.4	99.4	4.7
24/25-10-07	50.1	21.4	71.5	2.3
25/26-10-07	61.6	14.7	76.3	4.2
25/26-10-07	56.5	12.6	69.1	4.5
25/26-10-07	96.9	19.9	116.7	4.9
26/27-10-07	43.9	8.7	52.6	5.1
26/27-10-07	33.9	4.5	3.8	7.6
27/28-10-07	61.5	11.7	73.2	5.3
27/28-10-07	66.3	10.0	76.3	6.6
27/28-10-07	53.1	9.5	62.6	5.6
28/29-10-07	44.4	8.6	53.0	5.1
28/29-10-07	69.5	16.8	86.4	4.1
28/29-10-07	44.2	10.2	54.4	4.4
29/30-10-07	57.1	34.0	91.1	1.7
29/30-10-07	68.9	13.9	82.8	4.9
29/30-10-07	51.7	32.7	84.4	1.6
30/31-10-07	77.6	18.8	96.4	4.1
30/31-10-07	25.2	7.2	32.4	3.5

Concentration of EC, OC and TC in $PM_{2.5}$ at Dharavi (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
22/23.10.07	26.6	17.3	43.9	1.5
23/24.10.07	26.2	6.7	32.9	3.9
27/28.10.07	20.4	16.9	37.3	1.2
28/29.10.07	33.9	9.4	43.2	3.6

Table A_K_P.1 Observed Concentrations of Ambient Air Quality at Khar (Post Monsoon)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM10 (µg/m³)		PM2.5 (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	22/23.11.07	377	169	221	229		15	72	62						
2	23/24.11.07	354	171	215	218		14	78	55		58.5	1.63	0.33	1.96	
3	24/25.11.07	351	201	214	213		23	50	27						
4	25/26.11.07	364	241	188	188		9	64	53						
5	26/27.11.07	396	248	271	269		21	76	63	0.62					
6	27/28.11.07	276	240	256	253		14	62	55	0.73					
7	28/29.11.07	338	155	211	209		9	56	50	5.34					
8	29/30.11.07	343	248	202	205		12	64	44	0.85		1.04	0.46	1.50	
9	30/1.11.07	513	228	276	276		8	77	60	0.79					
10	1/2.12.07	499	232	264	272		12	64	70						8.1
11	2/3.12.07	388	191	216	216		9	69	55						14.6
12	3/4.12.07	381	155	187	182	76	14	68	51	0.92					12.2
13	4/5.12.07	504	227	206	210	66	16	81	24	1.08					12.7
14	5/6.12.07	469	257	262	256	107	**	**	**	0.72					11.5
15	6/7.12.07	588	231	284	278		22	61	28						8.7
16	7/8.12.07	364	240	156	223		8	88	35			1.19	0.35	1.54	
17	8/9.12.07	449	247	179	178		16	94	47						
18	9/10.12.07	479	163	128	129		8	89	53						
19	10/11.12.07	326	196	191	182		6	59	36		51.0				
20	11/12.12.07	285	137	120	118		5	60	40						
21	12/13.12.07	324	149	197	195		6	42	36						
22	13/14.12.07	366	188	230	229		4	45	42						
23	14/15.12.07	416	195	255	259		5	59	38						
24	15/16.12.07	400	268	276	275		15	67	52						
25	16/17.12.07	432	296	293	307		10	65	45			1.58	0.20	1.78	
26	17/18.12.07	456	250	258	311		13	75	51						
27	18/19.12.07	338	214	220	257		8	70	48						
28	19/20.12.07	425	196	291	320		14	63	36						
29	20/21.12.07	441	196	277	257		8	75	40						
30	21/22.12.07	346	172	238	229		6	31	28						

* Sampler not working at specified flow rate

** Gases was not analyzed due to electricity problem

Table A_K_P.2 : Concentration of EC, OC and TC in PM_{10} at Khar Site (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
22/23-11-07	40.4	9.3	49.8	4.3
23/24-11-07	34.6	22.6	57.1	1.5
24/25-11-07	60.0	9.2	69.2	6.5
25/26-11-07	47.2	5.0	52.2	9.4
26/27-11-07	52.6	15.7	68.3	3.4
27/28-11-07	79.0	7.3	86.3	10.8
28/29-11-07	33.1	25.1	58.2	1.3
29/30-11-07	49.0	8.0	57.0	6.1
30/1-11/12-07	66.2	6.3	72.5	10.6
1/2-12-07	65.6	8.0	73.6	8.2
2/3-12-07	4.2	0.5	4.7	8.6
3/4-12-07	41.4	6.0	47.3	6.9
4/5-12-07	45.3	5.8	51.1	7.8
6/7-12-07	64.2	7.3	71.5	8.7
7/8-12-07	3.9	0.6	4.6	6.2
8/9-12-07	3.4	0.5	3.9	7.0
9/10-12-07	36.7	5.0	41.7	7.3
10/11-12-07	4.0	0.7	4.6	5.8
11/12-12-07	28.40	8.54	36.94	3.3
12/13-12-07	61.28	17.20	78.48	3.6
12/13-12-07	31.08	7.40	38.48	4.2
12/13-12-07	37.43	9.08	46.51	4.1
13/14-12-07	39.85	10.46	50.30	3.8
13/14-12-07	42.70	10.16	52.86	4.2
13/14-12-07	59.97	15.71	75.68	3.8
14/15-12-07	47.1	10.5	57.6	4.5
14/15-12-07	58.2	15.3	73.5	3.8
14/15-12-07	58.2	12.0	70.2	4.9
15/16-12-07	42.8	11.9	54.7	3.6
15/16-12-07	54.1	12.6	66.8	4.3
15/16-12-07	81.3	20.4	101.7	4.0
16/17-12-07	45.7	9.3	55.0	4.9
16/17-12-07	85.3	14.1	99.4	6.1
16/17-12-07	42.4	9.9	52.2	4.3
17/18-12-07	69.3	13.6	82.9	5.1
17/18-12-07	55.3	16.8	72.2	3.3
17/18-12-07	43.2	14.2	57.4	3.0
18/19-12-07	36.0	9.5	45.5	3.8
18/19-12-07	43.1	10.1	53.2	4.3
18/19-12-07	57.0	7.8	64.9	7.3
20/21-12-07	42.4	7.2	49.6	5.9
20/21-12-07	38.0	8.8	46.8	4.3
20/21-12-07	67.7	17.1	84.8	4.0
21/22-12-07	47.7	11.7	59.4	4.1
21/22-12-07	38.2	8.8	47.1	4.3
21/22-12-07	39.0	7.5	46.5	5.2

Concentration of EC, OC and TC in PM2.5 at Khar (Post Monsoon)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
1/2-12-07	37.6	9.9	47.4	3.81
2/3-12-07	37.2	5.8	43.0	6.41
6/7-12-07	29.3	20.7	50.0	1.41

Table A_A_P.1 : Observed Concentrations of Ambient Air Quality at Andheri (Post Monsoon)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	20/21.11.07	742	356	183	177		6	80	45						
2	21/22.11.07	356	339	230	205		14	87	45						
3	22/23.11.07	323	273	202	179		15	80	49	0.945	31.0	1.840	0.590	2.430	
4	23/24.11.07	365	269	220	209		9	73	36	1.513					
5	24/25.11.07	355	248	207	223		17	60	26	1.607					
6	25/26.11.07	377	264	273	277		16	75	60						
7	26/27.11.07	408	301	285	289	113	22	93	82	1.033					
8	27/28.11.07	471	236	200	200	84	8	63	16	0.790		1.420	0.850	2.265	
9	28/29.11.07	481	200	236	257	99	18	68	71	4.870					
10	29/30.11.07	377	252	218	218		15	84	41	0.990					
11	30/1.11.07	430	235				9	91	43						
12	1/2.12.07	384	182	197	195		13	76	57						
13	2/3.12.07	361	186	194	201		12	82	56						
14	3/4.12.07	357	198	176	178		13	69	55						
15	4/5.12.07	392	172	170	179		19	83	26			1.350	1.083	2.430	
16	5/6.12.07	454	206	219	227		**	**	**						
17	6/7.12.07	427	269	244	258		34	97	57						
18	7/8.12.07	389	206	256	270		12	89	30						
19	8/9.12.07	408	302	216	225		22	94	28						
20	9/10.12.07	365	254	248	255		13	95	63						
21	10/11.12.07	312	160	208	217		5	73	50		28.6				
22	11/12.12.07	253	167	182	202		5	79	35			1.647	0.327	1.977	
23	12/13.12.07	375	234	250	273		9	57	51						
24	13/14.12.07	387	259	238	243		8	77	51						
25	14/15.12.07	417	260	241	274		10	69	40						16.9

* Sampler not working at specified flow rate

** Gases was not analyzed due to electricity problem

Table A_A_P.2 :Concentration of EC, OC and TC in PM_{10} at Andheri Site (Post Monsoon)

Date	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)	OC/EC Ratio
20/21-11-07	37.3	7.7	45.0	4.8
21/22-11-07	51.9	6.2	58.1	8.3
22/23-11-07	26.3	18.1	44.5	1.5
23/24-11-07	46.0	8.7	54.7	5.3
24/25-11-07	47.9	6.7	54.6	7.2
25/26-11-07	55.9	15.3	71.2	3.6
26/27-11-07	74.4	6.6	81.0	11.2
27/28-11-07	53.6	8.7	62.3	6.2
28/29-11-07	58.2	11.5	69.7	5.1
29/30-11-07	55.3	11.0	66.3	5.0
30/1-11/12-07	56.8	8.3	65.2	6.8
1/2-12-07	48.0	7.8	55.8	6.2
2/3-12-07	48.8	10.8	59.6	4.5
3/4-12-07	44.6	8.3	52.9	5.4
4/5-12-07	26.6	12.0	48.6	2.2
5/6-12-07	34.9	23.7	58.6	1.5
6/7-12-07	65.5	11.4	76.9	5.8
7/8-12-07	44.0	31.9	76.0	1.4
8/9-12-07	38.4	17.8	56.2	2.2
9/10-12-07	62.9	15.8	78.8	4.0
10/11-12-07	46.2	10.1	56.3	4.6
10/11-12-07	69.4	23.0	92.4	3.0
10/11-12-07	46.9	15.4	62.3	3.0
11/12-12-07	39.3	6.7	46.0	5.8
11/12-12-07	46.6	17.8	64.4	2.6
11/12-12-07	47.6	13.0	60.7	3.7
13/14-12-07	40.9	8.0	48.9	5.1
13/14-12-07	39.0	8.4	47.4	4.6
13/14-12-07	55.4	14.2	69.6	3.9
14/15-12-07	57.6	10.4	68.0	5.6
14/15-12-07	56.2	14.4	70.6	3.9
14/15-12-07	41.7	26.8	68.5	1.6

Concentration of EC, OC and TC in $PM_{2.5}$ at Andheri (Post Monsoon)

Date	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)	OC/EC
24-25/11-07	25.6	8.2	33.8	3.1
25-26/11-07	34.6	11.4	46.0	3.0
29-30/11-07	24.9	17.0	41.9	1.5
30-1/11-07	39.5	9.4	49.0	4.2

Table A_M_P.1 : Observed Concentrations of Ambient Air Quality at Mahul (Post Monsoon)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	6/7.11.07	282	146	173	193		4	35	94						
2	7/8.11.07	319	166	281	273		5	39	94		25.0				
3	12/13.11.07	391	225	256	252		7	48	30			1.865	0.785	2.66	
4	13/14.11.07	372	233	257	269		11	46	26						
5	14/15.11.07	237	104	100	101		20	43	16						
6	15/16.11.07	385	191	219	211		17	46	117						
7	16/17.11.07	373	200	185	180		14	49	48						
8	17/18.11.07	330	203	172	169		16	44	48						27.9
9	18/19.11.07	355	159	179	172		12	39	53						20.2
10	19/20.11.07	395	175	209	205	89	13	49	85	0.87		1.4	0.55	1.95	26.1
11	20/21.11.07	238	152	236	209	87	12	45	53						26.6
12	21/22.11.07	385	225	210	200	85	25	38	58	0.61					24.2
13	22/23.11.07	402	217	236	240		17	57	111	0.605					15.7
14	23/24.11.07	409	225	219	216		14	64	104	0.835					17.7
15	24/25.11.07	397	210	196	192		11	48	15						
16	25/26.11.07	482	171	229	221		15	54	75			1.395	0.765	2.165	
17	26/27.11.07	481	204	284	275		23	76	57						
18	27/28.11.07	405	174	226	217		18	39	53						
19	28/29.11.07	491	200	267	266		18	68	71	4.78					
20	29/30.11.07	399	204	185	182		24	56	61	1.08					
21	30/1.11.07	404	255	201	185		8	53	66						
22	1/2.12.07	467	214	265	270		16	65	54						
23	2/3.12.07	369	207	251	240		12	53	61		19.7	1.33	0.49	1.81	
24	3/4.12.07	401	241	209	207		13	71	52						
25	4/5.12.07	497	212	239	231		22	70	24						
26	5/6.12.07	412	217	203	199		**	**	**						
27	6/7.12.07	408	191	271	274		18	97	43						

* Sampler not working at specified flow rate

** Gases was not analyzed due to electricity problem in the lab.

Table A_M_P.2: Concentration of EC, OC and TC in PM_{10} at Mahul Site (Post Monsoon)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
6/7-11-07	29.3	7.7	37.0	3.8
7/8-11-07	48.8	12.2	61.0	4.0
12/13-11-07	51.2	7.5	61.3	6.8
13/14-11-07	42.3	8.7	51.0	4.8
14/15-11-07	21.2	6.3	27.5	3.4
15/16-11-07	41.6	7.9	49.5	5.3
16/17-11-07	32.2	5.4	37.6	6.0
17/18-11-07	29.0	6.1	35.1	4.7
18/19-11-07	38.8	7.6	46.4	5.1
19/20-11-07	43.2	7.5	50.7	5.8
20/21-11-07	48.8	5.9	54.7	8.3
21/22-11-07	43.2	5.8	49.0	7.5
22/23-11-07	57.9	10.0	68.0	5.8
23/24-11-07	44.8	9.3	55.8	4.8
24/25-11-07	44.2	5.4	49.6	8.1
25/26-11-07	48.6	6.7	55.3	7.2
26/27-11-07	70.7	7.1	77.9	9.9
27/28-11-07	53.5	6.5	60.0	8.2
28/29-11-07	64.3	7.2	71.5	9.0
29/30-11-07	39.2	6.0	45.2	6.5
30/1-11/12-07	52.03	13.27	65.30	3.9
30/1-11/12-07	37.77	10.05	47.81	3.8
30/1-11/12-07	25.55	5.90	31.45	4.3
1/2-12-07	57.33	13.83	71.16	4.1
1/2-12-07	70.40	15.17	85.57	4.6
1/2-12-07	56.02	8.53	64.55	6.6
2/3-12-07	58.7	10.5	69.2	5.6
2/3-12-07	49.7	9.2	58.8	5.4
2/3-12-07	53.3	11.2	64.5	4.8
3/4-12-07	54.5	14.1	68.6	3.9
3/4-12-07	36.8	8.6	45.4	4.3
3/4-12-07	46.7	11.0	57.7	4.3
4/5-12-07	62.3	12.1	74.4	5.1
4/5-12-07	44.1	7.7	51.8	5.7
4/5-12-07	37.3	7.4	44.6	5.0
5/6-12-07	51.1	12.3	63.4	4.1
5/6-12-07	35.1	9.7	44.8	3.6
5/6-12-07	43.8	11.2	55.0	3.9
6/7-12-07	68.8	15.5	84.3	4.4
6/7-12-07	60.5	17.9	78.5	3.4
6/7-12-07	61.4	22.9	84.3	2.7
7/8-12-07	64.8	12.8	77.5	5.1
7/8-12-07	77.3	13.3	90.7	5.8
7/8-12-07	40.8	11.4	52.2	3.6
8/9-12-07	37.2	8.6	45.8	4.3
8/9-12-07	67.4	16.7	84.1	4.0
8/9-12-07	42.7	9.2	51.9	4.7

Concentration of EC, OC and TC in $PM_{2.5}$ at Mahul (Post Monsoon)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC
17-18/11-07	17.2	9.7	26.9	1.78
18-19/11-07	17.0	11.2	28.2	1.52
22-23/11-07	41.0	6.0	47.0	6.87
23-24/11-07	23.6	11.1	34.7	2.13

Table A_Mu_P.1: Observed Concentrations of Ambient Air Quality at Mulund (Post Monsoon)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	6/7.10.07	384	181	248	258		5	51	62						
2	7/8.10.07	337	116	212	217		4	44	77						
3	8/9.10.07	375	125	184	188		7	44	40						
4	9/10.10.07	436	154	290	302		5	46	54						
5	10/11.10.07	461	170	280	283		7	59	64		21.7	2.2	0.295	2.495	
6	11/12.10.07	419	236	313	317		21	64	42						
7	12/13.10.07	521	158	250	251		7	32	72						
8	13/14.10.07	293	115	161	158		19	48	31						
9	14/15.10.07	316	168	184	184		23	62	67						
10	15/16.10.07	352	170	185	190		25	37	30						
11	16/17.10.07	420	225	201	198		23	33	60						
12	17/18.10.07	473	217	234	227		23	36	56			2.09	0.74	2.85	
13	18/19.10.07	382	182	212	209		19	57	78						
14	19/20.10.07	462	219	217	212		21	76	68						
15	20/21.10.07	566	261	269	270		17	63	51						
16	21/22.10.07	367	205	246	241		17	57	44						
17	22/23.10.07	453	216	233	239		23	42	59	1.85					
18	23/24.10.07	347	191		191		29	43	55	0.7					
19	24/25.10.07	281	176	222	205		13	30	48	0.48		2.075	0.935	3.005	
20	25/26.10.07	411	165	200	194		14	46	55	1.025					
21	26/27.10.07	359	173	225	303		18	44	61	0.735					
22	27/28.10.07	343	183	225	238		29	77	49	0.45					
23	28/29.10.07	418	206	287	299		26	58	49	2.12					
24	29/30.10.07	463	102	338	357	159	16	100	44		40.5				6.54
25	30/31.10.05	515	308	359	364	220	41	94	20						23.55
26	31/1.10.07	287	158	177	181		9	53	56						6.12
27	1/2.10.07	283	126	158	160		6	64	48			2.14	1.41	3.555	6.53
28	2/3.10.07	269	138	224	205		11	46	15						15.65
29	3/4.10.07	297	158	244	244		13	47	41						21.01
30	4/5.10.07	454	179	183	181		13	42	28						29.80

* Sampler not working at specified flow rate

Table A_Mu_P.2: Concentration of EC, OC and TC in PM_{10} at Mulund Site (Post Monsoon)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
6/7-10-07	46.5	6.4	52.9	7.2
7/8-10-07	24.5	11.2	35.7	2.2
8/9-10-07	32.7	8.6	41.2	3.8
9/10-10-07	61.9	14.7	76.6	4.2
10/11-10-07	54.7	19.4	74.1	2.8
11/12-10-07	67.9	16.4	84.3	4.1
12/13-10-07	42.5	26.0	68.5	1.6
13/14-10-07	37.1	8.4	45.5	4.4
14/15-10-07	45.0	11.8	58.2	3.8
15/16-10-07	37.8	18.1	55.9	2.1
16/17-10-07	35.4	24.3	59.7	1.5
17/18-10-07	51.9	15.3	67.2	3.4
18/19-10-07	64.7	9.1	73.8	7.1
19/20-10-07	38.3	17.9	56.1	2.1
20/21-10-07	64.3	10.7	74.4	6.0
21/22-10-07	63.0	9.8	72.9	6.4
22/23-10-07	57.6	10.6	68.2	5.4
23/24-10-07	45.5	9.7	56.0	4.7
25/26-10-07	27.6	8.2	35.8	3.4
26/27-10-07	87.7	19.7	107.4	4.4
26/27-10-07	50.2	15.1	65.3	3.3
26/27-10-07	38.0	11.5	49.6	3.3
27/28-10-07	79.6	24.0	103.6	3.3
27/28-10-07	38.0	19.1	57.1	2.0
27/28-10-07	27.8	6.4	34.2	4.3
28/29-10-07	69.6	20.0	82.6	3.5
28/29-10-07	49.1	15.9	65.0	3.1
28/29-10-07	56.4	30.5	86.9	1.8
29/30-10-07	149.7	32.0	181.7	4.7
29/30-10-07	59.1	21.2	80.3	2.8
29/30-10-07	59.3	19.8	79.1	3.0
30/31-10-07	159.3	46.5	205.8	3.4
30/31-10-07	42.0	13.0	55.0	3.2
30/31-10-07	59.1	19.3	78.4	3.1
31/1-10/11-07	41.5	9.0	50.5	4.6
31/1-10/11-07	38.2	17.0	55.1	2.2
31/1-10/11-07	43.1	20.2	63.4	2.1
1/2-11-07	48.4	16.8	65.3	2.9
1/2-11-07	29.4	15.0	44.4	2.0
1/2-11-07	33.4	19.1	52.6	1.7
2/3-11-07	59.5	13.2	72.8	4.5
2/3-11-08	46.7	18.4	65.0	2.5
3/4-11-07	51.2	15.4	66.6	3.3
3/4-11-07	34.8	10.6	45.4	3.3
4/5-11-07	50.4	8.8	60.7	5.7
4/5-11-07	70.7	19.8	90.5	3.6
4/5-11-07	36.0	11.0	46.9	3.3

Concentration of EC, OC and TC in PM2.5 at Mulund (Post Monsoon)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC
1/2-11-07	9.5	2.5	12.0	3.80
2/3-11-07	31.4	9.5	40.9	3.29
3/4-11-07	30.4	14.1	44.5	2.16
4/5-11-07	33.0	7.9	40.9	4.17

Table A_C_W_1: Observed Concentrations of Ambient Air Quality at Colaba (Winter)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	25/26.12.07	202	172	149	147		19	41	299			2.36	0.80	3.16	
2	26/27.12.07	277	246	203	192		13	58	165						
3	27/28.12.07	251	219	176	168		18	49	121		23.2				
4	28/29.12.07	197	172	46	44		5	38	30						
5	29/30.12.07	239	186	170	167		24	24	20						
6	30/31.12.07	312	209	220	211		45	61	45						
7	31/1.12.07	263	186	142	136		11	46	15						
8	1/2.1.08	261	196	175	165	54	12	59	41						
9	2/3.1.08	253	192	152	146	110	21	51	50			3.12	0.93	4.05	
10	3/4.1.08	272	195	169	162	113	26	63	29						
11	4/5.1.08	258	177	131	121		22	77	11						
12	5/6.1.08	300	200	152	153		29	113	41						
13	10/11.2.08	177	165	143	141		9	37	58						
14	11/12.2.08	208	170	197	198		11	77	54						
15	12/13.2.08	199	143	165	155		9	50	49						
16	13/14.2.08	*	169	147	146		23	76	54	1.68		3.32	1.13	4.45	
17	14/15.2.08	*	179	191	191		13	26	48	0.79					
18	15/16.2.08	*	158	144	140		8	57	36	1.24					
19	16/17.2.08	130	90	115	114		10	47	37	0.92					
20	17/18.2.08	123	91	106	104		6	42	53	3.11					
21	18/19.2.08	157	118	140	149		11	92	80	3.79					
22	19/20.2.08	120	65	101	102		9	81	86	0.50		3.46	1.11	4.57	14.3
23	20/21.2.08	172	103	155	156		13	37	30		12.0				21.9
24	21/22.2.08	189	105	173	177		7	48	46						22.6
25	22/23.2.08	115	87	109	108		5	38	37						23.4
26	23/24.2.08	512	204	508	395		15	26	36						19.7
27	24/25.2.08	512	274	477	484		7	24	28						27.8
28	25/26.2.08	390	321	369	370		17	60	81						23.8
29	26/27.2.08	284	196	268	200		21	14	57						
30	27/28.2.08	273	227	241	247		22	79	24						

* Sampler not working at specified flow rate

Table A_C_W_2 :Concentration of EC, OC and TC in PM_{10} at Colaba Site (Winter)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
25/26-12-07	24.0	5.3	29.3	4.5
26/27-12-07	29.1	7.0	36.1	4.1
27/28-12-07	20.0	12.0	32.0	1.7
28/29-12-07	7.2	2.2	9.4	3.3
29/30-12-07	18.9	11.0	29.8	1.7
30/31-12-07	24.4	14.6	39.0	1.7
31/1-12/1-07/08	13.6	7.2	20.8	1.9
01/02-01-08	18.5	10.9	29.4	1.7
02/03-01-08	17.5	9.6	27.1	1.8
03/04-01-08	27.2	8.9	36.1	3.1
04/05-01-08	18.8	13.3	32.1	1.4
05/06-01-08	24.4	13.9	38.3	1.8
10/11-02-08	18.4	8.9	27.3	2.1
12/13-02-08	17.4	9.4	26.8	1.9
13/14-02-08	23.6	7.7	31.4	3.1
14/15-02-08	34.2	8.8	43.0	3.9
15/16-02-08	27.0	7.1	34.1	3.8
16/17-02-08	15.8	7.2	23.0	2.2
17/18-02-08	16.6	6.3	23.0	2.6
18/19-2-08	25.0	7.4	32.5	3.4
18/19-2-08	18.1	3.9	22.0	4.6
18/19-2-08	35.7	11.7	47.3	3.1
19/20-2-08	10.6	3.1	13.7	3.4
19/20-2-08	12.8	2.8	15.5	4.6
19/20-2-08	16.5	4.0	20.6	4.1
20/21-2-08	26.0	7.6	33.7	3.4
20/21-2-08	17.1	4.7	21.8	3.6
20/21-2-08	29.2	8.8	38.0	3.3
21/22-2-08	38.0	7.9	45.9	4.8
21/22-2-08	15.8	4.1	19.9	3.9
21/22-2-08	42.4	17.2	59.5	2.5
22/23-2-08	18.6	5.9	24.4	3.2
22/23-2-08	13.3	3.0	16.3	4.4
22/23-2-08	17.5	5.4	22.9	3.3
23/24-2-08	10.4	1.5	11.9	6.9
23/24-2-08	13.7	2.9	16.6	4.7
23/24-2-08	31.5	4.9	36.4	6.4
24/25-2-08	29.1	5.2	34.2	5.6
24/25-2-08	24.7	5.4	30.1	4.6
24/25-2-08	33.3	5.1	38.4	6.5
25/26-2-08	26.2	3.8	30.0	7.0
25/26-2-08	31.6	6.1	37.7	5.2
25/26-2-08	59.0	14.6	73.6	4.0
26/27-2-08	29.5	5.3	34.8	5.6
26/27-2-08	31.0	7.0	37.9	4.4
26/27-2-08	38.9	10.7	49.6	3.6
27/28-2-08	30.1	7.4	37.5	4.1
27/28-2-08	25.0	6.2	31.1	4.1
27/28-2-08	46.7	11.4	58.1	4.1

Concentration of EC, OC and TC in $PM_{2.5}$ at Colaba Site (Winter)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
30/31-12-07	14.65	10.87	25.51	1.348
31/01-12-07	22.63	5.95	28.59	3.804
04/05-1-08	33.27	7.42	40.68	4.486
05/06-1-08	37.70	8.41	46.11	4.485

Table A_D_W_1 : Observed Concentrations of Ambient Air Quality at Dadar (Winter)

Sr. No.	Date	SPM ($\mu g/m^3$)	RSPM ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)		$PM_{2.5}$ ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	NO_X ($\mu g/m^3$)	NH_3 ($\mu g/m^3$)	CO (mg/m^3)	Formaldehyde ($\mu g/m^3$)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	10/11.01.08	350	122	244	218		31	95	74						
2	11/12.01.08	320	205	233	229		20	110	73			2.95	0.87	3.82	
3	12/13.01.08	399	248	390	379		17	131	96		22.1				
4	13/14.01.08	356	230	337	309		17	121	110						
5	14/15.01.08	377	170	367	360		15	47	128						
6	15/16.01.08	385	291	371	375		9	90	225						
7	16/17.01.08	345	293	276	275		11	71	64						
8	17/18.01.08	250	188	234	228		17	108	51						
9	18/19.01.08	296	161	137	96		23	148	114			3.70	1.65	5.34	
10	19/20.01.08	224	160	179	125	75	**	**	**						
11	20/21.01.08	247	197	224	221	106	**	**	**						
12	21/22.01.08	240	189	222	223	137	21	113	82						
13	22/23.01.08	258	184	201	203		13	93	88						
14	23/24.01.08	287	186	203	195		17	111	33						
15	24/25.01.08	217	174	200	200		6	56	67						
16	25/26.01.08	274	213	200	202		10	111	72						
17	26/27.01.08	177	140	167	169		10	80	119						
18	27/28.01.08	294	201	279	279		20	102	184	1.29		3.53	1.71	5.23	17.05
19	28/29.01.08	326	236	309	317		18	120	119	5.26					13.65
20	29/30.01.08	327	178	314	310		14	133	84	2.05					11.06
21	30/31.01.08	199	130	196	190		7	61	91	1.73					10.6
22	31/1.01.08	262	216	242	250		11	71	45	1.23					12.43
23	1/2.02.08	409	223	380	386		30	146	132	5.32					13.05
24	2/3.02.08	234	139	217	221		15	112	79	0.77					11.9
25	3/4.02.08	423	215	389	400		13	68	57		23.4				
26	4/5.02.08	223	200	211	221		10	85	125						
27	5/6.02.08	252	212	227	232		19	106	105			3.99	2.16	6.15	
28	6/7.02.08	243	167	215	220		10	71	91						
29	7/8.02.08	270	214	241	250		13	82	51						
30	8/9.02.08	283	180	251	258		24	122	59						

** Gaseous not analyzed due to electricity problem

Table A_D_W_2: Concentration of EC, OC and TC in PM_{10} at Dadar Site (Winter)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
10/11-01-08	42.0	12.6	54.7	3.3
16/17-01-08	54.5	9.3	63.8	5.9
17/18-01-08	42.9	8.9	51.8	4.8
18/19-01-08	19.0	7.6	26.7	2.5
19/20-01-08	32.0	7.3	39.2	4.4
20/21-01-08	40.7	6.8	47.6	6.0
21/22-01-08	35.6	15.5	51.1	2.3
22/23-01-08	35.7	9.0	44.7	4.0
23/24-01-08	39.6	9.1	48.7	4.4
24/25-01-08	43.7	7.8	51.6	5.6
25/26-01-08	44.5	7.6	52.2	5.8
26/27-01-08	22.9	18.7	41.6	1.2
27/28-01-08	55.4	9.1	64.5	6.1
28/29-01-08	74.0	12.1	86.1	6.1
29/30-01-08	59.5	12.7	72.2	4.7
30/31-1-08	31.94	11.78	43.72	2.712
30/31-1-08	39.51	14.49	54.00	2.7263
30/31-1-08	41.61	14.46	56.07	2.8783
31/1-1/2-08	58.61	13.30	71.92	4.4054
31/1-1/2-08	83.47	20.09	103.55	4.1552
31/1-1/2-08	90.27	19.54	109.81	4.6191
1/2-2-08	65.55	15.31	80.86	4.2813
1/2-2-08	103.30	29.44	133.01	3.5086
1/2-2-08	103.52	21.97	125.49	4.7126
2/3-2-08	28.74	6.44	35.18	4.4622
2/3-2-08	23.11	7.00	30.11	3.3004
2/3-2-08	30.97	6.50	37.47	4.7653
3/4-2-08	41.18	5.18	46.37	7.9485
3/4-2-08	29.07	4.21	33.28	6.896
3/4-2-08	37.92	8.24	46.16	4.6051
4/5-2-08	29.22	8.04	37.26	3.6349
4/5-2-08	54.21	17.81	72.02	3.0438
4/5-2-08	52.81	16.78	69.59	3.1477
5/6-2-08	36.51	13.54	50.05	2.6954
5/6-2-08	65.75	25.55	91.30	2.5738
5/6-2-08	63.74	22.57	86.31	2.8248
6/7-2-08	24.94	5.74	30.67	4.3465
6/7-2-08	33.55	10.72	44.27	3.1281
6/7-2-08	33.40	12.27	45.67	2.7224
7/8-2-08	29.31	6.47	35.78	4.5314
7/8-2-08	33.70	9.66	43.35	3.4899
7/8-2-08	34.77	11.78	33.27	2.9509
8/9-2-08	42.26	13.43	55.69	3.147
8/9-2-08	64.84	25.18	90.02	2.5749
8/9-2-08	58.37	21.94	80.30	2.6606

Concentration of EC, OC and TC in PM2.5 at Dadar (Winter)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
10/11-01-08	23.03	15.37	38.39	1.50
16/17-01-08	12.15	8.46	20.61	1.44
17/18-01-08	28.48	7.53	36.01	3.78

Table A_Dh_W.1 : Observed Concentrations of Ambient Air Quality at Dharavi (Winter)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	21/22.01.08	515	282	209	205		19	91	62			4.23	2.59	4.55	
2	22/23.01.08	503	252	202	213		15	74	62						
3	23/24.01.08	446	226	216	220		12	67	16						
4	24/25.01.08	497	200	211	214		12	119	98						
5	25/26.01.08	289	134	139	147		9	28	30						
6	26/27.01.08	447	197	201	194		7	62	68		45.9				
7	27/28.01.08	591	264	282	302		14	70	63						
8	28/29.01.08	859	356	427	418		16	119	141						
9	29/30.01.08	539	248	266	269		8	73	90			3.97	2.23	4.13	
10	30/31.01.08	433	170	202	203		10	53	71						
11	31/1.01/.02.08	526	247	241	242		19	65	17						
12	1/2.02.08	697	378	469	467		21	75	113						
13	2/3.02.08	474	206	260	264		13	77	60						
14	3/4.02.08	670	280	330	358	67	10	43	60						
15	4/5.02.08	402	191	215	183	87	13	57	88						
16	5/6.02.08	489	274	254	253	122	11	69	72						
17	6/7.02.08	481	180	198	203		10	42	59	3.38		4.85	2.28	4.76	20.6
18	7/8.02.08	470	210	184	240		9	50	19	0.82					15.39
19	8/9.02.08	502	271	199	150		13	54	38	0.79					18.7
20	9/10.02.08	550	268	232	234		11	73	38	0.88					21.37
21	10/11.02.08	517	294	349	365		10	62	74	0.3					23.85
22	11/12.02.08	714	299	381	405		8	77	63	0.77					25.6
23	12/13.02.08	703	266	318	316		16	80	148	1.21					24.87
24	13/14.02.08	696	278	377	387		19	86	74						
25	14/15.02.08	726	305	388	395		9	53	55						
26	15/16.02.08	700	317	*	239		11	104	77		27.5	4.39	1.98	4.24	
27	16/17.02.08	592	282	*	*		16	85	55						
28	17/18.02.08	562	255	*	*		10	65	57						
29	18/19.02.08	577	241	328	357		18	55	66						
30	19/20.02.08	383	140	199	205		7	59	87						
31	20/21.02.08	--	--	303	308										

-- Sample already done 30 days (PM-Tef &Tef1 run due to earlier invalid sample), * - Invalid Samples

Table A_Dh_W_2 : Concentration of EC, OC and TC in PM_{10} at Dharavi Site (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
21/22-01-08	32.7	15.6	48.3	2.1
22/23-01-08	42.2	6.6	48.8	6.4
23/24-01-08	42.9	6.4	49.3	6.7
24/25-01-08	43.4	8.5	51.9	5.1
25/26-01-08	39.9	4.1	44.1	9.6
26/27-01-08	37.6	8.2	45.8	4.6
27/28-01-08	56.4	10.3	66.7	5.5
28/29-01-08	99.3	14.5	113.7	6.9
29/30-01-08	51.2	17.6	68.7	2.9
30/31-01-08	40.6	10.9	51.5	3.7
31/1-01/02-08	50.5	8.0	58.5	6.3
1/2-02-08	115.5	15.9	131.4	7.3
2/3-02-08	53.0	7.9	60.9	6.7
3/4-02-08	23.5	4.4	27.9	5.3
4/5-02-08	31.0	13.3	44.3	2.3
5/6-02-08	57.1	9.1	66.2	6.3
6/7-02-08	32.0	6.0	38.0	5.3
7/8-02-08	26.7	4.5	31.2	5.9
8/9-02-08	40.4	7.9	48.3	5.1
9/10-02-08	47.8	7.2	55.1	6.6
10/11-2-08	75.2	17.7	92.9	4.3
10/11-2-08	65.0	13.8	78.8	4.7
10/11-2-08	94.6	28.8	123.5	3.3
11/12-2-08	64.5	12.2	76.7	5.3
11/12-2-08	104.6	20.7	125.4	5.0
11/12-2-08	79.4	21.1	100.5	3.8
12/13-2-08	87.5	18.4	105.8	4.7
12/13-2-08	40.9	11.1	52.0	3.7
12/13-2-08	102.7	24.5	127.3	4.2
13/14-2-08	65.8	15.9	81.6	4.1
13/14-2-08	111.4	20.9	132.3	5.3
13/14-2-08	63.9	15.4	79.3	4.1
14/15-2-08	29.8	10.0	39.8	3.0
14/15-2-08	94.2	21.8	116.0	4.3
14/15-2-08	140.1	33.4	173.6	4.2
18/19-2-08	68.2	14.8	83.0	4.6
18/19-2-08	25.5	6.5	32.0	3.9
18/19-2-08	79.9	21.0	100.9	3.8
19/20-2-08	42.1	13.9	56.0	3.0
19/20-2-08	29.7	17.7	47.3	1.7
19/20-2-08	32.9	17.3	50.2	1.9
20/21-2-08	46.8	10.2	57.0	4.6
20/21-2-08	41.0	12.6	53.6	3.3
20/21-2-08	72.8	20.8	93.6	3.5

Concentration of EC, OC and TC in $PM_{2.5}$ at Dharavi (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC
01/02-02-08	57.7	43.9	101.6	1.3
02/03-02-08	32.2	9.1	41.3	3.5
06/07-02-08	20.4	4.9	25.3	4.1
07/08-02-08	17.2	5.5	22.7	3.1

Table A_K_W_1: Observed Concentrations of Ambient Air Quality at Khar (Winter)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	22/23.12.07	452	220	286	287		8	73	134						
2	23/24.12.07	472	226	301	307		10	49	101						
3	24/25.12.07	424	214	251	245	105	13	49	51						
4	25/26.12.07	360	146	210	200	91	10	50	342			2.04	0.96	3.00	
5	26/27.12.07	493	214	281	277	110	10	67	265						
6	27/28.12.07	478	271	225	221		13	60	73		47.8				
7	28/29.12.07	322	183	172	162		6	115	55						7.49
8	29/30.12.07	352	196	209	192		10	46	47						11.96
9	30/31.12.07	416	208	175	168		18	70	40						10.14
10	31/1.12.07	361	190	200	189		11	81	29			3.00	0.97	3.97	9.23
11	1/2.1.08	414	271	208	202		8	67	41						10.53
12	2/3.1.08	479	229	187	170		8	80	51						7.89
13	3/4.1.08	455	267	205	195		8	41	68						9.2
14	4/5.1.08	604	318	396	388		15	84	13						
15	5/6.1.08	585	336	251	246		16	116	49						
16	6/7.1.08	599	361	360	351		10	90	45						
17	7/8.1.08	485	271	286	278		7	62	39			1.87	0.95	2.82	
18	8/9.1.08	579	301	195	189		7	77	36						
19	9/10.1.08	521	292	368	349		8	80	40						
20	10/11.1.08	420	223	207	193		9	53	56						
21	11/12.1.08	582	248	302	239		11	85	29	1.16					
22	12/13.1.08	580	320	349	335		8	114	56	5.19					
23	13/14.1.08	569	349	346	350		9	63	41	1.26	54.8	2.39	1.10	3.45	
24	14/15.1.08	812	373	458	423		41	120	51	2.60					
25	15/16.1.08	691	385	376	353		14	63	38	4.11					
26	16/17.1.08	677	423	427	366		6	39	25	0.82					
27	17/18.1.08	506	226	268	270		18	71	41	3.75					
28	18/19.1.08	288	110	163	139		16	129	51						
29	19/20.1.08	316	173	194	161		**	**	**						
30	20/21.1.08	549	226	262	223		**	**	**						

** Gaseous not analyzed due to electricity problem

Table A_K_W_2 : Concentration of EC, OC and TC in PM_{10} at Khar Site (Winter)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC Ratio
22/23-12-07	49.8	26.5	76.3	1.9
23/24-12-07	72.2	11.8	84.0	6.1
24/25-12-07	53.5	13.3	66.8	4.0
25/26-12-07	42.8	9.8	52.7	4.4
26/27-12-07	51.0	23.6	74.6	2.2
27/28-12-07	30.0	17.0	47.0	1.8
28/29-12-07	23.9	13.5	37.4	1.8
29/30-12-07	35.4	8.8	44.2	4.0
30/31-12-07	23.9	11.0	34.8	2.2
31/1-12/1-07/08	28.2	15.1	43.3	1.9
1/2-01-08	40.1	10.8	50.9	3.7
2/3-01-08	36.5	8.1	44.6	4.5
3/4-01-08	37.1	7.7	44.8	4.8
4/5-01-08	90.0	15.7	105.8	5.7
5/6-01-08	49.1	9.7	58.8	5.1
6/7-01-08	80.6	18.1	98.7	4.5
7/8-01-08	55.8	15.3	71.0	3.7
8/9-01-08	45.6	8.7	54.3	5.2
9/10-01-08	83.3	16.6	99.9	5.0
10/11-01-08	36.9	7.1	44.0	5.2
11/12-1-08	45.9	13.8	59.7	3.3
11/12-1-08	73.1	14.2	87.3	5.1
11/12-1-08	103.1	29.1	132.3	3.5
12/13-1-08	72.3	16.0	88.3	4.5
12/13-1-08	114.4	27.1	141.5	4.2
12/13-1-08	107.9	28.3	136.2	3.8
13/14-1-08	80.5	14.7	95.2	5.5
13/14-1-08	62.5	15.3	77.9	4.1
13/14-1-08	144.6	25.5	170.1	5.7
14/15-1-08	73.7	10.3	84.1	7.1
14/15-1-08	112.2	20.9	133.1	5.4
14/15-1-08	109.2	19.4	128.6	5.6
15/16-1-08	64.5	18.0	82.4	3.6
15/16-1-08	117.4	28.0	145.3	4.2
15/16-1-08	91.7	19.9	111.6	4.6
16/17-1-08	60.4	12.1	72.5	5.0
16/17-1-08	102.4	28.7	131.1	3.6
16/17-1-08	81.8	17.1	99.0	4.8
17/18-1-08	54.6	13.3	68.0	4.1
17/18-1-08	53.7	15.4	69.1	3.5
17/18-1-08	61.9	18.5	80.4	3.3
18/19-1-08	29.6	7.8	37.5	3.8
18/19-1-08	21.2	3.2	24.4	6.6
18/19-1-08	35.6	9.8	45.4	3.6
19/20-1-08	25.8	5.3	31.2	4.8
19/20-1-08	36.1	11.4	47.5	3.2
19/20-1-08	90.8	18.3	109.1	5.0
20/21-1-08	47.2	10.2	57.4	4.6
20/21-1-08	72.4	19.0	91.5	3.8
20/21-1-08	40.8	6.2	47.0	6.6

Concentration of EC, OC and TC in $PM_{2.5}$ at Khar (Winter)

Date	OC (µg/m³)	EC (µg/m³)	TC (µg/m³)	OC/EC
22/23-12-07	25.3	6.4	31.6	4.0
23/24-12-07	50.6	31.7	82.3	1.6
27/28-12-07	23.9	9.7	33.5	2.5
28/29-12-07	20.3	6.4	26.7	3.2

Table A_A_W_1: Observed Concentrations of Ambient Air Quality at Andheri (Winter)

Sr. No.	Date	SPM (μg/m^3)	RSPM (μg/m^3)	PM_{10} (μg/m^3)		$PM_{2.5}$ (μg/m^3)	SO_2 (μg/m^3)	NO_X (μg/m^3)	NH_3 (μg/m^3)	CO (mg/m^3)	Formaldehyde (μg/m^3)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	22/23.01.08	467	167	222	222		13	100	59	1.53	27.4	3.60	1.11	4.70	
2	23/24.01.08	338	218	199	203		12	61	26	1.40					
3	24/25.01.08	334	272	208	207		9	63	78	0.88					
4	25/26.01.08	332	308	189	188		6	64	36	0.70					
5	26/27.01.08	256	239	160	151		9	62	56	0.97					
6	27/28.01.08	399	275	87	234	120	11	103	56	1.63					
7	28/29.01.08	449	339	278	276	103	17	130	39	0.55					
8	29/30.01.08	350	272	225	233	140	13	87	73			2.64	0.92	3.56	
9	30/31.01.08	241	118	142	138		11	65	53						
10	31/1.01.08	365	202	218	213		6	65	32						
11	1/2.02.08	500	320	438	429		22	79	75						
12	2/3.02.08	301	181	281	189		24	115	57						
13	3/4.02.08	370	193	357	345		8	59	51						
14	4/5.02.08	208	167	189	182		6	81	69						
15	5/6.02.08	279	181	236	120		10	88	62						
16	6/7.02.08	239	135	211	207		9	61	63			3.78	0.88	4.65	9.32
17	7/8.02.08		165	242	236		7	60	32						12.97
18	8/9.02.08	429	267	198	189		10	73	38						9.8
19	9/10.02.08	412	221	201	194		13	78	52						11.9
20	10/11.02.08	459	218	245	236		11	88	82						10.53
21	11/12.02.08	570	245	340	314		10	115	81						7.89
22	12/13.02.08	499	218	247	289		14	75	46						8.53
23	13/14.02.08	563	286	358	361		26	91	37		28.0	3.34	0.81	4.14	
24	14/15.02.08	543	248	326	304		8	68	59						
25	15/16.02.08	447	221	258	210		8	104	77						
26	16/17.02.08	438	210	230	211		11	91	56						
27	17/18.02.08	393	210	211	201		6	74	75						
28	18/19.02.08	478	227	263	242		10	67	80						
29	19/20.02.08	395	171	231	207		5	29	63						
30	20/21.02.08	446	172	261	223		10	64	39						

* Sampler not working at specified flow rate

Table A_A_W_2 :Concentration of EC, OC and TC in PM_{10} at Andheri Site (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
22/23-01-08	25.6	5.4	30.9	4.7
23/24-0108	40.2	8.3	48.5	4.8
24/25-01-08	46.9	6.5	53.4	7.2
25/26-01-08	42.0	6.8	48.9	6.1
26/27-01-08	33.0	5.1	38.1	6.5
27/28-01-08	55.3	10.7	66.0	5.2
28/29-01-08	66.6	11.4	78.0	5.9
29/30-01-08	46.6	9.2	55.8	5.1
30/31-01-08	27.2	6.2	33.4	4.4
31/1-01/02-08	44.5	7.0	51.5	6.3
1/2-02-08	103.3	16.9	120.2	6.1
2/3-02-08	54.9	7.3	62.2	7.5
3/4-02-08	28.9	3.1	32.0	9.4
4/5-02-08	33.8	6.9	40.7	4.9
5/6-02-08	51.6	8.1	59.6	6.4
6/7-02-08	28.7	4.7	33.4	6.0
7/8-02-08	27.0	3.0	30.1	8.9
8/9-02-08	35.8	6.4	42.2	5.6
9/10-02-08	40.3	7.1	47.4	5.7
10/11-02-08	47.3	7.4	54.7	6.4
11/12-2-08	62.9	13.6	76.4	4.6
11/12-2-08	107.8	24.6	132.4	4.4
11/12-2-08	97.1	25.4	122.5	3.8
14/15-2-08	48.1	9.6	57.7	5.0
14/15-2-08	97.7	18.3	116.0	5.3
f14/15-2-08	64.8	17.0	81.9	3.8
15/16-2-08	48.5	11.3	59.8	4.3
15/16-2-08	74.2	20.8	95.0	3.6
15/16-2-08	74.4	19.2	93.4	3.9
16/17-2-08	50.2	10.5	60.6	4.8
16/17-2-08	55.9	16.7	72.6	3.3
16/17-2-08	53.0	16.8	69.8	3.2
17/18-2-08	39.6	7.1	46.7	5.6
17/18-2-08	39.0	9.6	48.6	4.1
17/18-2-08	49.0	13.8	62.7	3.6
18/19-2-08	41.3	7.7	49.0	5.4
18/19-2-08	40.4	9.0	49.4	4.5
18/19-2-08	72.9	15.4	88.3	4.7
19/20-2-08	34.7	7.7	42.4	4.5
19/20-2-08	32.2	14.4	46.6	2.2
19/20-2-08	60.6	17.5	78.2	3.5
20/21-2-08	31.0	6.0	37.0	5.2
20/21-2-08	49.9	14.5	64.4	3.4
20/21-2-08	53.6	13.5	67.1	4.0

Concentration of EC, OC and TC in PM2.5 at Andheri (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC
25/26-01-08	21.1	13.6	34.8	1.6
26/27-01-08	20.0	13.9	33.9	1.4
30/31-01-08	16.7	8.0	24.7	2.1
31/1-01-08	21.7	16.8	38.6	1.3

Table A_M_W_1: Observed Concentrations of Ambient Air Quality at Mahul (Winter)

Sr. No.	Date	SPM (μg/m³)	RSPM (μg/m³)	PM_{10} (μg/m³)		$PM_{2.5}$ (μg/m³)	SO_2 (μg/m³)	NO_X (μg/m³)	NH_3 (μg/m³)	CO (mg/m³)	Formaldehyde (μg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	11/12.12.07	345	132	179	178		7	88	54			3.1	0.85	3.95	
2	12/13.12.07	471	176	204	203		10	29	53		23.3				
3	13/14.12.07	465	227	298	294		11	84	67						
4	14/15.12.07	502	252	268	265		10	93	101						
5	15/16.12.07	442	240	246	277	134.52	16	61	46						
6	16/17.12.07	500	218	258	262	130.20	23	43	55						
7	17/18.12.07	337	237	213	220	116.52	21	59	60						
8	18/19.12.07	331	223	190	192		21	53	72						
9	19/20.12.07	365	197	212	217		29	80	58			2.39	0.7	3.09	11.5
10	20/21.12.07	393	185	216	220		23	83	56						13.0
11	21/22.12.07	302	172	196	199		13	57	56						13.1
12	22/23.12.07	389	209	251	252		15	69	128						11.9
13	23/24.12.07	353	218	237	237		11	60	101						10.5
14	24/25.12.07	449	282	316	319		9	88	35	1.01					15.1
15	25/26.12.07	405	252	299	279		15	70	249	0.58					14.6
16	26/27.12.07	461	325	305	310		21	92	247	0.74					
17	27/28.12.07	451	289	279	279		21	65	208	0.74					
18	28/29.12.07	367	316	234	235		10	77	174	0.71		1.98	1.08	3.06	
19	29/30.12.07	427	272	238	240		16	51	80	2.32					
20	30/31.12.07	439	277	231	231		17	91	128	3.97					
21	31/1.12.07	486	332	393	407		18	89	73						
22	1/2.1.08	416	276	310	308		11	96	96						
23	2/3.1.08	426	272	314	315		18	58	80						
24	3/4.1.08	393	285	334	331		28	84	117						
25	4/5.1.08	379	271	324	303		26	85	67						
26	5/6.1.07	334	278	298	294		34	82	79		17.9				
27	6/7.1.08	275	161	332	293		35	68	93			1.64	1.05	2.69	
28	7/8.1.08	241	129	285	292		20	67	73						
29	8/9.1.08	383	305	370	367		21	97	111						
30	9/10.1.08	322	236	304	298		21	41	98						

Table A_M_W_2 :Concentration of EC, OC and TC in PM_{10} at Mahul Site (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
11/12-12-07	31.4	10.5	41.9	3.0
12/13-12-07	30.0	5.6	35.5	5.4
13/14-12-07	54.4	9.2	63.5	5.9
14/15-12-07	41.2	10.6	51.8	3.9
15/16-12-07	48.6	14.4	63.0	3.4
16/17-12-07	46.9	10.3	57.2	4.6
17/18-12-07	43.6	9.2	52.8	4.7
18/19-12-07	35.8	6.2	42.0	5.8
19/20-12-07	35.8	13.8	49.6	2.6
20/21-12-07	33.3	18.3	51.6	1.8
21/22-12-07	33.6	9.1	42.7	3.7
22/23-12-07	45.1	13.9	59.0	3.3
23/24-12-07	46.0	10.2	56.1	4.5
24/25-12-07	46.2	33.5	79.6	1.4
25/26-12-07	54.1	12.3	66.4	4.4
26/27-12-07	57.8	10.9	68.6	5.3
27/28-12-07	44.0	19.6	63.5	2.2
28/29-12-07	31.8	24.6	56.4	1.3
31/1-12/1-07/08	90.8	26.6	117.4	3.4
31/1-12/1-07/08	97.7	21.8	119.5	4.5
31/1-12/1-07/08	84.1	20.4	104.5	4.1
1/2-01-08	51.3	14.9	66.2	3.5
1/2-01-08	56.8	18.3	75.0	3.1
1/2-01-08	54.0	15.9	69.9	3.4
2/3-1-08	46.0	10.4	56.4	4.4
2/3-1-08	90.6	20.3	110.9	4.5
2/3-1-08	71.1	19.0	90.0	3.7
3/4-01-2008	46.4	10.4	56.8	4.4
3/4-01-2008	83.8	17.4	101.2	4.8
3/4-01-2008	71.9	18.4	90.2	3.9
4/5-1-08	88.0	21.9	111.1	4.0
4/5-1-08	79.5	17.4	96.9	4.6
4/5-1-08	60.2	18.2	78.4	3.3
5/6-1-08	85.4	13.9	99.3	6.1
5/6-01-08	45.9	12.6	58.5	3.7
5/6-01-08	44.4	12.0	56.4	3.7
7/8-01-08	53.7	12.7	66.4	4.2
7/8-01-08	66.7	15.8	82.4	4.2
7/8-01-08	47.6	15.7	63.4	3.0
8/9-1-08	93.7	19.5	113.1	4.8
8/9-1-08	99.4	32.8	132.2	3.0
8/9-1-08	62.7	19.2	81.9	3.3
9/10-1-08	60.4	15.9	76.3	3.8
9/10-1-08	103.9	20.9	124.9	5.0
9/10-1-08	65.9	22.3	88.1	3.0

Concentration of EC, OC and TC in $PM_{2.5}$ at Mahul Site (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
11/12-12-07	23.2	13.5	36.7	1.7
12/13-12-07	32.3	6.5	38.8	5.0
13/14-12-07	23.8	20.2	44.0	1.2
14/15-12-07	34.5	10.4	44.8	3.3

Table A_Mu_W_1 : Observed Concentrations of Ambient Air Quality at Mulund (Winter)

Sr. No.	Date	SPM (µg/m³)	RSPM (µg/m³)	PM_{10} (µg/m³)		$PM_{2.5}$ (µg/m³)	SO_2 (µg/m³)	NO_X (µg/m³)	NH_3 (µg/m³)	CO (mg/m³)	Formaldehyde (µg/m³)	CH_4 (ppm)	Nonmethane HC (ppm)	Total HC (ppm)	O_3 (ppb)
				Tef	Tef#										
1	21/22.02.08	**	108	424	426		28	139	79			4.73	2.3	7.03	
2	22/23.02.08	512	252	278	277		12	77	46						
3	23/24.02.08	594	301	488	492		12	59	54						
4	24/25.02.08	689	446	553	545	165	8	66	43	4.12	18.2				
5	25/26.02.08	648	456	430	423	138	13	68	85	0.97					
6	26/27.02.08	503	409	256	252	89	8	52	31	3.41					
7	27/28.02.08	502	339	269	272		33	79	39	3.79					
8	28/29.02.08	363	143	274	267		22	82	92	0.66					
9	29/1.02/03.08	487	300	296	295		10	59	33	3.43		4.51	1.85	6.36	14.53
10	1/2.03.08	494	325	265	258		21	62	59	2.38					15.83
11	2/3.03.08	458	297	217	210		21	60	43						11.79
12	3/4.03.08	434	221	236	224		5	73	29						21.35
13	4/5.03.08	511	279	247	240		10	77	23						29.37
14	5/6.03.08	526	312	#	#		6	77	37						27.10
15	6/7.03.08	544	234	261	258		12	70	89						33.93
16	7/8.03.08	486	226	272	279		13	70	63						
17	8/9.03.08	494	294	319	316		16	93	88						
18	9/10.03.08	458	228	312	312		28	88	91			4.62	1.75	6.38	
19	10/11.03.08	372	169	186	199		10	57	53						
20	11/12.03.08	458	288	249	245		7	60	76						
21	12/13.03.08	443	198	265	253		11	73	21						
22	13/14.03.08	310	176	246	275		13	48	73						
23	14/15.03.08	448	230	287	285		11	82	50						
24	15/16.03.08	373	266	199	198		12	96	34						
25	16/17.03.08	411	255	212	224		22	80	68						
26	17/18.03.08	339	225	200	196		18	60	45		21.9				
27	18/19.03.08	350	187	205	190		14	74	78						
28	19/20.03.08	313	185	162	124		15	38	42						
29	20/21.03.08	457	218	267	250		12	46	34			4.33	1.71	6.04	
30	21/22.03.08	451	245	281	269		16	65	25						

Not Run, ** Invalid

Table A_Mu_W_2 :Concentration of EC, OC and TC at Mulund Site (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
21/22-02-08	101.5	17.6	119.1	5.8
22/23-02-08	79.4	10.8	90.2	7.4
23/24-02-08	53.6	5.6	58.1	9.5
24/25-02-08	93.6	11.5	105.1	8.1
25/26-02-08	64.5	8.9	73.3	7.3
26/27-02-08	44.8	7.4	52.2	6.0
27/28-02-08	59.5	7.3	66.8	8.2
28/29-02-08	59.4	7.9	67.3	7.5
29/1-03-08	74.7	9.0	83.7	8.3
1/2-03-08	66.9	7.8	74.7	8.6
2/3-03-08	58.0	9.8	67.8	5.9
3/4-03-08	55.4	13.7	69.1	4.0
4/5-03-08	60.4	14.9	75.3	4.1
5/6-03-08	60.2	9.1	69.3	6.6
7/8-03-08	48.1	9.0	57.1	5.4
8/9-03-08	66.7	23.6	90.3	2.8
9/10-03-08	57.3	15.4	72.6	3.7
10/11-03-08	30.5	6.0	36.5	5.1
11/12-03-08	38.5	19.9	58.4	1.9
12/13-03-08	70.1	15.7	85.9	4.5
12/13-03-08	41.2	13.9	55.1	3.0
12/13-03-08	68.6	21.1	89.7	3.3
13/14-03-08	35.9	9.9	45.8	3.6
13/14-03-08	76.7	23.0	99.7	3.3
13/14-03-08	60.6	18.5	79.0	3.3
14/15-03-08	75.6	17.1	92.7	4.4
14/15-03-08	53.8	13.1	66.9	4.1
14/15-03-08	56.0	14.1	70.1	4.0
15/16-03-08	79.5	18.1	97.6	4.4
15/16-03-08	31.8	10.4	42.2	3.1
15/16-03-08	47.9	14.9	62.7	3.2
16/17-03-08	55.4	7.9	63.3	7.0
16/17-03-08	27.9	9.6	37.5	2.9
16/17-03-08	66.6	14.1	80.8	4.7
17/18-03-08	52.6	13.1	65.8	4.0
17/18-03-08	44.6	13.1	57.7	3.4
17/18-03-08	48.8	16.5	65.3	3.0
18/19-03-08	55.3	15.0	70.3	3.7
18/19-03-08	34.1	12.2	46.3	2.8
19/20-03-08	37.0	7.3	44.3	5.1
19/20-03-08	7.7	1.2	8.9	6.3
19/20-03-08	33.8	8.1	41.9	4.2
20/21-03-08	81.0	20.2	101.2	4.0
20/21-03-08	33.7	10.7	44.4	3.1
20/21-03-08	52.3	11.8	64.1	4.4
21/22-03-08	94.7	18.9	113.7	5.0
21/22-03-08	47.2	9.8	57.0	4.8
21/22-03-08	20.6	3.9	24.5	5.3

Concentration of EC, OC and TC at Mulund Site (Winter)

Date	OC (µg/m^3)	EC (µg/m^3)	TC (µg/m^3)	OC/EC Ratio
22/23-02-08	38.7	19.6	58.3	2.0
23/24-02-08	28.4	7.4	35.8	3.8
27/28-02-08	40.6	5.9	46.6	6.8

Seasonal variation of pollutants at Different Sites

Table A : Seasonal trends of pollutants at different sites

Pollutants	SPM (μg/m³)	RSPM (μg/m³)	PM_{10} (μg/m³)	$PM_{2.5}$ (μg/m³)	SO_2 (μg/m³)	NO_X (μg/m³)	NH_3 (μg/m³)	CO (mg/m³)	Formaldehyde (μg/m³)	Methane (ppm)	Non-Methane (ppm)	Total HC (ppm)	O_3 (ppb)	OC (μg/m³)	EC (μg/m³)	TC (μg/m³)
Colaba Sum	159.0	52.0	91.0	29.0	5.0	18.0	47.0	2.9	18.0	1.1	15.0	16.1		11.4	3.3	14.6
Colaba Post	204.6	128.1	140.7	59.7	12.7	37.7	53.1	2.9	19.0	2.1	0.5	2.6	31.4	26.4	7.0	33.5
Colaba Win	246.2	173.8	183.7	92.3	15.4	53.0	58.7	1.6	18.5	3.1	1.0	4.1	21.9	22.9	8.2	31.0
Colaba_ Avg	**203.3**	**118.0**	**138.5**	**60.3**	**11.0**	**36.2**	**52.9**	**2.5**	**18.5**	**2.1**	**5.5**	**7.6**	**26.7**	**20.2**	**6.2**	**26.4**
Dadar Sum	335.0	90.0	116.0	37.0	6.0	31.0	59.0	2.4	93.0	0.9	4.2	5.1		16.3	5.8	22.0
Dadar Post	350.7	180.0	212.4	111.7	15.0	63.0	103.0	1.2	32.4	1.8	1.9	3.8	14.4	40.4	11.9	52.2
Dadar Win	291.5	195.4	253.3	106.0	15.8	98.7	93.5	2.9	22.8	3.6	1.7	5.4	12.8	45.2	11.8	56.8
Dadar_ Avg	**325.7**	**155.1**	**193.9**	**84.9**	**12.3**	**64.2**	**85.2**	**2.2**	**49.4**	**2.1**	**2.6**	**4.8**	**13.6**	**34.0**	**9.8**	**43.7**
Dharavi Sum	400.8	133.4	176.9	74.0	6.0	39.0	69.0	2.4	31.0	2.0	1.2	3.2		29.8	8.9	38.8
Dharavi Post	501.2	206.2	244.8	91.3	15.8	53.1	64.4	1.0	61.2	2.2	1.0	3.2	32.5	52.7	8.4	61.1
Dharavi Win	551.7	250.4	272.5	92.0	12.5	69.6	67.4	1.2	36.7	4.4	2.3	4.4	21.5	54.2	11.7	65.8
Dharavi_ Avg	**484.6**	**196.7**	**231.4**	**85.8**	**11.4**	**53.9**	**66.9**	**1.5**	**43.0**	**2.9**	**1.5**	**3.6**	**27.0**	**45.6**	**9.7**	**55.2**
Khar Sum	145.6	65.4	62.0	15.0	5.0	14.0	41.0	0.6	26.3	1.8	1.2	3.0		10.2	2.1	12.3
Khar Post	399.6	210.0	228.8	83.0	11.4	66.3	45.7	1.4	54.8	1.4	0.3	1.8	11.3	43.4	9.2	52.6
Khar Win	494.7	259.0	263.1	102.0	11.7	74.8	68.1	2.7	51.3	2.5	1.0	3.5	9.5	56.5	14.5	71.0
Khar_ Avg	**346.6**	**178.1**	**184.6**	**66.7**	**9.4**	**51.7**	**51.6**	**1.6**	**44.1**	**1.9**	**0.8**	**2.8**	**10.4**	**36.7**	**8.6**	**45.3**
Andheri Sum	255.0	112.0	84.0	28.0	8.0	17.0	81.0	1.2	31.0	3.8	6.0	9.8		14.5	4.1	18.6
Andheri Post	398.6	241.1	223.4	98.7	13.5	78.9	46.4	1.7	29.8	1.5	0.5	2.0		48.9	12.7	62.0
Andheri Win	396.5	222.2	236.8	121.0	11.2	78.7	56.7	1.1	27.7	3.3	0.9	4.1	10.1	47.8	9.3	57.1
Andheri_ Avg	**350.0**	**191.8**	**181.4**	**82.6**	**10.9**	**58.2**	**61.4**	**1.3**	**29.5**	**2.9**	**2.5**	**5.3**	**10.1**	**37.1**	**8.7**	**45.9**
Mahul Sum	239.0	117.0	98.0	17.0	7.0	20.0	112.0	1.9	28.0	0.9	21.1	22.0		11.5	3.6	15.1
Mahul Post	388.4	197.1	218.7	87.0	14.8	53.5	60.3	1.5	22.4	1.6	0.5	2.1	22.6	46.9	8.7	55.7
Mahul Win	395.0	241.5	270.9	127.1	18.4	72.0	97.2	1.4	20.6	2.3	0.9	3.2	12.8	51.6	14.9	66.6
Mahul_ Avg	**340.8**	**185.2**	**195.8**	**77.0**	**13.4**	**48.5**	**89.8**	**1.6**	**23.7**	**1.6**	**7.5**	**9.1**	**17.7**	**36.7**	**9.1**	**45.8**
Mulund Sum	352.0	189.0	163.0	62.0	5.0	51.0	64.0	2.3	22.0	2.0	17.8	19.7		32.7	8.8	41.5
Mulund Post	391.5	179.4	234.3	189.5	16.8	53.2	50.8	1.1	31.1	2.2	1.0	3.2	15.6	51.0	15.1	66.1
Mulund Win	463.0	260.4	279.5	130.7	14.6	71.0	54.1	2.7	20.0	4.5	1.9	6.4	21.9	58.1	12.0	70.0
Mulund_ Avg	**402.2**	**209.6**	**225.6**	**127.4**	**12.1**	**58.4**	**56.3**	**2.0**	**24.4**	**2.9**	**6.9**	**9.8**	**18.8**	**47.3**	**12.0**	**59.2**

Table B : Concentrations Range of Ions for Seven Sites All Seasons

	F-	Cl-	NO_2-	SO_4--	Br-	NO_3--	PO_4--	Na+	NH4+	K+	Mg++	Ca++
Colaba Summer												
Minimum	0.01	0.38	0.02	3.56	0.07	1.91	0.04	1.24	1.81	0.86	0.36	6.53
Maximum	0.16	6.84	0.10	16.25	0.37	11.77	0.26	10.32	5.72	8.53	9.24	27.43
Colaba Post Monsoon												
Minimum	3.55	0.38	--	8.67	--	0.44	*	0.58	0.27	0.35	--	0.85
Maximum	5.56	6.84	--	25.78	--	2.78	0.66	3.48	10.14	4.03	--	3.94
Colaba Winter												
Minimum	4.70	3.56	--	2.54	--	0.67	--	2.34	0.18	0.90	*	0.82
Maximum	9.49	13.48	--	11.17	--	5.15	--	7.69	4.46	3.73	0.77	7.61
Dadar Summer												
Minimum	*	0.97	--	0.21	--	0.82	--	1.12	0.40	0.62	*	1.66
Maximum	0.04	8.00	--	9.22	--	6.59	--	6.75	2.49	1.47	0.60	7.52
Dadar Post Monsoon												
Minimum	0.64	2.08	--	10.79	--	0.65	--	0.95	0.17	0.96	--	2.37
Maximum	17.16	10.33	--	49.77	--	4.68	--	4.45	5.72	3.91	--	15.06
Dadar Winter												
Minimum	0.57	3.86	*	10.90	--	0.95	--	3.34	*	1.74	0.66	6.03
Maximum	9.98	12.96	2.57	38.67	--	6.55	--	22.74	3.22	5.51	41.74	34.06
Dharavi Summer												
Minimum	0.09	1.50	--	4.47	0.05	3.43	0.09	1.36	0.45	0.64	0.43	2.26
Maximum	0.60	8.00	0.23	11.87	0.28	10.44	0.29	4.99	5.66	3.76	1.76	9.23
Dharavi Post Monsoon												
Minimum	0.98	0.90	*	8.14	--	0.50	--	1.20	0.19	0.90	0.61	4.87
Maximum	2.10	7.21	3.41	32.10	--	3.65	--	3.42	6.09	5.81	2.31	9.87
Dharavi Winter												
Minimum	5.72	7.27	*	6.47	--	1.32	--	4.80	0.88	0.51	0.69	6.18
Maximum	22.85	22.11	0.73	28.26	--	4.28	--	13.65	4.66	6.69	2.24	19.77
Khar Summer												
Minimum	0.01	0.71	--	1.45	0.05	1.00	0.04	0.98	0.37	1.11	--	1.22
Maximum	0.55	10.23	--	5.44	0.84	7.06	0.05	10.62	1.32	2.56	--	7.21
Khar Post Monsoon												
Minimum	0.39	1.14	*	7.37	--	0.61	--	0.75	0.83	1.24	--	1.21
Maximum	10.98	25.96	0.93	31.07	--	1.98	--	3.39	7.46	2.47	--	8.60
Khar Winter												
Minimum	3.68	3.76	--	13.77	--	0.99	--	3.80	--	2.58	0.79	6.76
Maximum	14.74	9.78	--	30.25	--	3.42	--	9.21	--	4.58	2.93	15.84
Andheri Summer												
Minimum	1.5	0.8	--	--	0.1	--	1.5	1.5	1.3	0.9	0.4	1.5
Maximum	8.0	7.7	4.3	13.2	15.4	--	26.8	5.0	11.1	9.9	2.4	9.8
Andheri Post Monsoon												
Minimum	0.6	0.8	--	8.3	--	0.4	--	0.8	0.7	1.8	--	3.1
Maximum	7.7	12.8	--	31.8	--	2.4	--	2.8	8.3	4.1	--	8.5
Andheri Winter												
Minimum	0.9	5.6	--	10.4	--	0.6	--	2.7	--	1.1	0.7	1.9
Maximum	17.2	16.0	--	23.8	--	2.6	--	8.9	--	4.6	0.9	12.7

-- Not detected, * Only one reading

Table B (Contd..) : Concentrations Range of Ions for Seven Sites All Seasons

	F-	Cl-	NO_2-	SO_4--	Br-	NO_3--	PO_4--	Na+	NH4+	K+	Mg++	Ca++
Mahul Summer												
Minimum	0.01	2.52	0.01	2.98	--	2.35	--	2.13	1.84	0.75	0.37	2.28
Maximum	0.21	9.87	0.16	10.66	--	8.64	--	7.50	6.59	3.96	3.04	6.87
Mahul Post Monsoon												
Minimum	3.46	1.04	--	11.64	--	0.46	--	0.51	2.51	0.94	*	1.46
Maximum	5.64	7.03	--	31.76	--	4.14	--	3.17	9.59	4.93	0.71	7.11
Mahul Winter												
Minimum	4.39	0.92	10.31	2.69	27.84	0.46	2.07	3.16	8.42	0.54	0.63	2.14
Maximum	9.99	23.30	11.88	36.53	33.58	2.57	4.22	7.66	10.41	4.35	7.42	14.00
Mulund Summer												
Minimum	0.02	0.83	--	0.35	0.05	0.21	--	1.09	1.39	0.85	0.42	1.81
Maximum	0.24	7.79	--	19.21	0.17	12.51	--	5.12	11.02	9.40	4.42	10.58
Mulund Post Monsoon												
Minimum	1.24	2.13	--	14.16	--	0.49	--	0.98	0.73	0.74	*	2.77
Maximum	14.46	6.48	--	30.24	--	2.04	--	19.87	2.72	45.78	4.55	6.31
Mulund Winter												
Minimum	1.23	2.13	--	14.16	--	0.49	--	3.36	0.22	1.34	0.65	5.72
Maximum	14.45	5.17	--	31.87	--	3.13	--	18.88	0.66	9.63	1.71	41.70

-- Not detected, * only one reading

Table C : Concentrations Range of Elements for Seven Sites All Seasons

	Ag	Al	As	Ba	Ca	Cd	Ce	Co	Cr	Cu	Fe	Ga	Hf	Hg	In	K	Lu	Mg	Mn
Colaba Summer																			
Minimum	--	0.024	--	0.008	1.630	0.002	--	--	0.003	0.004	1.578	--	--	--	0.053	0.339	*	0.597	0.022
Maximum	--	0.065	--	0.162	6.154	0.063	--	--	0.119	0.062	6.169	--	--	--	0.196	1.842	0.001	1.779	0.067
Colaba Post Monsoon																			
Minimum	--	0.073	--	--	1.179	--	--	--	0.008	0.035	2.096	--	--	--	--	1.379	--	0.521	0.073
Maximum	0.006	0.522	--	0.380	17.157	0.059	--	0.018	0.599	0.257	26.393	--	0.022	--	2.153	7.305	0.003	3.977	0.540
Colaba Winter																			
Minimum	*	0.111	0.008	0.030	2.128	0.008	0.043	0.004	0.016	0.037	5.634	--	--	--	0.546	2.224	--	1.165	0.113
Maximum	0.015	0.852	0.060	0.211	24.727	0.023	0.056	0.023	0.192	0.269	39.069	--	--	--	3.167	12.097	0.001	24.547	0.881
Dadar Summer																			
Minimum	*	0.020	--	0.005	0.645	0.002	--	--	0.003	0.009	1.014	--	*	0.009	0.041	0.197	0.002	0.214	0.014
Maximum	0.023	0.152	--	0.093	14.249	0.017	--	--	0.026	0.061	19.658	--	0.050	0.069	4.032	0.902	0.004	3.070	0.156
Dadar Post Monsoon																			
Minimum	0.013	0.154	--	0.123	7.274	0.008	0.018	0.004	0.025	0.089	7.823	0.013	0.006	--	0.651	1.144	--	1.541	0.154
Maximum	0.104	0.678	--	1.163	31.905	4.602	0.029	0.017	0.240	0.426	26.821	0.058	0.052	--	3.266	5.643	0.002	5.908	0.703
Dadar Winter																			
Minimum	--	0.140	0.008	0.123	7.648	0.011	--	0.004	0.010	0.107	7.765	--	--	--	0.872	0.831	--	1.931	0.143
Maximum	--	1.097	0.031	0.245	24.407	0.027	--	0.035	0.681	0.260	51.864	--	--	--	7.805	8.544	0.002	21.604	1.080
Dharavi Summer																			
Minimum	--	0.024	--	--	--	--	--	--	--	--	--	--	--	--	0.138	0.049	--	0.380	0.024
Maximum	0.021	0.220	0.030	0.105	12.335	0.015	0.098	0.007	0.206	0.113	9.316	0.083	0.018	0.020	1.585	2.832	0.001	4.068	0.220
Dharavi Post Monsoon																			
Minimum	0.005	0.240	0.011	0.073	7.842	0.009	0.014	0.004	0.034	0.122	11.189	0.093	0.004	--	1.276	2.245	--	2.941	0.244
Maximum	0.180	0.966	0.028	0.491	25.400	0.048	0.074	0.015	0.407	0.668	40.172	0.196	0.230	--	4.909	27.723	0.003	11.227	0.991
Dharavi Winter																			
Minimum	0.005	0.097	0.010	0.052	7.106	0.012	0.018	0.005	0.006	0.055	4.633	--	--	--	0.624	1.430	*	0.949	0.099
Maximum	0.016	0.862	0.093	0.426	31.401	0.038	0.055	0.042	0.183	0.628	38.595	--	--	--	6.565	16.409	0.002	7.878	0.897
Khar Summer																			
Minimum	--	0.011	--	0.002	1.304	0.002	0.154	*	0.003	0.009	0.589	--	0.013	--	0.064	0.180	*	0.261	0.012
Maximum	--	0.119	--	0.099	45.145	0.047	1.418	0.006	0.028	0.105	4.583	--	0.057	--	0.788	1.123	0.002	1.675	0.122
Khar Post Monsoon																			
Minimum	*	0.208	*	0.084	7.488	0.010	0.018	0.003	0.034	0.129	9.062	*	0.011	--	1.020	1.837	--	1.690	0.237
Maximum	0.007	0.687	0.030	0.566	25.318	0.035	0.049	0.028	0.222	0.336	26.238	0.012	0.025	--	3.169	5.044	0.005	5.135	0.739

Table C (Contd..) : Concentrations Range of Elements for Seven Sites All Seasons

	Ag	Al	As	Ba	Ca	Cd	Ce	Co	Cr	Cu	Fe	Ga	Hf	Hg	In	K	Lu	Mg	Mn
Khar Winter																			
Minimum	--	0.159	0.006	0.084	7.964	0.011	*	0.003	0.014	0.095	6.986	--	--	--	0.774	3.791	--	1.762	0.168
Maximum	--	0.796	0.029	0.501	24.710	0.038	0.018	0.016	0.213	0.564	35.767	--	--	--	4.996	13.540	0.001	7.117	0.864
Andheri Summer																			
Minimum	--	0.003	--	0.009	1.639	0.001	--	0.005	0.002	0.003	0.412	--	--	*	--	0.191	--	0.044	0.005
Maximum	--	0.280	--	0.067	7.793	0.020	--	0.040	9.011	0.107	40.065	--	--	0.038	--	1.313	--	1.883	0.296
Andheri Post Monsoon																			
Minimum	0.004	0.231	--	0.101	8.273	0.012	0.018	0.005	0.051	0.120	7.423	--	0.006	--	2.293	1.888	--	2.005	0.250
Maximum	0.010	0.713	--	1.315	25.391	0.031	0.059	0.018	0.259	0.285	23.373	--	0.051	--	5.603	4.803	0.005	6.626	0.723
Andheri Winter																			
Minimum	0.005	0.217	0.008	0.096	6.844	0.011	*	0.003	0.002	0.095	10.116	--	--	--	0.739	4.033	--	2.217	0.209
Maximum	0.019	0.671	0.043	0.329	22.632	0.038	0.062	0.019	0.154	0.515	31.435	--	--	--	10.381	12.593	0.001	6.515	0.657
Mahul Summer																			
Minimum	--	0.006	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.506	0.005
Maximum	0.038	0.154	0.034	0.044	6.849	0.110	0.047	0.009	0.094	0.080	5.123	0.062	0.027	0.004	0.869	1.382	0.001	2.456	0.152
Mahul Post Monsoon																			
Minimum	--	0.220	--	0.081	7.049	--	--	--	0.026	0.118	8.732	--	--	--	0.925	2.674	--	1.769	0.220
Maximum	0.017	0.669	0.020	0.932	20.815	4.563	0.022	0.041	0.196	0.313	31.851	--	0.028	--	5.382	6.870	0.002	5.534	0.676
Mahul Winter																			
Minimum	0.004	0.294	0.008	0.093	7.558	0.010	0.022	0.004	0.037	0.113	11.274	--	--	--	1.319	4.573	--	2.499	0.298
Maximum	0.017	0.726	0.050	2.790	28.783	0.084	0.050	0.005	0.285	0.490	36.538	--	--	--	4.920	28.826	0.001	6.091	0.768
Mulund Summer																			
Minimum	--	0.034	--	0.013	2.520	0.001	--	*	0.009	0.018	2.363	--	*	--	0.126	0.528	0.001	0.596	0.034
Maximum	--	0.206	--	0.977	14.316	0.023	--	0.006	0.096	0.127	10.785	--	0.066	--	1.051	2.770	0.012	3.624	0.209
Mulund Post Monsoon																			
Minimum	--	0.212	*	0.079	8.019	0.005	0.016	--	0.040	0.070	8.055	--	0.004	--	1.007	1.584	--	2.167	0.236
Maximum	--	0.786	0.009	0.789	26.848	0.045	0.022	--	0.270	0.295	29.462	--	0.023	--	4.058	7.764	0.001	7.322	0.785
Mulund Winter																			
Minimum	--	0.151	0.014	0.112	7.584	0.013	0.016	0.005	0.008	0.096	9.908	*	*	--	0.907	3.211	--	2.670	0.150
Maximum	--	0.622	0.027	0.238	23.593	0.079	0.058	0.011	0.286	0.292	23.656	0.018	0.013	--	4.514	11.037	0.007	10.064	0.640

-- Not detected, * Only one reading

Table C (Contd..) : Concentrations Range of Elements for Seven Sites All Seasons

	Mo	Na	Ni	P	Pb	Pd	Sb	Sc	Se	Si	Sm	Sn	Sr	Th	Ti	V	W	Y	Zn	Zr
Colaba Summer																				
Minimum	0.007	1.689	*	0.041	0.032	--	*	--	0.016	0.026	--	0.599	0.012	0.022	0.044	--	--	--	0.004	--
Maximum	0.017	5.990	0.145	0.201	1.514	--	0.017	--	0.079	2.272	--	6.581	0.038	0.033	0.141	--	--	--	0.383	--
Colaba Post Monsoon																				
Minimum	--	1.304	0.021	0.077	0.401	--	--	--	--	0.153	--	--	0.013	--	0.088	--	--	--	0.103	--
Maximum	0.046	6.313	0.118	0.382	3.018	--	0.059	0.002	0.077	4.009	--	--	0.136	--	0.676	0.155	0.089	0.003	2.998	0.017
Colaba Winter																				
Minimum	0.004	2.540	0.017	0.080	0.061	0.015	0.017	0.001	0.022	0.121	--	0.011	0.029	--	0.124	0.032	0.015	0.001	0.607	0.003
Maximum	0.031	30.935	0.156	0.286	2.909	0.084	0.036	0.006	0.074	3.463	--	0.042	0.451	--	0.592	0.098	0.038	0.010	3.552	0.018
Dadar Summer																				
Minimum	0.009	0.690	--	0.027	0.038	*	*	0.0008	--	0.039	--	0.285	0.004	--	0.023	*	*	0.002	0.039	--
Maximum	0.024	5.400	--	0.184	0.326	0.061	0.019	0.0014	--	1.077	--	3.705	0.063	--	0.229	0.060	0.124	0.003	3.557	--
Dadar Post Monsoon																				
Minimum	0.009	0.959	0.046	0.138	0.755	0.017	0.017	0.001	0.023	0.358	--	--	0.032	--	0.235	0.057	0.033	0.002	0.882	0.003
Maximum	0.058	5.325	0.190	3.288	30.535	0.021	0.101	0.003	0.178	5.938	--	--	0.206	--	1.414	0.153	0.194	0.006	3.549	0.049
Dadar Winter																				
Minimum	0.004	3.127	0.032	0.076	0.481	0.015	0.022	0.001	*	0.607	*	0.015	0.044	--	0.281	0.038	--	0.002	0.934	0.003
Maximum	0.014	22.527	0.164	0.576	2.259	0.091	0.074	0.006	0.026	4.533	0.018	0.051	0.336	--	0.810	0.045	--	0.009	8.602	0.017
Dharavi Summer																				
Minimum	--	0.647	--	--	0.091	--	--	--	--	--	--	--	0.003	--	0.029	--	--	0.001	0.049	--
Maximum	0.012	5.112	0.133	0.359	1.464	0.042	0.120	0.002	0.030	--	0.026	1.627	0.105	0.048	0.391	0.023	0.049	0.003	1.276	0.005
Dharavi Post Monsoon																				
Minimum	0.009	1.911	0.037	0.163	0.623	0.016	0.021	0.001	0.014	0.148	--	--	0.070	--	0.221	0.036	*	0.002	1.340	0.002
Maximum	0.097	30.383	0.223	0.867	3.001	0.039	0.165	0.007	0.177	4.160	--	--	0.244	--	1.602	0.481	0.102	0.007	4.602	0.018
Dharavi Winter																				
Minimum	0.003	2.091	0.021	0.079	0.219	0.013	0.015	0.001	0.009	0.100	*	0.030	0.025	--	0.185	0.030	0.012	0.002	0.814	0.002
Maximum	0.072	16.210	0.151	0.503	3.210	0.066	0.115	0.006	0.033	8.092	0.007	0.083	0.197	--	1.473	0.103	0.086	0.007	7.753	0.019
Khar Summer																				
Minimum	0.006	0.928	0.034	0.056	0.076	0.021	0.018	0.001	0.027	0.018	--	0.351	0.005	0.007	0.014	0.009	0.032	0.001	0.015	0.002
Maximum	0.020	14.464	0.053	0.379	0.870	0.060	0.027	0.004	0.104	1.194	--	5.589	0.061	0.027	0.132	0.021	0.117	0.002	0.519	0.004
Khar Post Monsoon																				
Minimum	0.003	0.501	0.031	0.073	0.571	0.013	0.013	0.001	*	0.037	--	--	0.037	--	0.304	0.030	0.014	0.002	1.160	0.004
Maximum	0.027	2.793	0.128	0.163	2.486	0.061	0.077	0.003	0.032	2.703	--	--	0.121	--	0.912	0.036	0.094	0.007	3.910	0.020
Khar Winter																				
Minimum	0.003	2.591	0.021	0.069	0.617	0.021	0.026	0.001	0.011	0.090	*	0.019	0.046	--	0.266	0.031	--	0.001	0.937	0.003
Maximum	0.010	10.153	0.144	0.210	3.195	0.072	0.094	0.005	0.049	3.384	0.007	0.146	0.181	--	1.453	0.043	--	0.009	5.754	0.014

Table C (Contd..) : Concentrations Range of Elements for Seven Sites All Seasons

	Mo	Na	Ni	P	Pb	Pd	Sb	Sc	Se	Si	Sm	Sn	Sr	Th	Ti	V	W	Y	Zn	Zr
Andheri Summer																				
Minimum	0.047	0.168	0.403	0.028	0.037	--	--	--	0.051	0.027	--	0.036	0.001	--	0.005	0.011	--	--	0.011	0.002
Maximum	0.072	4.058	4.683	0.171	0.458	--	--	--	0.152	0.424	--	1.431	0.032	--	0.215	0.035	--	--	1.188	0.008
Andheri Post Monsoon																				
Minimum	0.010	0.144	0.039	0.071	0.467	0.016	0.026	0.001	0.017	0.026	--	--	0.037	--	0.380	0.062	0.034	0.002	2.588	0.004
Maximum	0.049	3.211	0.152	0.369	3.576	0.021	0.106	0.004	0.118	2.742	--	--	0.137	--	0.936	0.149	0.183	0.006	5.629	0.019
Andheri Winter																				
Minimum	0.007	2.889	0.024	0.065	0.455	0.014	0.015	0.001	0.009	0.120	--	0.017	0.050	--	0.264	0.029	--	0.002	0.875	0.003
Maximum	0.029	11.595	0.103	0.093	2.134	0.058	0.050	0.004	0.093	3.169	--	0.066	0.168	--	1.131	0.033	--	0.006	11.214	0.012
Mahul Summer																				
Minimum	--	1.126	--	0.072	0.006	--	--	--	--	--	--	--	0.002	--	0.054	--	--	--	0.012	--
Maximum	0.017	6.218	0.077	0.366	0.801	0.048	0.069	0.002	0.035	0.101	0.009	1.278	0.041	0.017	0.214	0.015	0.043	0.002	0.876	0.009
Mahul Post Monsoon																				
Minimum	--	1.014	0.044	0.181	0.631	--	--	--	--	0.256	--	--	0.036	--	0.416	--	0.016	--	1.171	0.002
Maximum	0.154	6.498	0.208	0.889	13.125	0.067	0.096	0.004	0.187	3.623	--	--	0.089	--	1.268	0.195	0.166	0.006	5.906	0.033
Mahul Winter																				
Minimum	0.003	2.468	0.044	0.175	0.924	0.016	0.020	0.001	*	0.294	--	0.011	0.053	--	0.421	0.038	0.017	0.002	1.491	0.003
Maximum	0.043	9.980	0.175	0.866	4.509	0.086	0.079	0.004	0.086	4.858	--	0.094	0.274	--	1.211	0.153	0.093	0.007	6.107	0.013
Mulund Summer																				
Minimum	0.043	1.686	*	0.041	0.104	--	--	*	0.112	0.054	--	0.054	0.010	--	0.058	0.012	0.157	0.001	0.048	0.003
Maximum	0.085	6.067	0.037	0.274	1.756	--	--	0.001	0.157	0.167	--	6.049	0.109	--	0.329	0.093	0.157	0.002	1.322	0.010
Mulund Post Monsoon																				
Minimum	0.008	1.054	0.026	--	0.301	0.019	0.019	0.001	*	0.099	--	0.016	0.033	--	0.309	0.039	0.020	0.001	1.148	0.003
Maximum	0.062	5.164	0.127	--	4.915	0.051	0.132	0.004	0.010	2.191	--	0.074	0.116	--	1.240	0.054	0.092	0.004	4.681	0.020
Mulund Winter																				
Minimum	*	2.165	0.037	0.071	0.228	0.027	0.014	0.001	--	0.245	--	0.019	0.045	--	0.305	0.043	--	0.002	1.018	0.003
Maximum	0.006	12.219	0.255	0.291	2.776	0.044	0.052	0.003	--	1.859	--	0.059	0.188	--	0.799	0.071	--	0.005	5.088	0.006

-- Not detected, * Only one reading

Annexure 3.2

Gridwise Vehicle Kilometer Travelled

	2 Wheelers				3 Wheelers				Car Diesel				Car Petrol				HDDV				Taxies			
	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV
A2	5369	2668	8370	4509	0	0	0	0	3548	1601	4122	2432	5322	2401	6183	2775	5911	3335	7787	2979	8370	7103	8587	1590
A3	809	402	1261	505	0	0	0	0	535	241	621	404	802	362	931	440	890	502	1173	427	1261	1070	1294	205
A14	533	265	831	891	0	0	0	0	352	159	409	147	528	238	614	221	587	331	773	351	831	705	853	245
A15	18028	8958	28106	19002	0	0	0	0	11914	5375	13840	7343	17871	8062	20760	8837	19848	11198	26146	10485	28106	23851	28834	6098
A25	564	597	703	638	0	0	0	0	284	338	453	237	425	507	679	356	139	123	74	74	826	891	900	613
A27	21603	17552	21410	20816	6870	3758	4757	4330	20074	17423	20409	17209	30111	26135	30613	25814	7537	9257	7795	7005	22622	18062	12176	13491
A28	8469	7781	7103	7428	1124	441	513	476	9418	9517	9775	7016	14126	14275	14662	10524	2027	4048	1786	1671	15740	15545	7953	8048
A37	1751	2530	3030	1637	0	0	0	0	1551	3076	3053	1364	2327	4614	4579	2046	1095	3479	3365	1483	3175	3687	5281	2213
A38	18708	17013	15647	17284	624	369	475	431	22530	21676	23057	17064	33796	32514	34585	25596	3110	9547	2597	2875	35075	34830	17888	18930
A39	22849	25687	34146	34014	3919	2318	2981	2705	26074	25755	32756	24823	39112	38633	49135	37234	5215	13773	6182	5390	16838	30099	30673	23065
A40	13089	11979	13015	12017	4378	2590	3330	3021	9422	9283	9909	7861	14132	13925	14864	11792	4711	4780	5596	4983	14417	14717	8435	7888
A50	8684	13979	15064	17175	1742	1030	1325	1202	3879	5041	5334	3987	5819	7561	8001	5980	3068	3116	3536	2810	8008	18931	15579	10240
A51	23853	37781	40686	39787	0	0	0	0	13925	16883	19214	12359	20887	25324	28820	18538	8291	9407	7220	5526	27433	52339	45688	33369
A52	16834	17708	19706	16942	0	0	0	0	19497	14165	14437	11313	29245	21247	21655	16969	9537	19468	13294	8900	14514	16674	15689	17186
A53	819	1043	1335	936	0	0	0	0	273	708	819	689	409	1063	1228	1033	224	575	283	263	858	1257	1160	1452
A62	3709	4898	4102	5006	0	0	0	0	7810	7135	7897	8809	11715	10703	11846	13213	1247	1416	939	1283	5897	10794	6524	5262
A63	17274	19435	21004	19541	0	0	0	0	14392	11683	13135	9060	21588	17524	19703	13589	4052	6763	4188	3152	19638	22303	22243	15976
A64	26687	33713	36412	26970	0	0	0	0	16672	15485	17453	9723	25008	23227	26180	14585	10625	11272	8229	5251	28487	35452	30076	24637
A65	1897	1472	1095	1025	0	0	0	0	1042	661	785	504	1563	992	1177	755	2698	2426	2175	1367	1207	961	579	612
A67	1418	1137	1160	1281	1785	746	1890	1408	793	370	1107	625	1189	555	1661	938	1299	1604	1507	956	151	146	112	190
A68	770	528	641	629	1140	476	1207	899	374	194	593	351	562	291	889	527	515	538	575	412	52	67	62	85
A74	2748	3336	4034	3161	0	0	0	0	2339	3052	4031	2949	3509	4577	6046	4424	793	1363	786	622	3459	3762	3795	3243
A75	31592	36858	45356	39115	0	0	0	0	42252	44842	60303	42112	63377	67263	90454	63168	7529	18242	7203	4832	37796	39862	47226	32281
A76	35086	46666	57066	41501	0	0	0	0	30048	37363	52482	31452	45072	56044	78723	47179	14115	15674	12438	8837	43526	51282	55737	41794
A77	12704	12692	16571	12603	0	0	0	0	6343	7149	13063	7465	9514	10723	19594	11198	9542	7799	8865	7899	10663	10720	14160	12253
A78	755	965	1452	925	0	0	0	0	545	605	1214	598	817	908	1821	896	443	363	357	306	919	942	1333	1072
A79	2372	2933	1809	2913	1035	432	1096	817	1976	697	1951	914	2963	1045	2927	1371	4371	6511	5318	2828	604	395	168	524
A80	8902	5426	7499	6768	14450	6036	15303	11401	3902	2195	6788	4146	5853	3292	10182	6219	4512	3719	4817	3963	366	671	732	854
A87	3057	4195	5686	5059	0	0	0	0	4832	6123	8798	6061	7248	9185	13197	9091	1003	1617	1107	756	4815	5209	6509	3888
A88	46646	59801	67835	52807	0	0	0	0	49626	57257	78551	51076	74438	85886	117827	76615	15851	22331	15572	10704	59173	63712	70986	49278
A89	21898	20748	22695	20199	11299	8689	12776	11055	15630	13116	15118	15066	23445	19674	22677	22599	14342	10487	13008	14019	10716	10063	10848	9333
A90	3844	4012	4234	2842	0	0	0	0	1003	817	1820	891	1504	1226	2730	1337	1839	1003	1504	279	446	149	297	0
A91	1343	2278	1435	2282	0	0	0	0	1534	557	1574	756	2301	836	2360	1135	1241	1827	1505	811	453	273	138	403
A92	3809	4868	7331	4668	6401	6234	5962	5845	2749	3055	6128	3016	4124	4582	9192	4525	4303	4877	4313	2898	4639	4754	6730	5412
A93	2858	3653	5500	3502	0	0	0	0	2063	2292	4598	2263	3094	3438	6897	3395	1676	1375	1354	1160	3481	3567	5049	4061
A94	715	914	1377	876	0	0	0	0	516	574	1151	566	774	860	1726	850	419	344	339	290	871	893	1264	1016
A99	4654	5218	6912	6926	0	0	0	0	7462	7723	10428	7597	11193	11585	15642	11396	1753	2210	1965	1752	7371	8903	11152	7543
A100	22478	27365	29579	24117	2593	1900	2985	2307	24878	25805	34592	23333	37317	38707	51888	34999	7691	9604	6832	4109	28925	29150	30405	20819
A101	11542	9300	14992	7999	10057	8232	14061	8815	6296	6535	8473	5218	9443	9802	12710	7826	4728	5362	7245	4140	4812	5421	5861	4057
A102	7998	6261	5400	5804	7174	5826	7983	5274	6569	4987	6840	6053	9854	7481	10260	9080	5076	4499	4961	4540	1135	414	896	784
A103	9942	9336	10672	10198	13762	9900	15119	9915	7933	6412	10194	8354	11900	9618	15290	12532	6547	5448	7079	5640	936	267	5887	1227
A104	7308	5450	6847	6244	5974	6124	6859	4117	4292	4397	5597	5357	6438	6596	8395	8036	3905	3184	4257	3350	540	136	5415	771
A105	5103	5636	7696	7418	7655	4234	7501	5380	3119	3421	4746	4753	4678	5131	7119	7130	4198	3838	4506	4215	486	433	441	708
A106	399	4151	5109	4151	12043	5109	10172	7025	4987	2342	4683	2828	7481	3512	7025	4242	4470	3148	4516	3467	456	182	91	502
A111	17018	18794	23093	15797	8845	9825	13585	9981	19545	16623	19211	9711	29317	24935	28817	14567	6873	7007	6848	3691	16735	27602	30951	17206
A112	28586	25040	30421	34842	54731	39408	49663	44883	29713	31229	34004	37665	44570	46844	51006	56497	11694	15671	12379	8577	18834	17922	18703	21923
A113	8623	4609	7598	5396	11868	8495	11222	8129	5725	4305	5618	4741	8587	6457	8426	7112	2331	2945	4310	1715	1855	1656	2215	1713
A114	19089	10436	22324	12985	20458	15008	25617	14292	5472	4188	7164	3983	8208	6281	10746	5975	4499	4063	7243	4194	974	597	1636	1192
A115	3831	12991	16979	16065	33708	15630	36185	27260	9656	5733	15882	10131	14485	8600	23822	15197	10667	8593	11574	9673	840	546	1710	1777

Annexure III 3.2 (Contd..)

Gridwise Vehicle Kilometer Travelled

	2 Wheelers				3 Wheelers				Car Diesel				Car Petrol				HDDV				Taxies			
	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV
A116	12838	12660	10670	10733	17761	11488	18185	11588	13006	9218	13669	11359	19509	13827	20504	17038	8841	7099	8747	7536	1756	580	1998	1466
A117	3036	3359	3925	3750	5020	3323	5492	4035	1350	2569	3192	3697	2025	3854	4788	5546	2976	2301	2744	2821	369	400	501	680
A118	3181	2661	3051	3083	2629	2402	3570	2726	303	2229	2359	3332	454	3343	3538	4998	2175	1753	1915	2240	292	389	519	617
A119	2060	1723	1975	1997	1702	1555	2312	1765	196	1443	1527	2158	294	2165	2291	3236	1408	1135	1240	1450	189	252	336	399
A123	10935	11644	12103	8450	8753	7849	9636	8980	11030	9661	9790	8906	16545	14491	14685	13360	4082	4316	3886	2491	6635	6913	6013	5581
A124	35554	37246	33454	33814	59789	49892	55982	43387	27994	21328	25835	24626	41991	31991	38752	36939	13267	14026	9853	7809	22715	24926	22164	18457
A125	11323	9980	10430	9712	20349	14131	18060	14991	15936	12243	15200	16754	23904	18364	22799	25131	4799	6063	5310	2933	12637	11128	10016	12172
A126	19180	14838	21246	16474	12356	8739	14145	9123	16214	12742	15078	10086	24321	19114	22616	15130	5325	5751	6027	3903	14963	21806	25053	14548
A127	26153	21371	28772	23761	9730	5883	11122	6275	24599	15635	17715	6963	36898	23453	26573	10444	8297	6957	8429	5432	25123	40004	46966	21470
A128	13953	8131	16998	9756	14574	11119	19545	11378	3893	2973	5415	2936	5840	4460	8123	4404	3785	2892	5503	3749	526	322	1184	706
A129	445	568	856	545	0	0	0	0	321	357	715	352	481	535	1073	528	261	214	211	180	541	555	785	632
A135	4034	3415	3647	3473	9499	9832	12158	10271	6487	6594	6703	6964	9730	9890	10055	10446	1275	1117	1109	563	692	711	849	944
A136	63285	40790	33427	52549	54957	61324	72904	69035	41720	26524	25745	26350	62581	39787	38618	39525	14677	13817	9917	6827	14033	16834	15554	16490
A137	18847	16524	16162	20650	37542	28776	32290	32761	24265	18056	21196	19894	36397	27084	31795	29842	7834	9380	8070	5385	9561	9525	8924	9817
A138	12164	8576	14408	10194	12222	9291	11598	9664	7373	7634	8813	7237	11059	11452	13220	10855	3181	5008	6578	4014	1299	3240	6045	4994
A139	15839	10590	15398	7255	20006	15609	17671	16017	5932	6158	4653	4160	8899	9237	6979	6240	4541	4681	5135	2070	645	504	2206	512
A140	14328	7952	17260	9621	14233	10537	19141	10251	3312	2496	4764	2152	4968	3744	7146	3228	3323	2666	5107	3131	451	200	1005	702
A141	4077	3589	5366	4321	1011	1045	1464	1080	3880	3578	4460	2602	5819	5366	6690	3903	2857	2509	3066	3101	0	209	70	139
A147	13730	10144	10203	9244	20393	19697	24117	22791	17050	13775	12974	14080	25576	20663	19461	21119	3696	2744	2557	1109	1987	1718	2162	2293
A148	17704	13824	11833	14261	38910	35104	43234	40349	30843	23103	23303	27259	46264	34654	34954	40888	5993	4779	3755	1798	7253	5188	5379	6189
A149	27044	19108	26880	25208	40988	31961	43432	37469	21887	22001	21959	25499	32831	33001	32938	38249	8772	11050	10490	6455	8040	8564	8764	10272
A150	9830	6325	11093	7430	9251	7284	11986	7377	5237	4502	5222	4100	7856	6754	7833	6151	2176	2738	3695	2442	915	1637	2206	2305
A151	11624	10247	10926	6623	10206	11338	13652	7823	2225	2122	2646	2169	3338	3183	3968	3253	2473	2242	2475	1912	1134	1410	1700	1129
A152	13000	9894	13252	7625	12138	11941	16274	8984	2588	2273	3272	2149	3882	3410	4908	3223	2764	2386	3271	2181	894	984	1395	964
A153	20048	12994	22729	12920	20372	17369	27318	15561	4950	3958	6623	3824	7424	5938	9935	5736	4939	3900	6694	4452	920	762	1714	1109
A157	1132	990	925	882	2786	2645	3222	3058	2242	1959	1800	2162	3363	2939	2699	3243	359	305	218	87	239	207	272	261
A158	2251	1970	1840	1753	5541	5259	6407	6082	4459	3896	3578	4300	6688	5844	5368	6450	714	606	433	173	476	411	541	519
A159	13189	10911	11725	8141	23830	21989	26932	25039	19473	17155	16118	17698	29210	25733	24177	26547	3999	2979	3011	1233	2066	1658	2182	2119
A160	14394	11590	8745	11077	44863	32722	43615	34381	30758	18315	23988	29885	46136	27472	35982	44828	7935	5657	5515	3010	18943	11095	9110	12392
A161	18648	16657	17494	20221	24677	21846	26078	23340	14365	16811	16147	21108	21548	25216	24220	31662	6213	9713	8137	6005	7704	9875	10090	11639
A162	15732	15903	11969	9921	26951	29102	32252	27999	17935	16045	14458	17818	26902	24067	21687	26727	4230	3726	2320	1558	2837	3001	3434	2845
A163	4604	4232	3732	3455	9439	9321	11025	10197	7549	6652	6063	7251	11323	9978	9094	10877	1351	1329	962	538	939	1039	1259	1229
A164	6462	5841	5513	4198	10579	10788	12787	10640	6685	5915	5561	6494	10027	8873	8341	9742	1694	1470	1225	746	987	992	1220	1027
A165	10028	7200	10938	7773	13471	11819	16583	12902	9589	8341	8976	8332	14383	12512	13464	12498	3425	2920	3684	2623	849	756	1136	1074
A166	1363	1200	1794	1444	338	349	489	361	1297	1196	1491	870	1945	1794	2236	1304	955	839	1025	1037	0	70	23	47
A169	2728	2387	2230	2125	6715	6374	7764	7371	5404	4722	4337	5211	8105	7082	6505	7817	866	734	525	210	577	498	656	630
A170	401	351	328	312	987	937	1141	1083	794	694	637	766	1191	1041	956	1149	127	108	77	31	85	73	96	93
A171	6973	5033	7303	1815	2517	1320	1857	866	2530	2448	2861	605	3796	3672	4291	908	1898	908	2145	908	248	0	0	41
A172	14474	10577	7431	11437	42455	30840	41179	34038	31299	18210	23518	28961	46948	27316	35276	43441	7741	5341	5126	2633	18274	10670	8730	12158
A173	13394	10336	11521	16575	28633	20261	27525	25293	18032	17109	17756	23878	27049	25664	26633	35818	6290	8420	6729	4499	11214	9945	8578	11546
A174	6395	5596	5227	4981	15742	14943	18202	17280	12668	11069	10167	12217	19001	16603	15250	18325	2029	1722	1230	492	1353	1168	1537	1476
A175	965	697	1011	251	348	183	257	120	350	339	396	84	526	508	594	126	263	126	297	126	34	0	0	6
A176	2987	2156	3128	778	1078	566	795	371	1084	1049	1225	259	1626	1573	1838	389	813	389	919	389	106	0	0	18
A177	11009	8204	10766	7689	19501	17457	23115	19477	13279	11526	11304	12259	19919	17290	16956	18388	3049	2473	2782	1367	1452	1157	1720	1613
A178	9510	7840	11366	6303	6169	4370	6391	4080	5487	5094	6123	3051	8231	7641	9184	4577	4135	3038	4231	3523	431	329	256	317
ff	4476	3231	4688	1165	1616	848	1192	556	1625	1572	1836	388	2437	2357	2755	583	1218	583	1377	583	159	0	0	26

Annexure 3.2 (Contd..)
Gridwise Vehicle Kilometer Travelled

	2 Wheelers				3 Wheelers				Car Diesel				Car Petrol				HDDV				Taxies			
	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV	Shi_I	Shi_II	Shi_III	Shi_IV
A181	1604	1404	1311	1249	3948	3748	4565	4334	3177	2776	2550	3064	4766	4164	3825	4596	509	432	308	123	339	293	386	370
A182	1485	1299	1214	1157	3655	3470	4227	4012	2941	2570	2361	2837	4412	3855	3541	4255	471	400	286	114	314	271	357	343
A183	195	128	154	60	0	0	0	0	235	235	161	29	352	352	242	44	114	114	70	34	514	232	332	84
A184	13977	11466	6669	11005	43294	30622	41134	33769	33811	21325	25890	31741	50716	31987	38836	47612	7917	5789	5271	3017	26982	18681	10732	15226
A185	20139	16469	17873	21674	41512	34982	44545	42718	29168	28925	26938	34586	43752	43388	40407	51879	7527	9747	7395	4644	8717	9091	8751	10809
A186	6216	5439	5080	4841	15300	14523	17691	16794	12312	10758	9881	11874	18468	16137	14822	17810	1972	1673	1195	478	1315	1136	1494	1434
A188	4091	2953	4285	1065	1477	775	1089	508	1485	1436	1678	355	2227	2155	2518	533	1114	533	1259	533	145	0	0	24
A189	13228	8914	14310	5834	31368	26053	35882	27763	5426	4818	5865	3065	8138	7227	8798	4598	3151	1863	3862	1762	3023	2273	3214	3043
A190	19519	16459	18096	15888	21024	18754	24309	20969	27401	23381	22158	25692	41102	35071	33237	38539	5767	4675	3834	2286	825	693	912	872
A191	3696	2864	3848	3634	1436	1635	2117	1890	2229	1691	2012	1288	3344	2536	3018	1932	2023	1745	2043	2025	128	269	197	289
A194	8055	5428	8525	5771	7202	5528	9776	4495	1781	1368	2127	1730	2671	2052	3190	2596	1458	1014	2313	1399	356	110	402	254
A195	6115	4108	4630	5299	4016	3808	4722	4645	3697	2359	2738	2528	5545	3538	4107	3792	2022	1444	2070	1685	809	537	657	844
A196	20488	20587	22848	15797	21290	22646	27683	22281	11839	9796	12159	13752	17982	14695	18238	20628	5784	9204	9149	3521	9442	6630	11931	10362
A197	19193	18687	22670	21808	13384	13119	20789	15668	13802	10956	15893	14299	20703	16434	23839	21449	8171	10211	8135	8884	13113	8935	10371	10163
A198	3012	1892	1592	2581	3649	3582	4238	3862	1816	892	957	855	2724	1338	1436	1282	697	589	409	314	383	375	412	480
A200	852	634	945	317	230	249	323	180	214	191	273	85	321	287	410	127	323	211	305	118	12	0	0	0
A201	3187	1895	2760	2163	2974	2642	4431	2344	813	365	540	418	1220	547	811	626	314	219	466	148	105	101	209	169
A202	8210	4675	7873	5599	6786	6029	10054	6364	2775	1569	2039	1369	4163	2354	3059	2053	1701	1626	2317	1436	569	429	800	724
A203	535	471	704	567	133	137	192	142	306	282	351	205	458	423	527	307	375	329	402	407	16	27	9	18
A205	3170	2615	3619	2958	1875	1109	1426	1294	1655	1532	1972	1796	2483	2298	2958	2694	1532	1083	1928	1638	475	158	238	291
A206	675	557	770	630	399	236	304	275	352	326	420	382	528	489	630	573	326	230	410	349	101	34	51	62
A207	9226	6375	5090	7171	5921	6677	8261	8173	6098	3446	3425	2876	9146	5169	5137	4315	2295	1690	1077	1080	4610	6700	5482	3738
A208	14998	12890	9380	10815	20450	21115	24159	19298	12848	8968	10437	11699	19272	13452	15656	17548	4752	3697	3301	2517	6176	4798	4256	4869
A209	18166	14673	17170	20729	13701	11123	14782	16130	8700	13398	11171	13746	13050	20097	16756	20618	6087	8963	6939	5886	8926	15358	12907	11076
A210	3780	3484	2952	2768	1079	1319	1613	1635	1768	1482	1365	712	2652	2223	2048	1068	1154	864	513	779	3657	6005	4713	2564
A217	3877	4580	4007	2654	0	0	0	0	1266	1769	1596	520	1900	2654	2394	781	1483	1119	651	1197	5933	9914	7676	3903
A219	7245	4783	4356	5850	4306	4825	5928	5952	4450	2544	2588	2172	6674	3816	3882	3259	1913	1398	1326	1134	2255	3034	2570	1951
A220	15157	13245	9678	10621	12733	15122	16337	13182	9613	7180	7064	6801	14419	10770	10597	10202	4228	3691	2526	2205	6710	8801	7275	5446
A221	23785	18781	17865	23298	21705	22505	26172	24774	12693	14316	12067	15725	19098	21475	18101	23588	6340	9255	6549	5033	5765	9053	8697	9768
A222	1129	597	450	908	810	989	1210	1227	769	333	322	305	1153	499	482	458	213	155	98	57	131	139	155	204
A229	5926	4135	4032	4957	10855	8888	10078	8537	3851	2575	3103	2791	5776	3863	4654	4186	1765	1966	1915	1094	1222	1112	1275	1093
A230	3533	1869	1408	2842	2535	3098	3789	3840	2407	1041	1007	956	3610	1562	1511	1434	666	486	307	179	410	435	486	640
A231	1648	877	973	1035	2601	1927	2083	1908	1637	1185	1404	1354	2455	1778	2106	2031	497	716	926	304	556	520	630	504
A232	7841	7017	6326	5975	3363	3335	4171	4033	4246	3397	3436	2380	6370	5096	5154	3570	2614	1929	1571	1885	6765	10524	8309	4733
A233	27190	23337	23613	27234	25591	26120	30630	27681	14442	17862	16835	19478	21914	26793	25253	29217	8319	10581	8706	7101	9189	14111	13520	12428
A234	594	314	237	478	426	521	637	646	405	175	169	161	607	263	254	241	112	82	52	30	69	73	82	108
A241	851	666	416	722	3332	2322	3136	2553	2418	1418	1863	2350	3626	2128	2794	3525	574	398	379	194	1499	860	694	971
A244	726	537	344	610	2454	1756	2358	1946	1800	1043	1357	1702	2700	1565	2036	2553	430	299	280	144	1079	626	510	712
A245	12790	9849	8195	10252	12352	12563	15084	13422	9521	6649	7137	7374	14281	9973	10706	11061	3818	3160	2638	2231	6045	7276	6091	5049
A246	7840	5997	7504	10178	7936	6594	8525	9154	3646	6869	5388	7816	5470	10304	8082	11724	2472	4723	3447	2589	1977	3836	3562	4545

Annexure 3.3

Gridwise Emission Load from Industries

	TSP	PM10	SO2	NOx	CO	HC
A2	1.27	0.85	148.07	61.92	5.22	0.99
A3	0.91	0.60	105.77	44.23	3.73	0.71
A14	0.91	0.60	105.77	44.23	3.73	0.71
A15	3.27	2.18	380.76	159.23	13.41	2.56
A16	0.91	0.60	105.77	44.23	3.73	0.71
A27	4.91	3.26	571.13	238.84	20.12	3.83
A28	5.09	3.38	592.29	247.69	20.87	3.97
A40	0.91	0.60	105.77	44.23	3.73	0.71
A51	0.67	0.57	95.49	9.30	0.78	0.15
A52	0.73	0.62	103.99	10.13	0.85	0.16
A62	0.01	0.01	1.84	0.18	0.02	0.00
A63	0.26	0.22	36.66	3.57	0.30	0.06
A64	1.03	0.87	150.26	21.54	1.96	0.37
A65	0.70	0.59	102.70	15.58	1.43	0.27
A66	0.30	0.25	44.02	6.68	0.61	0.12
A67	85.83	80.73	1307.15	1001.40	109.75	37.45
A68	171.67	161.45	2614.30	2002.81	219.50	74.90
A75	0.24	0.20	34.35	3.35	0.28	0.05
A76	0.82	0.69	119.94	17.26	1.57	0.30
A77	0.63	0.53	92.92	14.10	1.29	0.25
A78	0.13	0.11	19.56	2.97	0.27	0.05
A79	600.84	565.08	9150.05	7009.82	768.26	262.16
A80	85.83	80.73	1307.15	1001.40	109.75	37.45
A87	0.09	0.08	13.53	1.32	0.11	0.02
A88	0.86	0.73	123.20	12.00	1.01	0.19
A89	0.09	0.07	12.32	1.20	0.10	0.02
A91	858.35	807.25	13071.50	10014.03	1097.51	374.51
A92	686.68	645.80	10457.20	8011.23	878.01	299.61
A93	171.67	161.45	2614.30	2002.81	219.50	74.90
A100	0.65	0.55	92.40	9.00	0.76	0.14
A101	0.33	0.28	46.97	5.69	0.51	0.10
A102	0.01	0.01	1.15	1.79	0.20	0.04
A104	1201.69	1130.15	18300.10	14019.65	1536.52	524.31
A105	686.68	645.80	10457.20	8011.23	878.01	299.61
A112	0.03	0.03	1.95	3.39	0.32	0.06
A113	0.10	0.09	6.26	10.74	1.04	0.19
A114	0.01	0.01	1.15	1.79	0.20	0.04
A116	1287.52	1210.88	19607.25	15021.05	1646.27	561.76
A117	858.35	807.25	13071.50	10014.03	1097.51	374.51
A124	0.02	0.02	1.42	2.46	0.24	0.04
A125	0.24	0.22	15.00	25.80	2.50	0.45
A126	0.46	0.39	77.77	16.29	1.87	0.35
A127	0.48	0.41	83.65	14.97	1.74	0.32
A128	1201.86	1130.30	18330.52	14025.09	1537.15	524.43
A129	686.77	645.88	10472.41	8013.95	878.33	299.67
A136	0.77	0.65	112.39	12.08	1.08	0.20
A137	1.73	1.47	253.47	28.06	2.53	0.48
A138	0.57	0.48	95.09	22.30	2.55	0.47
A139	0.66	0.55	114.07	20.41	2.37	0.44
A140	0.52	0.44	91.25	16.33	1.89	0.35
A141	0.09	0.07	15.21	2.72	0.32	0.06
A149	2.17	1.84	321.09	31.18	2.76	0.53
A150	0.03	0.03	2.69	4.18	0.46	0.08
A151	0.54	0.46	92.79	18.72	2.16	0.40
A152	0.79	0.66	136.88	24.50	2.84	0.53

	TSP	PM10	SO2	NOx	CO	HC
A153	0.09	0.07	15.21	2.72	0.32	0.06
A161	2.08	1.76	307.13	29.82	2.64	0.50
A162	0.03	0.02	2.30	3.58	0.39	0.07
A163	1.09	0.92	157.53	17.03	1.52	0.29
A164	4.02	3.42	586.44	57.13	4.97	0.95
A165	2.68	2.28	390.96	38.09	3.31	0.63
A169	0.08	0.06	10.78	1.05	0.09	0.02
A170	0.06	0.05	8.62	0.84	0.07	0.01
A172	0.94	0.80	138.58	13.46	1.19	0.23
A173	1.98	1.68	292.14	28.37	2.51	0.48
A174	0.38	0.28	189.62	19.27	3.70	0.69
A175	2.93	2.45	534.43	52.03	6.13	1.16
A176	3.76	3.19	547.34	53.32	4.64	0.88
A177	2.15	1.82	312.77	30.47	2.65	0.50
A178	2.41	2.05	351.86	34.28	2.98	0.57
A183	0.05	0.04	6.47	0.63	0.05	0.01
A184	0.11	0.09	15.09	1.47	0.12	0.02
A185	0.06	0.05	8.62	0.84	0.07	0.01
A186	0.81	0.58	441.19	42.88	8.55	1.60
A187	0.68	0.48	394.55	38.35	7.75	1.45
A188	3.71	3.08	756.09	73.59	9.61	1.81
A189	2.95	2.51	430.05	41.90	3.64	0.69
A190	1.38	1.13	335.72	32.67	4.85	0.91
A195	0.04	0.03	5.39	0.52	0.04	0.01
A196	0.05	0.04	6.47	0.63	0.05	0.01
A198	0.49	0.35	286.94	27.89	5.64	1.05
A199	0.55	0.39	322.81	31.37	6.34	1.19
A200	1.30	1.03	404.23	39.31	6.63	1.24
A201	0.43	0.30	251.08	24.40	4.93	0.92
A206	0.00	12.00	0.59	0.48	0.06	0.01
A207	0.05	144.04	7.13	5.80	0.69	0.13
A208	0.01	36.01	1.78	1.45	0.17	0.03
A209	0.06	168.05	8.32	6.76	0.81	0.15
A210	0.05	132.04	6.53	5.32	0.63	0.12
A211	0.80	0.56	466.28	45.32	9.16	1.71
A212	0.49	0.35	286.94	27.89	5.64	1.05
A217	0.01	36.01	1.78	1.45	0.17	0.03
A218	0.03	72.02	3.56	2.90	0.35	0.06
A219	0.05	132.04	6.53	5.32	0.63	0.12
A220	0.25	208.71	35.59	8.99	0.98	0.18
A221	0.26	244.72	37.38	10.44	1.16	0.22
A222	0.39	129.33	56.93	6.38	0.59	0.11
A223	0.70	158.07	155.36	15.10	2.12	0.40
A229	0.39	141.33	57.53	6.87	0.64	0.12
A230	0.39	129.33	56.93	6.38	0.59	0.11
A231	0.39	141.33	57.53	6.87	0.64	0.12
A232	1.14	315.97	167.24	16.26	1.42	0.27
A233	1.34	368.63	195.11	18.96	1.65	0.31
A234	0.95	263.31	139.37	13.55	1.18	0.22
A235	0.57	157.99	83.62	8.13	0.71	0.13
A241	0.48	131.65	69.68	6.77	0.59	0.11
A242	0.48	131.65	69.68	6.77	0.59	0.11
A243	0.19	52.66	27.87	2.71	0.24	0.04
A244	0.95	263.31	139.37	13.55	1.18	0.22
A245	0.57	157.99	83.62	8.13	0.71	0.13
A246	0.38	105.32	55.75	5.42	0.47	0.09

Annexure 3.3

Gridwise Emission Load from Area Source

	PM	NOX	SO2	CO	HC
A2	93.92	57.06	10.54	541.90	425.31
A3	67.09	40.76	7.53	387.07	303.79
A14	67.09	40.76	7.53	387.07	303.79
A15	241.52	146.72	27.09	1393.45	1093.64
A16	67.09	40.76	7.53	387.07	303.79
A25	12.71	26.57	2.31	60.29	35.40
A27	449.79	306.57	107.98	17708.73	2015.92
A28	375.69	228.23	42.14	2167.59	1701.22
A38	196.98	411.76	35.88	934.44	548.73
A39	770.18	957.48	506.19	111405.66	3119.66
A40	604.62	377.93	76.43	7359.93	2825.29
A50	152.50	318.78	27.78	723.44	424.82
A51	396.20	475.68	312.15	61369.68	1117.86
A52	354.37	248.06	312.16	64875.84	1156.26
A62	15.00	36.33	12.09	2096.26	17.36
A63	237.89	520.16	199.21	35819.27	335.80
A64	229.43	356.02	203.59	41504.69	587.48
A65	133.17	249.33	109.55	21941.01	315.39
A66	56.64	106.85	46.91	9402.86	135.17
A67	18.61	37.68	15.73	2695.37	27.46
A68	10.05	23.39	13.30	2616.83	10.50
A75	231.14	560.94	183.50	31704.43	303.14
A76	218.61	413.31	182.74	34690.85	496.56
A77	176.66	266.05	160.32	30974.33	393.50
A78	119.70	112.25	118.92	21977.21	233.12
A79	48.76	107.86	55.62	10545.88	58.97
A80	5.03	11.70	6.65	1308.42	5.25
A87	60.14	149.22	46.54	7946.86	106.35
A88	364.78	879.59	275.16	46303.21	931.95
A89	162.50	174.98	159.30	28546.60	325.72
A90	94.53	64.76	98.07	17798.16	173.04
A91	131.74	272.85	120.97	21405.92	185.77
A92	108.10	223.48	98.59	17402.13	153.06
A93	10.05	23.39	13.30	2616.83	10.50
A98	135.15	265.70	91.85	16974.45	235.11
A99	73.15	32.40	37.54	7920.94	138.01
A100	285.05	660.72	202.15	34516.44	727.41
A101	250.23	438.58	223.39	39097.43	539.84
A102	104.06	117.82	111.73	20155.78	164.54
A104	138.26	293.66	138.48	25252.63	184.57
A105	89.74	184.51	84.97	15321.69	119.75
A111	201.16	89.10	103.24	21782.58	379.53
A112	305.44	252.54	199.81	44185.27	612.42
A113	220.80	466.51	252.85	57994.80	499.44
A114	45.98	77.34	50.53	9032.93	56.38
A115	94.05	181.86	63.57	9708.70	155.46
A116	184.03	383.30	172.37	30721.92	256.45
A117	63.84	142.95	75.56	14471.13	74.73
A123	179.21	121.81	92.97	19007.83	337.92
A124	233.11	188.08	150.43	33214.87	464.22
A125	263.89	560.21	302.36	69730.75	603.73

	PM	NOX	SO2	CO	HC
A126	112.92	223.16	137.79	25780.17	147.90
A127	116.89	247.76	113.76	20390.29	180.70
A128	176.81	375.49	176.96	32225.98	243.21
A129	62.88	140.99	74.69	14300.75	76.89
A135	59.42	132.41	32.99	5439.58	111.61
A136	279.81	598.51	188.13	35953.27	599.06
A137	270.82	642.48	240.02	49182.56	651.44
A138	204.46	386.38	242.68	44785.17	263.94
A139	68.41	160.72	93.21	18348.41	94.99
A141	55.54	128.58	74.58	14679.73	75.99
A141	9.09	21.43	12.43	2446.46	12.66
A147	83.18	185.38	46.19	7615.41	156.25
A148	142.60	317.79	79.18	13055.00	267.86
A149	268.58	671.19	204.63	40188.13	676.71
A150	104.94	180.47	117.68	21074.51	131.56
A151	114.51	231.70	141.82	26721.31	151.17
A152	81.82	192.86	111.86	22018.10	113.98
A153	9.09	21.43	12.43	2446.46	12.66
A158	24.77	52.96	13.20	2175.83	44.65
A159	178.25	397.23	98.97	16318.74	334.82
A160	178.25	397.23	98.97	16318.74	334.82
A161	257.93	644.32	196.31	38535.42	649.23
A162	89.95	154.68	100.87	18063.86	112.77
A163	76.15	137.26	78.06	13061.92	85.87
A164	100.65	225.10	103.26	15117.02	114.09
A165	67.10	150.07	68.84	10078.01	76.06
A169	66.02	164.01	45.73	10007.52	90.41
A170	75.78	184.17	49.78	10181.85	116.97
A171	142.60	317.79	79.18	13055.00	267.86
A172	316.42	756.51	208.96	39938.39	623.67
A173	290.90	734.40	221.34	45063.19	658.11
A174	106.32	217.79	71.32	13604.01	127.49
A175	87.35	175.28	72.79	10143.04	90.41
A176	93.94	210.10	96.37	14109.22	106.48
A177	53.68	120.06	55.07	8062.41	60.85
A178	60.49	135.06	61.95	9070.21	68.45
A183	39.01	98.40	27.44	6004.51	54.24
A184	128.89	315.72	97.60	20748.28	209.13
A185	81.41	195.79	61.77	13060.33	134.25
A186	161.64	325.75	91.17	16940.35	216.01
A187	56.70	69.34	10.97	179.82	39.47
A188	121.03	230.51	90.51	12223.67	119.97
A189	73.81	165.08	75.72	11085.82	83.66
A190	52.16	91.54	32.47	4112.49	48.36
A194	18.93	43.05	16.79	3368.88	41.28
A195	70.37	168.11	56.44	11741.52	127.77
A196	152.58	356.73	128.17	26217.79	301.94
A197	94.64	215.27	83.95	16844.40	206.41
A199	45.57	56.73	8.89	146.31	32.29
A200	60.64	95.45	28.55	3153.46	51.52
A201	35.45	44.12	6.92	113.80	25.11

Annexure 3.3

Gridwise Emission Load from Area Source

	PM	NOX	SO2	CO	HC
A205	37.86	86.11	33.58	6737.76	82.56
A206	107.44	230.44	93.46	18709.47	215.45
A207	248.19	397.26	198.08	39225.28	314.90
A208	143.49	282.29	120.87	24125.06	254.17
A209	235.93	341.48	183.52	36217.67	250.41
A210	179.61	252.93	138.30	27254.57	182.04
A211	65.83	81.94	12.84	211.33	46.63
A212	40.51	50.43	7.90	130.05	28.70
A217	57.32	88.55	45.32	8964.10	68.40
A218	114.63	177.10	90.65	17928.20	136.81
A219	141.76	166.82	104.62	20515.81	99.45
A220	178.29	228.26	131.00	25578.73	128.34
A221	216.68	273.76	159.53	31173.95	155.46
A222	49.47	92.55	33.72	6395.69	39.71
A223	45.95	105.93	24.03	4030.83	39.62
A229	62.27	107.71	43.24	8260.77	48.75
A230	49.47	92.55	33.72	6395.69	39.71
A231	62.27	107.71	43.24	8260.77	48.75
A232	71.64	186.65	44.11	7996.64	64.90
A233	83.58	217.76	51.46	9329.41	75.71
A234	59.70	155.54	36.75	6663.87	54.08
A235	35.82	93.33	22.05	3998.32	32.45
A241	29.85	77.77	18.38	3331.93	27.04
A242	29.85	77.77	18.38	3331.93	27.04
A243	11.94	31.11	7.35	1332.77	10.82
A244	59.70	155.54	36.75	6663.87	54.08
A245	35.82	93.33	22.05	3998.32	32.45
A246	23.88	62.22	14.70	2665.55	21.63

Annexure 3.3

Gridwise Emission Load from Vehicles

	2 Wheelers				3 Wheelers				Car Diesel				Car Petrol				HDDV				Taxies				Total			
	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC
A2	0.73	5.65	34.51	12.76	0.00	0.00	0.00	0.00	2.11	7.14	7.72	2.93	0.10	2.00	50.21	3.17	24.82	186.11	120.07	7.40	0.05	0.26	15.39	9.23	27.81	201.16	227.91	35.49
A3	0.10	0.80	4.91	1.82	0.00	0.00	0.00	0.00	0.32	1.10	1.19	0.45	0.02	0.30	7.63	0.48	3.71	27.83	17.96	1.11	0.01	0.04	2.30	1.38	4.16	30.08	33.98	5.23
A14	0.09	0.68	4.16	1.54	0.00	0.00	0.00	0.00	0.19	0.65	0.70	0.27	0.01	0.19	4.82	0.30	2.53	18.99	12.25	0.76	0.01	0.03	1.58	0.95	2.83	20.54	23.51	3.81
A15	2.59	20.01	122.26	45.20	0.00	0.00	0.00	0.00	6.93	23.47	25.39	9.62	0.33	6.66	167.15	10.55	83.92	629.39	406.06	25.04	0.17	0.87	52.13	31.28	93.94	680.40	772.99	121.69
A25	0.09	0.68	4.13	1.53	0.00	0.00	0.00	0.00	0.24	0.80	0.87	0.33	0.01	0.24	5.92	0.37	0.51	3.80	2.45	0.15	0.01	0.03	1.94	1.16	0.85	5.55	15.31	3.54
A27	2.85	21.97	134.28	49.64	2.33	3.75	13.60	40.61	13.52	45.82	49.58	18.78	0.68	13.52	339.15	21.41	39.18	293.82	189.56	11.69	0.13	0.66	39.81	23.89	58.68	379.55	765.98	166.02
A28	1.08	8.31	50.79	18.78	0.30	0.49	1.76	5.26	6.43	21.79	23.58	8.93	0.32	6.43	161.30	10.18	11.82	88.64	57.19	3.53	0.09	0.47	28.37	17.02	20.04	126.13	322.99	63.70
A37	0.31	2.42	14.76	5.46	0.00	0.00	0.00	0.00	1.63	5.52	5.97	2.26	0.08	1.63	40.83	2.58	11.68	87.63	56.53	3.49	0.03	0.14	8.61	5.17	13.73	97.33	126.71	18.95
A38	2.40	18.54	113.27	41.88	0.22	0.36	1.31	3.91	15.18	51.44	55.66	21.08	0.76	15.18	380.74	24.03	22.48	168.59	108.77	6.71	0.21	1.07	64.03	38.42	41.26	255.18	723.79	136.03
A39	4.08	31.51	192.55	71.18	1.41	2.27	8.23	24.56	19.69	66.74	72.21	27.35	0.98	19.69	493.98	31.18	37.89	284.21	183.36	11.31	0.20	1.01	60.41	36.24	64.27	405.42	1010.73	201.83
A40	1.75	13.53	82.67	30.56	1.57	2.53	9.19	27.44	6.57	22.25	24.07	9.12	0.33	6.57	164.69	10.40	24.89	186.65	120.42	7.43	0.09	0.45	27.27	16.36	35.20	231.98	428.31	101.30
A50	1.92	14.82	90.59	33.49	0.63	1.01	3.66	10.92	3.28	11.13	12.04	4.56	0.16	3.28	82.36	5.20	15.54	116.53	75.18	4.64	0.11	0.53	31.66	18.99	21.64	147.30	295.48	77.79
A51	4.97	38.37	234.48	86.69	0.00	0.00	0.00	0.00	11.23	38.05	41.17	15.59	0.56	11.23	281.65	17.78	37.75	283.13	182.66	11.26	0.32	1.59	95.30	57.18	54.83	372.36	835.25	188.50
A52	2.49	19.22	117.47	43.43	0.00	0.00	0.00	0.00	10.69	36.24	39.21	14.85	0.53	10.69	268.24	16.93	63.49	476.14	307.19	18.94	0.13	0.64	38.44	23.06	77.33	542.94	770.54	117.22
A53	0.14	1.12	6.82	2.52	0.00	0.00	0.00	0.00	0.45	1.52	1.64	0.62	0.02	0.45	11.24	0.71	1.67	12.51	8.07	0.50	0.01	0.05	2.84	1.70	2.29	15.64	30.61	6.05
A62	0.62	4.78	29.23	10.81	0.00	0.00	0.00	0.00	5.70	19.31	20.89	7.91	0.28	5.70	142.91	9.02	6.06	45.42	29.30	1.81	0.06	0.28	17.09	10.25	12.72	75.49	239.42	39.80
A63	2.70	20.86	127.47	47.13	0.00	0.00	0.00	0.00	8.69	29.44	31.86	12.07	0.43	8.69	217.94	13.76	22.51	168.84	108.93	6.72	0.16	0.80	48.10	28.86	34.50	228.64	534.29	108.52
A64	4.33	33.42	204.24	75.51	0.00	0.00	0.00	0.00	10.68	36.19	39.16	14.83	0.53	10.68	267.89	16.91	43.87	328.99	212.25	13.09	0.24	1.19	71.19	42.71	59.65	410.48	794.74	163.05
A65	0.19	1.48	9.06	3.35	0.00	0.00	0.00	0.00	0.54	1.82	1.97	0.75	0.03	0.54	13.51	0.85	10.75	80.59	51.99	3.21	0.01	0.03	2.02	1.21	11.51	84.47	78.55	9.36
A67	0.17	1.35	8.24	3.05	0.69	1.11	4.02	12.01	0.52	1.77	1.91	0.72	0.03	0.52	13.07	0.83	6.65	49.91	32.20	1.99	0.00	0.01	0.36	0.22	8.07	54.66	59.81	18.81
A68	0.09	0.69	4.24	1.57	0.44	0.71	2.57	7.67	0.27	0.92	1.00	0.38	0.01	0.27	6.83	0.43	2.53	18.98	12.24	0.76	0.00	0.00	0.16	0.10	3.35	21.58	27.04	10.89
A74	0.46	3.59	21.91	8.10	0.00	0.00	0.00	0.00	2.23	7.55	8.16	3.09	0.11	2.23	55.86	3.53	4.42	33.14	21.38	1.32	0.03	0.14	8.56	5.13	7.25	46.64	115.87	21.17
A75	5.35	41.29	252.32	93.28	0.00	0.00	0.00	0.00	34.11	115.60	125.08	47.38	1.71	34.11	855.63	54.01	46.88	351.61	226.84	13.99	0.31	1.57	94.30	56.58	88.36	544.18	1554.17	265.24
A76	6.31	48.69	297.53	109.99	0.00	0.00	0.00	0.00	27.24	92.32	99.89	37.84	1.36	27.24	683.33	43.13	63.32	474.90	306.39	18.89	0.38	1.92	115.40	69.24	98.62	645.07	1502.53	279.10
A77	1.91	14.73	90.04	33.29	0.00	0.00	0.00	0.00	6.12	20.75	22.45	8.50	0.31	6.12	153.60	9.70	42.29	317.18	204.63	12.62	0.10	0.48	28.68	17.21	50.73	359.27	499.40	81.31
A78	0.14	1.11	6.76	2.50	0.00	0.00	0.00	0.00	0.53	1.81	1.95	0.74	0.03	0.53	13.37	0.84	1.82	13.67	8.82	0.54	0.01	0.04	2.56	1.54	2.53	17.15	33.46	6.16
A79	0.35	2.71	16.55	6.12	0.40	0.64	2.33	6.96	1.00	3.38	3.65	1.38	0.05	1.00	25.00	1.58	23.59	176.95	114.16	7.04	0.00	0.02	1.01	0.61	25.39	184.70	162.71	23.69
A80	1.00	7.72	47.18	17.44	5.57	8.97	32.56	97.21	3.07	10.39	11.24	4.26	0.15	3.07	76.89	4.85	21.09	158.20	102.06	6.29	0.01	0.03	1.57	0.94	30.89	188.37	271.52	131.01
A87	0.63	4.86	29.69	10.98	0.00	0.00	0.00	0.00	4.65	15.75	17.04	6.45	0.23	4.65	116.55	7.36	5.56	41.70	26.90	1.66	0.04	0.20	12.25	7.35	11.11	67.16	202.44	33.80
A88	7.95	61.31	374.70	138.52	0.00	0.00	0.00	0.00	42.57	144.27	156.10	59.13	2.13	42.57	1067.84	67.41	79.93	599.46	386.75	23.85	0.49	2.43	145.89	87.53	133.06	850.05	2131.28	376.44
A89	2.99	23.10	141.14	52.18	5.17	8.33	30.24	90.27	10.61	35.95	38.89	14.73	0.53	10.61	266.07	16.79	64.30	482.26	311.14	19.19	0.08	0.41	24.58	14.75	83.69	560.65	812.05	207.91
A90	0.52	4.03	24.64	9.11	0.00	0.00	0.00	0.00	0.82	2.76	2.99	1.13	0.04	0.82	20.46	1.29	5.73	43.01	27.75	1.71	0.00	0.01	0.53	0.32	7.12	50.63	76.37	13.56
A91	0.26	1.98	12.11	4.48	0.00	0.00	0.00	0.00	0.80	2.70	2.92	1.11	0.04	0.80	19.96	1.26	6.68	50.08	32.31	1.99	0.00	0.01	0.76	0.46	7.77	55.56	68.05	9.29
A92	0.72	5.58	34.11	12.61	2.88	4.64	16.87	50.35	2.69	9.12	9.87	3.74	0.13	2.69	67.49	4.26	20.32	152.44	98.35	6.06	0.04	0.22	12.92	7.75	26.80	174.69	239.61	84.78
A93	0.54	4.19	25.60	9.46	0.00	0.00	0.00	0.00	2.02	6.84	7.40	2.80	0.10	2.02	50.64	3.20	6.90	51.75	33.39	2.06	0.03	0.16	9.69	5.82	9.60	64.96	126.72	23.34
A94	0.14	1.05	6.41	2.37	0.00	0.00	0.00	0.00	0.51	1.71	1.85	0.70	0.03	0.51	12.67	0.80	1.73	12.95	8.36	0.52	0.01	0.04	2.43	1.46	2.40	16.26	31.71	5.84
A99	0.83	6.40	39.12	14.46	0.00	0.00	0.00	0.00	5.98	20.26	21.92	8.30	0.30	5.98	149.94	9.46	9.52	71.42	46.08	2.84	0.07	0.35	20.98	12.59	16.70	104.41	278.04	47.66
A100	3.62	27.96	170.84	63.16	1.15	1.86	6.75	20.15	19.55	66.25	71.68	27.15	0.98	19.55	490.36	30.95	35.01	262.59	169.41	10.45	0.22	1.09	65.58	39.35	60.54	379.30	974.62	191.21
A101	1.53	11.83	72.32	26.74	4.86	7.82	28.40	84.80	4.77	16.18	17.50	6.63	0.24	4.77	119.74	7.56	26.63	199.71	128.84	7.95	0.04	0.20	12.09	7.25	38.07	240.52	378.91	140.93
A102	0.89	6.88	42.01	15.53	3.10	4.99	18.12	54.09	4.40	14.91	16.14	6.11	0.22	4.40	110.39	6.97	23.65	177.40	114.45	7.06	0.01	0.03	1.94	1.16	32.27	208.61	303.05	90.92
A103	1.41	10.84	66.24	24.49	5.75	9.25	33.60	100.31	5.92	20.06	21.71	8.22	0.30	5.92	148.51	9.37	30.64	229.83	148.28	9.14	0.02	0.08	4.99	2.99	44.03	275.99	423.34	154.54
A104	0.90	6.98	42.65	15.77	2.72	4.38	15.92	47.53	3.54	11.98	12.96	4.91	0.18	3.54	88.69	5.60	18.22	136.67	88.18	5.44	0.01	0.07	4.12	2.47	25.58	163.62	252.52	81.72
A105	0.90	6.98	42.66	15.77	2.92	4.71	17.09	51.02	2.89	9.78	10.59	4.01	0.14	2.89	72.41	4.57	20.78	155.84	100.54	6.20	0.00	0.02	1.24	0.74	27.64	180.22	244.53	82.32
A106	0.48	3.73	22.79	8.42	4.05	6.53	23.70	70.76	2.67	9.05	9.79	3.71	0.13	2.67	67.00	4.23	19.34	145.09	93.60	5.77	0.00	0.01	0.74	0.44	26.69	167.08	217.63	93.34
A111	2.61	20.17	123.26	45.57	4.98	8.03	29.14	87.01	11.72	39.71	42.96	16.27	0.59	11.72	293.88	18.55	30.28	227.08	146.50	9.03	0.18	0.92	55.50	33.30	50.36	307.62	691.25	209.73
A112	4.16	32.10	196.17	72.52	22.26	35.85	130.19	388.69	23.87	80.89	87.52	33.15	1.19	23.87	598.74	37.79	59.92	449.38	289.92	17.88	0.15	0.77	46.43	27.86	111.56	622.86	1348.97	577.90
A113	0.92	7.08	43.27	16.00	4.69	7.55	27.40	81.81	3.67	12.44	13.46	5.10	0.18	3.67	92.05	5.81	14.01	105.10	67.81	4.18	0.01	0.07	4.46	2.68	23.49	135.91	248.46	115.58
A114	2.27	17.51	106.98	39.55	8.89	14.32	52.01	155.27	3.75	12.69	13.73	5.20	0.19	3.75	93.94	5.93	24.80	185.99	119.99	7.40	0.01	0.04	2.64	1.58	39.90	234.30	389.29	214.94
A115	1.75	13.46	82.28	30.42	13.31	21.43	77.82	232.33	7.45	25.26	27.33	10.35	0.37	7.45	186.93	11.80	50.23	376.72	243.04	14.99	0.01	0.05	2.92	1.75	73.12	444.37	620.32	301.64

Annexure 3.3

Gridwise Emission Load from Vehicles

	2 Wheelers				3 Wheelers				Car Diesel				Car Petrol				HDDV				Taxies				Total			
	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC
A116	1.64	12.66	77.39	28.61	6.96	11.21	40.73	121.58	8.51	28.82	31.19	11.81	0.43	8.51	213.34	13.47	39.96	299.68	193.34	11.92	0.01	0.06	3.48	2.09	57.51	360.94	559.46	189.48
A117	0.49	3.80	23.22	8.58	2.11	3.40	12.33	36.81	1.95	6.59	7.13	2.70	0.10	1.95	48.80	3.08	13.44	100.82	65.05	4.01	0.00	0.02	1.17	0.70	18.09	116.58	157.70	55.89
A118	0.42	3.23	19.76	7.31	1.34	2.15	7.82	23.33	1.48	5.02	5.43	2.06	0.07	1.48	37.12	2.34	10.02	75.16	48.49	2.99	0.00	0.02	1.09	0.65	13.33	87.06	119.71	38.68
A119	0.27	2.09	12.80	4.73	0.87	1.39	5.06	15.11	0.96	3.25	3.51	1.33	0.05	0.96	24.04	1.52	6.49	48.67	31.40	1.94	0.00	0.01	0.71	0.42	8.63	56.37	77.51	25.05
A123	1.51	11.65	71.17	26.31	4.16	6.69	24.30	72.55	7.09	24.03	26.00	9.85	0.35	7.09	177.83	11.23	18.32	137.41	88.65	5.47	0.05	0.25	15.08	9.05	31.48	187.12	403.03	134.45
A124	4.90	37.82	231.11	85.44	24.67	39.72	144.25	430.65	17.96	60.87	65.86	24.95	0.90	17.96	450.52	28.44	55.74	418.08	269.73	16.63	0.18	0.88	52.96	31.77	104.35	575.32	1214.42	617.88
A125	1.45	11.19	68.39	25.28	7.97	12.83	46.60	139.11	10.82	36.68	39.69	15.03	0.54	10.82	271.50	17.14	23.69	177.68	114.63	7.07	0.09	0.46	27.57	16.54	44.57	249.66	568.37	220.18
A126	2.51	19.37	118.37	43.76	5.23	8.43	30.61	91.39	9.74	33.01	35.72	13.53	0.49	9.74	244.35	15.42	26.05	195.36	126.04	7.77	0.15	0.76	45.82	27.49	44.17	266.67	600.91	199.37
A127	3.50	27.02	165.09	61.03	3.90	6.27	22.78	68.00	11.68	39.60	42.84	16.23	0.58	11.68	293.08	18.50	36.10	270.77	174.69	10.77	0.27	1.34	80.14	48.08	56.04	356.67	778.62	222.62
A128	1.71	13.19	80.58	29.79	6.68	10.76	39.07	116.63	2.74	9.28	10.04	3.80	0.14	2.74	68.71	4.34	19.75	148.14	95.58	5.89	0.01	0.03	1.64	0.99	31.02	184.13	295.62	161.44
A129	0.08	0.65	3.98	1.47	0.00	0.00	0.00	0.00	0.31	1.06	1.15	0.44	0.02	0.31	7.88	0.50	1.07	8.05	5.19	0.32	0.01	0.03	1.51	0.90	1.49	10.11	19.71	3.63
A135	0.51	3.93	24.04	8.89	4.93	7.93	28.81	86.03	4.81	16.32	17.65	6.69	0.24	4.81	120.76	7.62	5.04	37.79	24.38	1.50	0.01	0.03	1.92	1.15	15.54	70.82	217.57	111.88
A136	6.65	51.31	313.58	115.93	30.47	49.06	178.17	531.93	21.66	73.41	79.42	30.09	1.08	21.66	543.34	34.30	56.09	420.71	271.42	16.74	0.13	0.63	37.75	22.65	116.09	616.78	1423.69	751.63
A137	2.53	19.49	119.10	44.03	15.50	24.96	90.64	270.62	15.01	50.88	55.05	20.85	0.75	15.01	376.60	23.77	38.03	285.21	184.01	11.35	0.08	0.38	22.70	13.62	71.90	395.94	848.11	384.24
A138	1.59	12.24	74.81	27.66	5.05	8.13	29.52	88.12	5.59	18.94	20.50	7.76	0.28	5.59	140.22	8.85	23.29	174.67	112.69	6.95	0.03	0.16	9.35	5.61	35.82	219.73	387.09	144.95
A139	1.72	13.25	80.98	29.94	8.18	13.17	47.82	142.76	3.76	12.75	13.80	5.23	0.19	3.76	94.38	5.96	20.37	152.78	98.57	6.08	0.01	0.04	2.32	1.39	34.22	195.75	337.86	191.35
A140	1.72	13.27	81.12	29.99	6.39	10.29	37.37	111.57	2.29	7.76	8.40	3.18	0.11	2.29	57.45	3.63	17.64	132.31	85.36	5.26	0.00	0.02	1.41	0.85	28.16	165.95	271.11	154.48
A141	0.61	4.69	28.63	10.59	0.54	0.87	3.17	9.48	2.61	8.86	9.58	3.63	0.13	2.61	65.55	4.14	14.30	107.27	69.20	4.27	0.00	0.00	0.25	0.15	18.20	124.30	176.40	32.25
A147	1.52	11.70	71.48	26.43	10.27	16.53	60.03	179.21	10.42	35.31	38.20	14.47	0.52	10.42	261.32	16.50	12.53	93.98	60.63	3.74	0.02	0.08	4.90	2.94	35.27	168.01	496.56	243.28
A148	2.02	15.56	95.08	35.15	18.60	29.94	108.74	324.65	18.81	63.75	68.97	26.13	0.94	18.81	471.85	29.78	20.24	151.82	97.95	6.04	0.05	0.24	14.40	8.64	60.66	280.12	856.99	430.39
A149	3.44	26.52	162.10	59.93	18.15	29.23	106.16	316.93	16.44	55.72	60.29	22.84	0.82	16.44	412.43	26.03	45.59	341.93	220.60	13.60	0.07	0.36	21.38	12.83	84.52	470.20	982.95	452.16
A150	1.21	9.36	57.22	21.15	4.24	6.82	24.77	73.95	3.43	11.63	12.58	4.77	0.17	3.43	86.07	5.43	13.70	102.78	66.31	4.09	0.01	0.07	4.24	2.54	22.77	134.09	251.18	111.93
A151	1.38	10.64	65.04	24.05	5.08	8.17	29.68	88.62	1.65	5.59	6.05	2.29	0.08	1.65	41.36	2.61	11.29	84.65	54.61	3.37	0.01	0.05	3.22	1.93	19.48	110.76	199.97	122.87
A152	1.53	11.82	72.22	26.70	5.82	9.37	34.04	101.64	1.85	6.27	6.79	2.57	0.09	1.85	46.42	2.93	13.15	98.60	63.61	3.92	0.01	0.04	2.54	1.52	22.45	127.96	225.63	139.28
A153	2.40	18.55	113.34	41.90	9.51	15.32	55.63	166.08	3.48	11.81	12.77	4.84	0.17	3.48	87.39	5.52	24.78	185.87	119.91	7.39	0.01	0.05	2.70	1.62	40.37	235.07	391.75	227.35
A157	0.14	1.06	6.48	2.40	1.38	2.23	8.08	24.13	1.47	4.98	5.39	2.04	0.07	1.47	36.86	2.33	1.20	9.01	5.81	0.36	0.00	0.01	0.59	0.35	4.27	18.75	63.21	31.60
A158	0.27	2.11	12.89	4.77	2.75	4.42	16.07	47.97	2.92	9.90	10.71	4.06	0.15	2.92	73.29	4.63	2.39	17.91	11.56	0.71	0.00	0.02	1.17	0.70	8.48	37.29	125.69	62.84
A159	1.54	11.87	72.54	26.82	11.54	18.58	67.47	201.45	12.68	42.97	46.49	17.61	0.63	12.68	318.06	20.08	13.92	104.37	67.34	4.15	0.02	0.08	4.82	2.89	40.32	190.55	576.72	272.99
A160	1.60	12.37	75.58	27.94	18.36	29.56	107.35	320.50	18.53	62.80	67.94	25.74	0.93	18.53	464.80	29.34	27.43	205.70	132.71	8.18	0.10	0.52	30.92	18.55	66.95	329.47	879.31	430.25
A161	2.56	19.72	120.48	44.54	11.32	18.23	66.20	197.64	12.32	41.74	45.16	17.11	0.62	12.32	308.96	19.50	37.28	279.63	180.40	11.12	0.08	0.39	23.58	14.15	64.17	372.02	744.80	304.07
A162	1.87	14.45	88.32	32.65	13.72	22.10	80.25	239.58	11.93	40.42	43.73	16.56	0.60	11.93	299.15	18.88	14.67	110.05	71.00	4.38	0.02	0.12	7.27	4.36	42.82	199.07	589.71	316.42
A163	0.56	4.33	26.44	9.77	4.72	7.60	27.59	82.36	4.95	16.78	18.16	6.88	0.25	4.95	124.23	7.84	5.18	38.88	25.08	1.55	0.01	0.04	2.68	1.61	15.67	72.58	224.18	110.01
A164	0.77	5.94	36.32	13.43	5.29	8.51	30.91	92.27	4.44	15.04	16.27	6.16	0.22	4.44	111.32	7.03	6.37	47.75	30.81	1.90	0.01	0.04	2.54	1.52	17.09	81.73	228.16	122.31
A165	1.26	9.70	59.30	21.92	6.46	10.41	37.79	112.84	6.34	21.50	23.26	8.81	0.32	6.34	159.10	10.04	15.69	117.66	75.91	4.68	0.01	0.04	2.29	1.37	30.08	165.65	357.65	159.67
A166	0.20	1.57	9.57	3.54	0.18	0.29	1.06	3.17	0.87	2.96	3.20	1.21	0.04	0.87	21.91	1.38	4.78	35.85	23.13	1.43	0.00	0.00	0.08	0.05	6.08	41.55	58.96	10.78
A169	0.33	2.56	15.62	5.78	3.33	5.36	19.47	58.14	3.54	12.00	12.98	4.92	0.18	3.54	88.82	5.61	2.89	21.71	14.01	0.86	0.00	0.02	1.42	0.85	10.28	45.20	152.33	76.16
A170	0.05	0.38	2.30	0.85	0.49	0.79	2.86	8.55	0.52	1.76	1.91	0.72	0.03	0.52	13.06	0.82	0.43	3.19	2.06	0.13	0.00	0.00	0.21	0.12	1.51	6.64	22.39	11.19
A171	0.74	5.70	34.85	12.89	0.77	1.25	4.53	13.51	1.52	5.15	5.57	2.11	0.08	1.52	38.13	2.41	7.26	54.48	35.15	2.17	0.00	0.00	0.17	0.10	10.37	68.11	118.40	33.19
A172	1.54	11.86	72.47	26.79	17.52	28.22	102.47	305.93	18.36	62.21	67.31	25.50	0.92	18.36	460.47	29.07	25.84	193.83	125.05	7.71	0.10	0.50	29.90	17.94	64.28	314.97	857.67	412.94
A173	1.81	13.99	85.51	31.61	12.00	19.33	70.18	209.53	13.82	46.83	50.67	19.19	0.69	13.82	346.64	21.88	32.16	241.22	155.63	9.60	0.08	0.41	24.77	14.86	60.57	335.60	733.40	306.68
A174	0.78	5.99	36.63	13.54	7.81	12.57	45.66	136.30	8.30	28.13	30.44	11.53	0.42	8.30	208.23	13.14	6.79	50.90	32.84	2.02	0.01	0.06	3.32	1.99	24.10	105.95	357.11	178.54
A175	0.10	0.79	4.83	1.78	0.11	0.17	0.63	1.87	0.21	0.71	0.77	0.29	0.01	0.21	5.28	0.33	1.01	7.54	4.87	0.30	0.00	0.00	0.02	0.01	1.44	9.43	16.39	4.59
A176	0.32	2.44	14.93	5.52	0.33	0.53	1.94	5.79	0.65	2.21	2.39	0.90	0.03	0.65	16.33	1.03	3.11	23.34	15.06	0.93	0.00	0.00	0.07	0.04	4.44	29.18	50.72	14.22
A177	1.32	10.17	62.15	22.98	9.39	15.11	54.89	163.87	8.71	29.50	31.92	12.09	0.44	8.71	218.38	13.78	11.99	89.94	58.03	3.58	0.01	0.06	3.57	2.14	31.85	153.50	428.94	218.44
A178	1.23	9.45	57.78	21.36	2.48	3.99	14.50	43.28	3.56	12.05	13.04	4.94	0.18	3.56	89.19	5.63	18.51	138.83	89.57	5.52	0.00	0.01	0.80	0.48	25.95	167.89	264.87	81.21
A179	0.47	3.66	22.38	8.27	0.50	0.80	2.91	8.68	0.98	3.31	3.58	1.36	0.05	0.98	24.48	1.54	4.66	34.98	22.57	1.39	0.00	0.00	0.11	0.07	6.66	43.73	76.01	21.31

Annexure 3.3
Gridwise Emission Load from Vehicles

	2 Wheelers				3 Wheelers				Car Diesel				Car Petrol				HDDV				Taxies				Total			
	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC	PM	NOx	CO	HC
A181	0.19	1.50	9.19	3.40	1.96	3.15	11.45	34.19	2.08	7.06	7.63	2.89	0.10	2.08	52.23	3.30	1.70	12.77	8.24	0.51	0.00	0.01	0.83	0.50	6.04	26.57	89.57	44.78
A182	0.18	1.39	8.51	3.14	1.81	2.92	10.60	31.65	1.93	6.53	7.07	2.68	0.10	1.93	48.35	3.05	1.58	11.82	7.62	0.47	0.00	0.01	0.77	0.46	5.60	24.60	82.92	41.46
A183	0.02	0.15	0.89	0.33	0.00	0.00	0.00	0.00	0.12	0.40	0.44	0.17	0.01	0.12	2.98	0.19	0.41	3.09	1.99	0.12	0.00	0.01	0.70	0.42	0.56	3.77	6.99	1.22
A184	1.51	11.64	71.14	26.30	17.56	28.28	102.68	306.57	20.30	68.79	74.43	28.19	1.01	20.30	509.14	32.14	27.27	204.54	131.96	8.14	0.14	0.72	42.97	25.78	67.80	334.26	932.33	427.12
A185	2.67	20.56	125.66	46.45	19.32	31.11	112.99	337.34	21.53	72.97	78.95	29.90	1.08	21.53	540.07	34.09	36.35	272.61	175.88	10.85	0.07	0.37	22.42	13.45	81.02	419.16	1055.97	472.09
A186	0.76	5.83	35.60	13.16	7.59	12.22	44.37	132.48	8.07	27.34	29.58	11.21	0.40	8.07	202.39	12.78	6.60	49.47	31.92	1.97	0.01	0.05	3.23	1.94	23.42	102.98	347.09	173.52
A188	0.43	3.35	20.45	7.56	0.45	0.73	2.66	7.93	0.89	3.02	3.27	1.24	0.04	0.89	22.37	1.41	4.26	31.97	20.63	1.27	0.00	0.00	0.10	0.06	6.09	39.96	69.47	19.47
A189	1.48	11.42	69.77	25.79	14.29	23.00	83.54	249.39	3.45	11.70	12.65	4.79	0.17	3.45	86.57	5.46	13.19	98.93	63.82	3.94	0.02	0.12	6.93	4.16	32.60	148.61	323.29	293.54
A190	2.45	18.89	115.44	42.68	10.04	16.16	58.69	175.21	17.75	60.17	65.10	24.66	0.89	17.75	445.33	28.11	20.54	154.02	99.37	6.13	0.01	0.03	1.98	1.19	51.67	267.02	785.90	277.98
A191	0.49	3.79	23.17	8.57	0.84	1.35	4.88	14.58	1.30	4.40	4.76	1.80	0.06	1.30	32.60	2.06	9.72	72.87	47.01	2.90	0.00	0.01	0.53	0.32	12.41	83.72	112.96	30.23
A194	0.97	7.50	45.83	16.94	3.19	5.13	18.63	55.62	1.26	4.27	4.62	1.75	0.06	1.26	31.63	2.00	7.67	57.51	37.10	2.29	0.00	0.01	0.67	0.40	13.15	75.69	138.50	79.00
A195	0.71	5.44	33.25	12.29	2.03	3.27	11.86	35.41	2.04	6.91	7.47	2.83	0.10	2.04	51.11	3.23	8.95	67.15	43.32	2.67	0.01	0.03	1.71	1.03	13.83	84.83	148.73	57.46
A196	2.79	21.52	131.54	48.63	11.08	17.84	64.79	193.44	8.56	29.00	31.38	11.89	0.43	8.59	215.35	13.59	34.30	257.22	165.95	10.23	0.08	0.38	23.02	13.81	57.23	334.56	632.02	291.59
A197	2.88	22.24	135.89	50.24	7.43	11.96	43.44	129.70	9.89	33.52	36.27	13.74	0.49	9.89	248.10	15.66	43.90	329.23	212.41	13.10	0.09	0.43	25.55	15.33	64.68	407.27	701.66	237.76
A198	0.32	2.45	14.98	5.54	1.81	2.91	10.58	31.58	0.81	2.76	2.98	1.13	0.04	0.81	20.41	1.29	2.49	18.70	12.06	0.74	0.00	0.02	0.99	0.59	5.48	27.65	62.00	40.87
A200	0.10	0.74	4.53	1.68	0.12	0.19	0.68	2.02	0.14	0.47	0.50	0.19	0.01	0.14	3.45	0.22	1.19	8.90	5.74	0.35	0.00	0.00	0.01	0.00	1.54	10.43	14.91	4.47
A201	0.35	2.70	16.51	6.10	1.46	2.35	8.55	25.53	0.38	1.30	1.41	0.53	0.02	0.38	9.64	0.61	1.42	10.67	6.89	0.42	0.00	0.01	0.35	0.21	3.64	17.42	43.35	33.41
A202	0.92	7.12	43.49	16.08	3.45	5.55	20.17	60.22	1.40	4.73	5.12	1.94	0.07	1.40	35.00	2.21	8.78	65.84	42.47	2.62	0.01	0.03	1.51	0.91	14.62	84.66	147.77	83.97
A203	0.08	0.61	3.76	1.39	0.07	0.11	0.42	1.24	0.21	0.70	0.75	0.29	0.01	0.21	5.16	0.33	1.88	14.08	9.08	0.56	0.00	0.00	0.04	0.03	2.24	15.71	19.22	3.83
A205	0.43	3.34	20.40	7.54	0.67	1.08	3.94	11.75	1.25	4.24	4.59	1.74	0.06	1.25	31.41	1.98	7.66	57.48	37.09	2.29	0.00	0.01	0.70	0.42	10.09	67.41	98.12	25.72
A206	0.09	0.71	4.34	1.60	0.14	0.23	0.84	2.50	0.27	0.90	0.98	0.37	0.01	0.27	6.68	0.42	1.63	12.23	7.89	0.49	0.00	0.00	0.15	0.09	2.15	14.35	20.88	5.47
A207	0.98	7.52	45.97	17.00	3.43	5.52	20.03	59.81	2.85	9.67	10.46	3.96	0.14	2.85	71.54	4.52	7.62	57.12	36.85	2.27	0.04	0.21	12.32	7.39	15.05	82.88	197.17	94.94
A208	1.68	12.98	79.34	29.33	10.03	16.15	58.66	175.14	7.91	26.81	29.01	10.99	0.40	7.91	198.44	12.53	17.69	132.69	85.60	5.28	0.04	0.20	12.06	7.24	37.75	196.75	463.12	240.50
A209	2.48	19.10	116.72	43.15	6.58	10.59	38.46	114.82	8.46	28.68	31.03	11.75	0.42	8.46	212.27	13.40	34.56	259.24	167.25	10.31	0.10	0.48	28.96	17.38	52.60	326.55	594.68	210.81
A210	0.45	3.51	21.42	7.92	0.67	1.07	3.89	11.63	0.96	3.25	3.52	1.33	0.05	0.96	24.05	1.52	4.10	30.78	19.86	1.22	0.03	0.17	10.16	6.10	6.26	39.73	82.90	29.72
A217	0.53	4.08	24.95	9.22	0.00	0.00	0.00	0.00	0.93	3.14	3.40	1.29	0.05	0.93	23.26	1.47	5.52	41.38	26.70	1.65	0.05	0.27	16.46	9.87	7.08	49.81	94.76	23.50
A219	0.78	6.00	36.68	13.56	2.48	3.99	14.50	43.28	2.12	7.17	7.76	2.94	0.11	2.12	53.07	3.35	7.16	53.67	34.63	2.14	0.02	0.10	5.89	3.53	12.65	73.05	152.52	68.80
A220	1.70	13.15	80.36	29.71	6.77	10.90	39.59	118.19	5.52	18.70	20.23	7.66	0.28	5.52	138.42	8.74	15.69	117.64	75.90	4.68	0.06	0.28	16.94	10.16	30.01	166.20	371.44	179.14
A221	2.93	22.61	138.15	51.07	11.23	18.08	65.66	196.02	9.86	33.43	36.17	13.70	0.49	9.87	247.61	15.63	33.70	252.74	163.06	10.06	0.07	0.33	19.97	11.98	58.28	337.06	670.62	298.46
A222	0.11	0.83	5.09	1.88	0.50	0.80	2.92	8.73	0.31	1.05	1.14	0.43	0.02	0.31	7.80	0.49	0.65	4.87	3.14	0.19	0.00	0.01	0.38	0.23	1.58	7.88	20.47	11.95
A229	0.67	5.14	31.43	11.62	4.53	7.29	26.47	79.02	2.22	7.52	8.13	3.08	0.11	2.22	55.62	3.51	8.36	62.69	40.44	2.49	0.01	0.05	2.82	1.69	15.89	84.90	164.92	101.42
A230	0.34	2.61	15.93	5.89	1.56	2.52	9.15	27.32	0.97	3.30	3.57	1.35	0.05	0.97	24.43	1.54	2.03	15.24	9.83	0.61	0.00	0.02	1.18	0.71	4.96	24.66	64.09	37.42
A231	0.16	1.22	7.48	2.76	1.01	1.62	5.88	17.55	1.00	3.40	3.68	1.40	0.05	1.00	25.19	1.59	3.03	22.71	14.65	0.90	0.00	0.02	1.33	0.80	5.25	29.99	58.22	25.00
A232	0.95	7.33	44.81	16.57	1.76	2.83	10.28	30.70	2.42	8.21	8.88	3.36	0.12	2.42	60.77	3.84	9.92	74.39	47.99	2.96	0.06	0.30	18.20	10.92	15.23	95.49	190.94	68.35
A233	3.55	27.37	167.27	61.84	12.98	20.90	75.91	226.64	12.35	41.86	45.29	17.15	0.62	12.38	310.56	19.60	43.04	322.77	208.24	12.84	0.10	0.49	29.55	17.73	72.63	425.77	836.82	355.81
A234	0.06	0.44	2.68	0.99	0.26	0.42	1.54	4.59	0.16	0.55	0.60	0.23	0.01	0.16	4.11	0.26	0.34	2.56	1.65	0.10	0.00	0.00	0.20	0.12	0.83	4.15	10.78	6.29
A241	0.09	0.72	4.38	1.62	1.34	2.16	7.83	23.37	1.45	4.91	5.31	2.01	0.07	1.45	36.34	2.29	1.92	14.37	9.27	0.57	0.01	0.04	2.41	1.45	4.88	23.64	65.54	31.31
A244	0.08	0.60	3.66	1.35	1.00	1.62	5.87	17.54	1.06	3.60	3.90	1.48	0.05	1.06	26.65	1.68	1.43	10.73	6.92	0.43	0.01	0.03	1.76	1.05	3.63	17.64	48.75	23.53
A245	1.44	11.09	67.79	25.06	6.30	10.15	36.86	110.05	5.52	18.72	20.25	7.67	0.28	5.52	138.52	8.74	14.69	110.18	71.08	4.38	0.05	0.24	14.68	8.81	28.28	155.90	349.18	164.71
A246	1.10	8.51	52.00	19.23	3.80	6.12	22.22	66.35	4.27	14.47	15.65	5.93	0.21	4.27	107.09	6.76	16.41	123.05	79.39	4.90	0.03	0.14	8.35	5.01	25.82	156.56	284.72	108.17

Annexure 3.1

Emission Factors

Bakery

Emission Factor for Wood Burning (kg/t)
PM_{10} = 17.3, SO_2 = 0.2, NOx = 1.3, CO =126.3, HC = 114.5 (VOC as HC)
*$PM_{2.5}$ /PM_{10} ratio considered was =0.68
http://www.epa.gov/ttn/chief/ap42/index.html (Sec. 1.9, pp. 1.10.4, Table 1.9.1)
(Rakesh Kumar and Abba Elizabeth., 2003), VOC to HC - lb/ton - kg/ton*
Emission Factor for Diesel Burning (kg/kiloliters)
SPM= 0.25, PM_{10} =60% of SPM, $PM_{2.5}$ =40% of SPM, CO= 0.63, SO_2 =17.25S,
NOx = 2.75, HC = 0.12, (Sulfur content = 0.35%) - automobile euro norms
(TERI, Environmental Effects of Energy Production
Transportation and Consumption in NCR, New Delhi, 1992)

Crematoria
Emission factors for wood burning (kg/t)
PM_{10}=17.3, SO_2 = 0.2, NOx 1.3, CO =126.3, HC =114.5 (VOC as HC)
*$PM_{2.5}$ /PM_{10} ratio considered was =0.68
http://www.epa.gov/ttn/chief/ap42/index.html (Sec. 1.9, pp. 1.10.4, Table 1.9.1)
Emission Factor Kerosene (kg/t)
SPM =1.95, PM_{10} =0.61, SO_2 =4, NOx =2.5, CO=62, HC =19
URBAIR, Working Group 1992 - Kerosene, Residential Emission Factor - Electric (kg/ body)
Emission Factor Electric (kg/body)
PM_{10} =0.000025, SO_2 = 0.0544, NOx =0.308, CO =0.141, NVOC =0.013
*$PM_{2.5}$ /PM_{10} ratio considered was =0.68
http://www.naei.org.uk/emissions/selection.php
Body burning was separately calculated based on emission factor electric crematoria

Open Eat Outs
Emission factor for LPG
PM_{10} =2.10, SO_2 = 0.40, NOx = 1.8, CO= 0.25, HC as VOC=0.07
Assessment of Sources of Air, Water and Land Pollution – A Guide to Rapid Source Inventory Techniques and their Use in Formulating Environmental Control Strategies – Part one – Rapid Inventory Techniques in Environmental Pollution by A.P. Economopolous, WHO, Geneva, 1993
Particulate emission LPG considered as $PM_{2.5}$
Emission factor for Kerosene : SPM=0.06, PM_{10}=0.61, SO_2 =4, NOx =2.5, CO = 62
Urban Air Quality Management Strategy in Asia – Greater Mumbai Report edited by Jitendra J. Shah and Tanvi Nagpal, World Bank Technical Paper No. 381, 1997
Emission factor for Coal : SPM =20, SO_2 = 13.3, NOx =3.99, CO=24.92, HC =0.5
Environmental effects of energy production, transformation and consumption in the National Capital Region submitted to the Ministry of Environment & Forest, by Tata Energy Research Institute (TERI), New Delhi, February 1992

Domestic Cooking

Emission Factor for LPG : PM=2.1, CO =0.252, SO_2 = 0.4, NOx = 1.8, VOC = 0.072

Emission Factor for Kerosene : PM_{10}=0.61, SO_2 =4, NOx =2.5, CO = 62

Assessment of Sources of Air, Water and Land Pollution – A Guide to Rapid Source Inventory Techniques and their Use in Formulating Environmental Control Strategies – Part one – Rapid Inventory Techniques in Environmental Pollution by A.P. Economopolous, WHO, Geneva, 1993

Hotels & Restaurants

Emission factor for LPG

PM_{10} =2.10, SO_2 = 0.40, NOx = 1.8, CO= 0.25, HC as VOC=0.07

Assessment of Sources of Air, Water and Land Pollution – A Guide to Rapid Source Inventory Techniques and their Use in Formulating Environmental Control Strategies – Part one – Rapid Inventory Techniques in Environmental Pollution by A.P. Economopolous, WHO, Geneva, 1993

Particulate emission LPG considered as PM2.5

Emission factor for Coal : SPM =20, SO_2 = 13.3, NOx =3.99, CO=24.92, HC =0.5

Environmental effects of energy production, transformation and consumption in the National Capital Region submitted to the Ministry of Environment & Forest, by Tata Energy Research Institute (TERI), New Delhi, February 1992

Open Burning

Emission Factor (kg/MT) PM_{10} = 8, $PM_{2.5}$ =5.44, CO=42, SO_2=0.5000,NOx= 3, VOC= 21.5

A Guide to Rapid Source Inventory Techniques and their Use in Formulating Environmental Control Strategies – Part one – Rapid Inventory Techniques in Environmental Pollution by A.P. Economopolous, WHO, Geneva, 1993

Aircrafts

Emission factor domestic flight

PM10=0.99*, CO =11.8, SOx =0.8, NOx =8.3, VOC=0.5

Emission factor international flight

PM10=0.99*, CO =6.1, SOx =1.6, NOx =26, VOC=0.2

** A Guide to Rapid Source Inventory Techniques and their Use in Formulating Environmental Control Strategies – Part one – Rapid Inventory Techniques in Environmental Pollution by A.P. Economopolous, WHO, Geneva, 1993*

Other emission factors are taken from

www.ecotourism.org/onlineLib/Uploaded/ … Airplanes emissions. PDF

PM2.5/PM10 = 0.92

Preparation of Fine Particulate Emission Inventories -Student Manual, APTI Course 419B, Sec. 4.2.1, pg-4.7

Locomotive
Emission Factors Line haul operations (kg/l) : CO= 0.0075, NOx =0.0591, SO_2 = 0.0043, PM=0.0014 Yard operations (kg/locomotive/month): CO = 278.75, NOx = 1572.75, SO_2 = 116.25, PM = 43, *$PM_{2.5}/PM_{10}$= 0.68 PM is considered as PM_{10} U.S. EPA, 1992a (Cited from Mexico Emission Inventory, Vol. V, p.71 & p.73)

Marine Vessels
Emission factors *(kg/t fuel consumed)*: PM_{10} =1.03, CO =1.85, SO_2 =11, NOx= 10, VOC as HC = 0.83, Density of diesel = 0.86 (HSD) *UK-Shipping international-Fuel oil*

Paved & Unpaved Dust
Paved Road Dust : $PM_{2.5}$ = 0.39, PM_{10}= 1.93
** Strengthening Environmental Management at the State Level (Cluster) Component E- Strengthening Environmental Management at West Bengal Pollution Control Board, TA No. 3423-IND, Asian Development Bank, Nov. 2005 (Table 12, Page 23) USEPA AP42 Paved, Section 13.2.1.4 Motor Transport Statistics, Transport Commissioner Office, Mumbai* Silt loading estimate -0.531 gm/m2 (*Kolkata ADB report –Table 13, page 23) Break and tire wear correction – (USEPA AP42 Paved, Section 13.2.1.4, Table 13.2.1.2) Wet days = 120, (IMD, Mumbai)

Emission factor for industrial and vehicular sources are given in respective chapters

Annexure 4.1
Chemical Abundance of Source Profiles

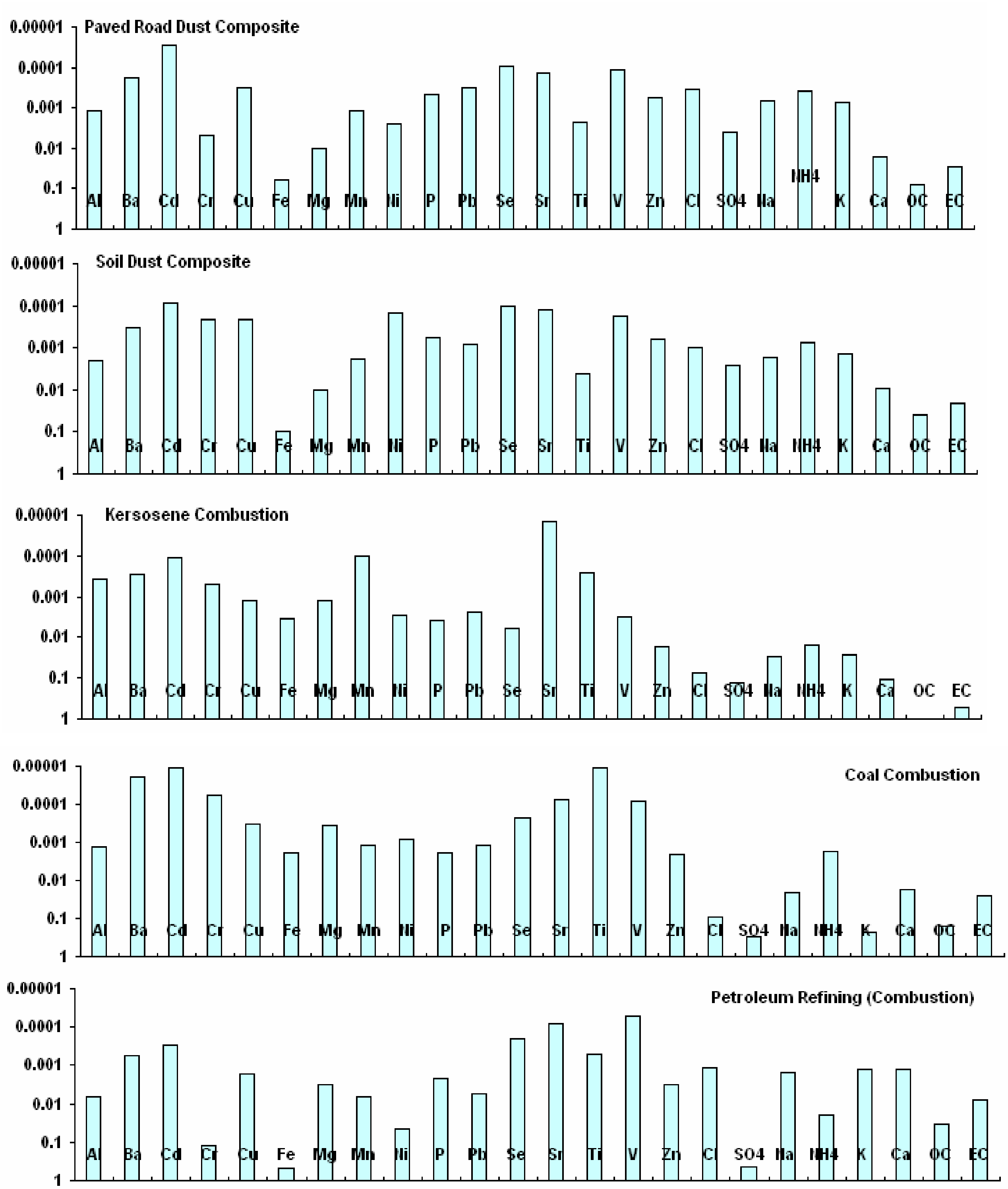


Figure IV.1 : Chemical abundance of source profiles

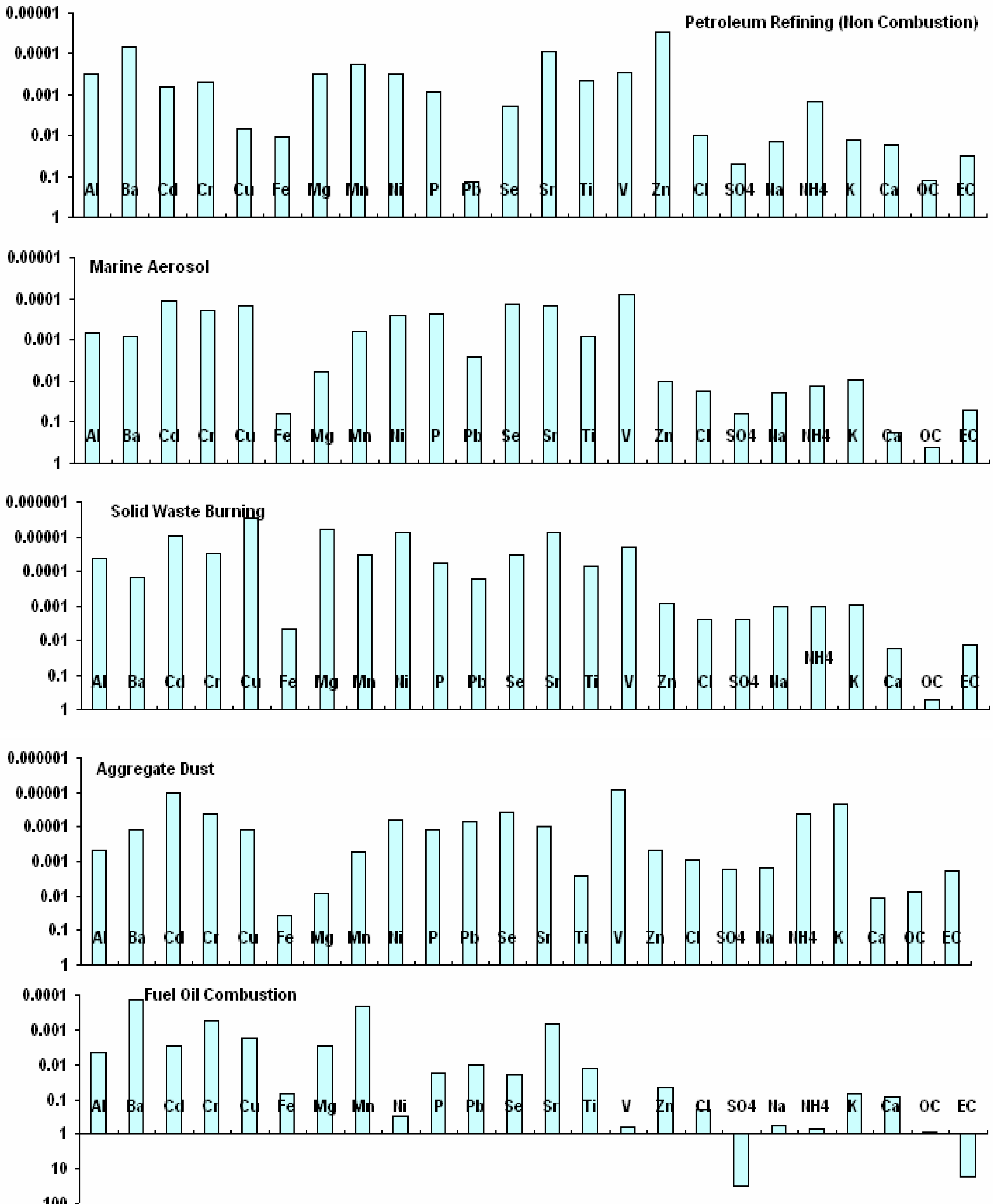


Figure IV.1 (Contd..) : Chemical abundance of source profiles

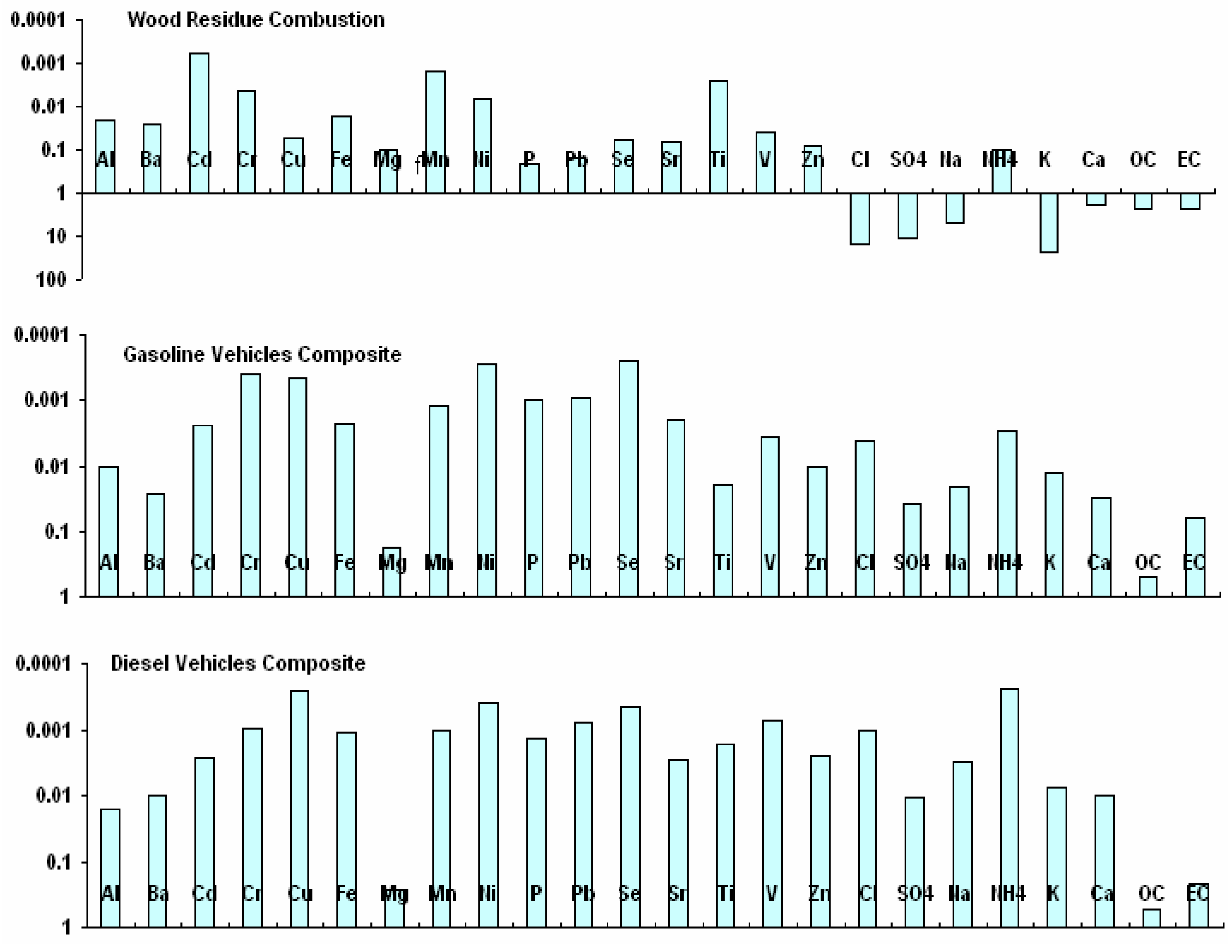


Figure IV.1 (Contd...) : Chemical abundance of source profiles

Annexure 4.2.1

Molecular Marker Methodology

In-Injection Port Thermal Desorption and Subsequent Gas Chromatography /Mass Spectrometry Analysis of Non-Polar Organic Species in Aerosol Filter Samples

This method is capable of both qualitative and quantitative analysis of non-polar organic compounds on aerosol loaded filters. The target compounds include *n*-alkanes, iso/ anteiso-alkanes, hopanes, steranes, phthalates, other alkanes, alkenes, cyclohexanes, and polycyclic aromatic hydrocarbons (PAHs). Small strips of aerosol-laden filter materials are packed into a gas chromatography (GC) split/ splitless injector liner. The organic compounds on the filter are thermally desorbed in the injection port and focused onto the head of a GC column for subsequent separation and mass spectrometric detection. Using data collected with the mass spectrometer (MS), we measure the peak area of ions known to be present in the analytes and internal standards for the quantification process. For QA/QC we perform replicates at a rate of one every ten samples to ensure good instrument reproducibility and use certified standard solutions to check the calibration created using a six-point calibration curve from standards mixed in-house.

Levoglucosan analysis of Filter Extracts by Ion Chromatography (IC)

Ion Chromatography (IC) using the Dionex ICS-3000 system is a liquid chromatographic technique based on an ion exchange mechanism and pulsed amperometric detection for the separation and quantification of levoglucosan and other carbohydrates found in the water-soluble fraction of aerosols collected on filter media. As a consequence of differences in the equilibrium distribution of sample components between the mobile (sample/eluent flow) and stationary (ion exchange column) phases, the carbohydrate species in the sample elute from the column as discrete bands based upon their migration velocities. Each species is identified by its retention time within the ion exchange column. During routine operation, a filtered aliquot of aerosol extract is pumped through an ion exchange column (Carbopac MA1, 4 X 250 mm, Dionex, Sunnyvale, CA, USA) where the carbohydrate species are separated using an eluent gradient of 17 mM - 600 mM NaOH. From the separator column, the species are detected using pulsed amperometric detection with waveform “A” using disposable gold electrodes on the Dionex ED50A detector module. Levoglucosan concentrations are quantitatively determined from amperometric peak areas. A minimum of five points are used to create each calibration curve. For QA/QC we run a replicate and a standard run as an unknown after every 10 samples to evaluate the instrument and detector’s performance.

Annexure 4.2 :
Molecular Marker Results at Seven Sites

	Colaba			Dadar			Dharavi			Khar			Andheri			Mahul			Mulund		
	Summer	**Post Monsoon**	**Winter**	**Summer**	**Post Monsoon**	**Winter**	**Summer**	**Post Monsoon**	**Winter**	**Summer**	**Post Monsoon**	**Winter**	**Summer**	**Post Monsoon**	**Winter**	**Summer**	**Post Monsoon**	**Winter**	**Summer**	**Post Monsoon**	**Winter**
PAHs																					
Average	1.098	0.868	1.445	1.204	1.754	2.124	4.592	3.012	9.930	0.760	3.537	5.491	1.578	3.535	4.279	0.789	3.674	2.475	1.757	2.080	4.469
Minimum	0.010	0.010	0.010	0.005	0.019	0.019	0.031	0.014	0.030	0.007	0.029	0.030	0.013	0.031	0.029	0.010	0.029	0.021	0.009	0.022	0.021
Maximum	7.798	5.463	10.792	9.881	15.360	14.004	36.559	18.678	94.963	5.191	28.296	55.615	11.817	29.901	48.580	5.763	28.227	14.781	16.271	16.740	53.122
Stdev	1.622	1.293	2.149	1.918	3.112	3.222	8.038	4.383	16.640	1.196	6.515	10.289	2.340	6.710	8.202	1.212	6.445	3.529	3.118	3.533	9.169
***n*-alkane**																					
Average	5.018	5.612	7.509	6.398	9.915	11.563	42.498	11.127	33.966	6.709	19.574	23.400	5.947	18.623	17.253	5.517	21.486	16.303	11.133	13.544	22.198
Minimum	0.343	0.411	0.588	0.579	0.870	0.941	2.071	1.136	3.016	0.522	1.526	2.350	0.769	1.691	1.623	0.863	1.288	0.819	0.937	1.248	2.186
Maximum	11.129	10.901	14.448	10.946	19.126	21.156	78.233	20.259	64.143	14.904	38.541	45.057	9.937	38.104	35.797	10.932	45.796	28.701	23.301	23.834	37.734
Stdev	3.423	3.593	4.584	3.771	6.487	7.252	28.572	7.023	17.139	4.632	12.810	13.477	3.395	11.572	9.818	3.247	14.396	9.860	8.224	8.109	13.505
hopane																					
Average	0.327	0.429	0.546	0.897	1.660	2.427	1.688	1.646	2.935	1.316	3.880	4.719	2.315	3.093	3.826	0.685	1.365	1.242	3.779	4.986	6.926
Minimum	0.044	0.072	0.060	0.087	0.194	0.175	0.157	0.158	0.302	0.147	0.352	0.506	0.265	0.282	0.348	0.076	0.117	0.128	0.318	0.449	0.652
Maximum	1.300	1.744	2.190	3.468	6.542	8.162	6.810	6.499	11.671	4.304	16.056	19.540	8.614	13.025	12.986	2.521	5.915	4.828	14.264	20.079	26.467
Stdev	0.340	0.440	0.558	0.902	1.696	2.443	1.776	1.673	2.968	1.307	4.062	4.964	2.270	3.290	3.800	0.666	1.507	1.252	3.732	5.039	6.781
sterane																					
Average	0.201	0.209	0.298	0.510	0.854	1.017	1.506	0.891	2.671	0.504	1.720	2.260	0.975	1.440	1.611	0.378	0.847	0.813	1.923	2.760	3.477
Minimum	0.068	0.068	0.065	0.124	0.370	0.408	0.377	0.230	0.633	0.157	0.675	0.892	0.369	0.564	0.681	0.114	0.234	0.308	0.743	1.117	1.514
Maximum	0.711	0.831	1.070	1.801	3.285	4.018	8.190	3.250	15.259	2.247	6.986	9.071	3.878	5.761	6.319	1.392	2.899	2.946	7.941	8.923	14.001
Stdev	0.217	0.233	0.317	0.553	0.859	1.065	2.288	0.977	4.269	0.598	1.852	2.414	1.002	1.508	1.620	0.396	0.964	0.861	2.077	2.760	3.663
methyl-alkane																					
Average	0.114	0.070	0.133	0.119	0.143	0.160	0.157	0.093	0.226	0.138	0.117	0.238	0.157	0.204	0.152	0.128	0.117	0.138	0.150	0.192	0.210
Minimum	0.111	0.068	0.116	0.101	0.130	0.136	0.157	0.086	0.211	0.123	0.117	0.208	0.148	0.157	0.130	0.117	0.117	0.117	0.106	0.142	0.168
Maximum	0.116	0.072	0.151	0.138	0.157	0.184	0.157	0.101	0.241	0.153	0.117	0.268	0.166	0.250	0.174	0.138	0.117	0.160	0.195	0.241	0.252
Stdev	0.003	0.003	0.025	0.026	0.020	0.034	0.000	0.010	0.021	0.022	0.000	0.042	0.013	0.066	0.031	0.015	0.000	0.030	0.063	0.070	0.059
branched-alkane																					
Average	0.337	0.472	0.470	0.671	1.252	0.909	1.182	0.824	2.664	1.029	1.536	1.675	1.341	1.294	0.367	0.785	1.074	1.280	1.595	2.390	2.361
Minimum	0.203	0.357	0.306	0.257	0.352	0.427	0.502	0.345	0.754	0.532	0.440	0.684	0.738	0.595	0.246	0.390	0.439	0.319	0.407	0.985	0.526
Maximum	0.590	0.555	0.783	1.222	2.841	1.834	2.416	1.668	5.911	1.763	3.552	3.390	2.033	2.630	0.478	0.988	2.284	3.169	3.811	4.576	5.823
Stdev	0.219	0.102	0.271	0.497	1.380	0.801	1.071	0.733	2.826	0.649	1.748	1.491	0.652	1.157	0.116	0.342	1.049	1.636	1.921	1.919	3.000
cycloalkane																					
Average	0.145	0.171	0.146	0.166	0.235	0.281	0.496	0.242	1.123	0.155	0.458	0.589	0.245	0.526	0.786	0.177	0.392	0.381	0.400	0.639	1.085
Minimum	0.034	0.072	0.065	0.051	0.102	0.146	0.157	0.144	0.844	0.072	0.205	0.208	0.090	0.219	0.290	0.045	0.146	0.138	0.080	0.186	0.273
Maximum	0.261	0.420	0.271	0.312	0.546	0.621	1.318	0.446	1.327	0.423	0.939	1.249	0.544	0.877	1.594	0.439	0.732	0.819	1.300	1.467	2.144
Stdev	0.094	0.144	0.077	0.100	0.183	0.197	0.471	0.122	0.230	0.151	0.285	0.433	0.174	0.317	0.510	0.168	0.262	0.274	0.521	0.529	0.802
alkene																					
1-octadecene	3.171	2.864	2.421	2.954	3.146	3.300	11.956	5.564	14.174	3.833	4.667	6.513	2.991	7.295	4.348	3.384	5.681	4.817	3.502	5.759	8.829
Levoglucosan	451.42	405.30	1221.17	876.00	586.79	995.40	3370.12	1088.32	5218.82	327.00	1691.13	2805.67	456.36	1176.44	2273.37	233.25	1737.17	1782.52	797.48	1569.80	1968.65

* All values expressed as (ng/m^3)

Annexure 5

Ten Heighest Concentrations of PM_{10} and NOx Due to All Sources at Seven Sites and Mumbai

A) COLABA

Table A5.1: Maximum ten Occurrences of PM_{10} Concentrations at Colaba for Summer Season due to all Sources

	X length,m	Y length,m	Concentration $\mu g/m^3$	Distance,m	Direction
1ST	-934.13	-597.12	140.69	1108.7	SW
2ND	278.62	626.88	121.30	686.0	NNE
3RD	482.69	805.63	118.89	939.2	NE
4TH	-947.66	-631.50	113.37	1138.8	SW
5TH	55.28	814.88	108.35	816.8	N
6TH	594.37	787.50	106.44	986.6	NE
7TH	258.97	645.38	106.09	695.4	NNE
8TH	-992.75	-620.87	105.48	1170.9	SW
9TH	353.69	723.38	104.34	805.2	NE
10TH	48.44	788.88	104.21	790.4	N

Ground Level Concentration of PM_{10} at Sampling Location at Colaba for Summer Season due to Cumulative Sources was found to be 35.591 $\mu g/m^3$.

Table A5.2 : Maximum ten Occurrences of PM_{10} Concentrations at Colaba for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration $\mu g/m^3$	Distance,m	Direction
1ST	-934.13	-597.12	53.68	1108.7	SW
2ND	482.69	805.63	41.15	939.2	NE
3RD	55.28	814.88	40.16	816.8	N
4TH	-947.66	-631.50	38.99	1138.8	SW
5TH	278.62	626.88	38.87	686.0	NNE
6TH	-992.75	-620.87	38.63	1170.9	SW
7TH	258.97	645.38	38.40	695.4	NNE
8TH	48.44	788.88	37.53	790.4	N
9TH	594.37	787.50	37.19	986.6	NE
10TH	293.37	678.38	35.01	739.1	NNE

Ground Level Concentration of PM_{10} at Sampling Location at Colaba for Post Monsoon Season due to Cumulative Sources was found to be 11.845 $\mu g/m^3$.

Table A5.3 : Maximum ten Occurrences of PM_{10} Concentrations at Colaba for Winter Season due to all sources

	X length,m	Y length,m	Concentration $\mu g/m^3$	Distance,m	Direction
1ST	-934.13	-597.12	186.18	1108.7	SW
2ND	-947.66	-631.50	160.78	1138.8	SW
3RD	-992.75	-620.87	139.59	1170.9	SW
4TH	278.62	626.88	135.81	686.0	NNE
5TH	258.97	645.38	134.30	695.4	NNE
6TH	482.69	805.63	132.59	939.2	NE
7TH	-963.28	-670.00	128.35	1173.4	SW
8TH	697.40	749.38	127.69	1023.7	NE
9TH	184.06	531.13	122.77	562.1	NNE
10TH	353.69	723.38	121.50	805.2	NE

Ground Level Concentration of PM_{10} at Sampling Location at Colaba for Winter Season due to Cumulative Sources Only was found to be 41.282 $\mu g/m^3$.

Table A5.4 : Maximum ten Occurrences of NOx Concentrations at Colaba for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-934.13	-597.12	172.80	1108.7	SW
2ND	278.62	626.88	149.17	686.0	NNE
3RD	482.69	805.63	146.50	939.2	NE
4TH	-947.66	-631.50	140.19	1138.8	SW
5TH	55.28	814.88	132.34	816.8	N
6TH	-992.75	-620.87	131.18	1170.9	SW
7TH	594.37	787.50	131.09	986.6	NE
8TH	258.97	645.38	130.13	695.4	NNE
9TH	353.69	723.38	127.81	805.2	NE
10TH	48.44	788.88	127.04	790.4	N

Ground Level Concentration of NOx at Sampling Location at Colaba for Summer Season due to all sources was found to be 43.73 μg/m^3.

Table A5.5 : Maximum ten Occurrences of NOx Concentrations at Colaba for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-934.13	-597.12	69.51	1108.7	SW
2ND	482.69	805.63	52.85	939.2	NE
3RD	55.28	814.88	51.91	816.8	N
4TH	-947.66	-631.50	50.98	1138.8	SW
5TH	258.97	645.38	50.00	695.4	NNE
6TH	278.62	626.88	49.91	686.0	NNE
7TH	-992.75	-620.87	49.81	1170.9	SW
8TH	48.44	788.88	48.36	790.4	N
9TH	594.37	787.50	47.54	986.6	NE
10TH	293.37	678.38	45.09	739.1	NNE

Ground Level Concentration of NOx at Sampling Location at Colaba for Post Monsoon Season due to Cumulative Sources was found to be 15.844μg/m^3.

Table A5.6 : Maximum ten Occurrences of NOx Concentrations at Colaba for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-934.13	-597.12	223.75	1108.7	SW
2ND	-947.66	-631.50	194.51	1138.8	SW
3RD	-992.75	-620.87	170.30	1170.9	SW
4TH	278.62	626.88	165.25	686.0	NNE
5TH	482.69	805.63	161.98	939.2	NE
6TH	258.97	645.38	161.98	695.4	NNE
7TH	-963.28	-670.00	154.81	1173.4	SW
8TH	697.40	749.38	154.16	1023.7	NE
9TH	184.06	531.13	148.16	562.1	NNE
10TH	353.69	723.38	147.10	805.2	NE

Ground Level Concentration of NOx at Sampling Location at Colaba for Winter Season due to Cumulative Sources Only was found to be 49.296 μg/m^3.

B) DADAR

Table A5.7 : Maximum ten Occurrences of PM_{10} Concentrations at Dadar for Summer Season due to all sources

	X length,m	Y length,m	Concentration µg/m^3	Distance,m	Direction
1ST	-703.06	545.25	395.61	889.7	NW
2ND	-962.00	463.75	379.61	1067.9	NW
3RD	-907.81	-865.75	365.03	1254.4	SW
4TH	-991.16	-855.75	359.03	1309.5	SW
5TH	-491.88	-961.75	329.77	1080.2	SW
6TH	-930.44	481.25	311.72	1047.5	NW
7TH	-16.31	-50.75	307.76	53.3	SW
8TH	-973.16	395.25	307.44	1050.4	NW
9TH	245.15	280.25	299.03	372.3	NE
10TH	-703.06	523.75	298.54	876.7	NW

Ground Level Concentration of PM_{10} at Sampling Location at Dadar for Summer Season due to Cumulative Sources was found to be 119.792 µg/m^3.

Table A5.8 : Maximum ten Occurrences of PM_{10} Concentrations at Dadar for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration µg/m^3	Distance,m	Direction
1ST	-455.94	-848.25	329.07	963.0	SW
2ND	-438.60	-853.50	324.93	959.6	SW
3RD	-521.25	-955.50	321.66	1088.4	SW
4TH	-522.06	-954.00	308.77	1087.5	SW
5TH	-421.25	-857.00	308.53	954.9	SW
6TH	465.47	574.25	307.78	739.2	NE
7TH	-491.88	-961.75	303.28	1080.2	SW
8TH	430.72	532.25	295.45	684.7	NE
9TH	-476.63	534.25	293.82	716.0	NW
10TH	487.19	560.25	291.27	742.5	NE

Ground Level Concentration of PM_{10} at Sampling Location at Dadar for Post Monsoon Season due to Cumulative Sources was found to be 87.713µg/m^3.

Table A5.9 : Maximum ten Occurrences of PM_{10} Concentrations at Dadar for Winter Season due to all sources

	X length,m	Y length,m	Concentration µg/m^3	Distance,m	Direction
1ST	-491.88	-961.75	643.40	1080.2	SW
2ND	-490.94	-906.00	512.36	1030.5	SW
3RD	-973.16	395.25	479.75	1050.4	NW
4TH	217.06	242.25	474.87	325.3	NE
5TH	245.15	280.25	472.71	372.3	NE
6TH	-505.35	-932.75	456.23	1060.8	SW
7TH	-527.13	439.50	424.73	686.3	NW
8TH	-563.81	-1012.25	421.47	1158.7	SW
9TH	-366.28	-648.00	419.64	744.4	SW
10TH	-110.50	-271.50	418.64	293.1	SW

Ground Level Concentration of PM_{10} at Sampling Location at Dadar for Winter Season due to Cumulative Sources Only was found to be 201.90 µg/m^3.

Table A5.10 : Maximum ten Occurrences of NOx Concentrations at Dadar for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	628.15	896.75	233.41	1094.9	NE
2ND	-16.31	-50.75	216.98	53.3	SW
3RD	360.00	498.50	216.94	614.9	NE
4TH	-27.56	-42.75	212.30	50.9	SW
5TH	-583.56	-991.75	192.22	1150.7	SW
6TH	610.84	874.00	191.94	1066.3	NE
7TH	610.84	875.50	190.06	1067.5	NE
8TH	-537.25	-932.75	183.48	1076.4	SW
9TH	-617.69	-999.75	182.05	1175.2	SW
10TH	-491.88	-961.75	175.80	1080.2	SW

Ground Level Concentration of NOx at Sampling Location at Dadar for Summer Season due to Cumulative Sources was found to be 53535 μg/m^3.

Table A5.11 : Maximum ten Occurrences of NOx Concentrations at Dadar for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-455.94	-848.25	168.47	963.0	SW
2ND	-521.25	-955.50	167.10	1088.4	SW
3RD	-438.60	-853.50	160.43	959.6	SW
4TH	-522.06	-954.00	158.73	1087.5	SW
5TH	465.47	574.25	158.05	739.2	NE
6TH	622.37	771.50	157.54	991.2	NE
7TH	430.72	532.25	157.38	684.7	NE
8TH	-421.25	-857.00	156.19	954.9	SW
9TH	826.78	962.25	154.95	1268.7	NE
10TH	-491.88	-961.75	154.17	1080.2	SW

Ground Level Concentration of NOx at Sampling Location at Dadar for Post Monsoon Season due to Cumulative Sources was found to be 44.888 μg/m^3.

Table A5.12 : Maximum ten Occurrences of NOx Concentrations at Dadar for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-491.88	-961.75	370.45	1080.2	SW
2ND	-490.94	-906.00	310.77	1030.5	SW
3RD	217.06	242.25	286.94	325.3	NE
4TH	-366.28	-648.00	275.40	744.4	SW
5TH	245.15	280.25	271.35	372.3	NE
6TH	-455.94	-848.25	268.76	963.0	SW
7TH	-563.81	-1012.25	252.64	1158.7	SW
8TH	-521.25	-955.50	248.67	1088.4	SW
9TH	-522.06	-954.00	247.09	1087.5	SW
10TH	-505.35	-932.75	246.94	1060.8	SW

Ground Level Concentration of NOx at Sampling Location at Dadar for Winter Season due to Cumulative Sources Only was found to be 123.79 μg/m^3.

C) DHARAVI

Table A5.13 : Maximum ten Occurrences of PM_{10} Concentrations at Dharavi for Summer Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	144.16	-544.25	229.46	563.0	SSE
2ND	223.51	-621.50	225.35	660.5	SSE
3RD	233.38	-630.00	222.41	671.8	SSE
4TH	-537.07	129.00	220.42	552.3	WNW
5TH	-561.32	182.00	214.92	590.1	WNW
6TH	-530.47	118.50	214.81	543.5	WNW
7TH	-789.24	287.75	210.88	840.1	WNW
8TH	152.32	-534.25	209.46	555.5	SSE
9TH	-566.59	192.50	209.14	598.4	WNW
10TH	201.38	-605.50	208.85	638.1	SSE

Ground Level Concentration of PM_{10} at Sampling Location at Dharavi for Summer Season due to Cumulative Sources was found to be 45.846 $\mu g/m^3$.

Table A5.14 : Maximum ten Occurrences of PM_{10} Concentrations at Dharavi for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	-725.32	268.00	204.24	773.2	NNW
2ND	248.63	389.25	201.75	461.9	NNE
3RD	-713.43	274.25	195.05	764.3	NNW
4TH	258.76	399.00	188.86	475.6	NNE
5TH	-675.93	287.00	186.87	734.3	NNW
6TH	-687.41	283.50	186.53	743.6	NNW
7TH	-687.41	283.50	186.53	743.6	NNW
8TH	-649.07	295.75	181.52	713.3	NNW
9TH	270.22	407.25	180.92	488.7	NNE
10TH	-691.82	291.75	180.03	750.8	NNW

Ground Level Concentration of PM_{10} at Sampling Location at Dharavi for Post Monsoon Season due to Cumulative Sources was found to be 71.314 $\mu g/m^3$.

Table A5.15 : Maximum ten Occurrences of PM_{10} Concentrations at Dharavi for Winter Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	248.63	389.25	319.66	461.9	NNE
2ND	-725.32	268.00	315.23	773.2	NNW
3RD	-713.43	274.25	307.66	764.3	NNW
4TH	258.76	399.00	301.18	475.6	NNE
5TH	-675.93	287.00	300.95	734.3	NNW
6TH	-687.41	283.50	299.18	743.6	NNW
7TH	-687.41	283.50	299.18	743.6	NNW
8TH	-649.07	295.75	294.50	713.3	NNW
9TH	-691.82	291.75	289.61	750.8	NNW
10TH	270.22	407.25	289.14	488.7	NNE

Ground Level Concentration of PM_{10} at Sampling Location at Dharavi for Winter Season due to Cumulative Sources Only was found to be 100.551 $\mu g/m^3$.

Table A5.16 : Maximum ten Occurrences of NOx Concentrations at Dharavi for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-789.24	287.75	225.16	840.1	WNW
2ND	-786.18	274.50	221.02	832.7	WNW
3RD	144.16	-544.25	209.96	563.0	SSE
4TH	-561.32	182.00	208.50	590.1	WNW
5TH	-566.59	192.50	203.69	598.4	WNW
6TH	223.51	-621.50	198.00	660.5	SSE
7TH	-781.32	256.00	197.91	822.2	WNW
8TH	-781.32	256.00	197.91	822.2	WNW
9TH	-756.63	241.50	196.80	794.2	WNW
10TH	-537.07	129.00	196.77	552.3	WNW

Ground Level Concentration of NOx at Sampling Location at Dharavi for Summer Season due to all Sources was found to be 35.419 μg/m^3.

Table A5.17 : Maximum ten Occurrences of NOx Concentrations at Dharavi for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	248.63	389.25	178.22	461.9	NNE
2ND	-725.32	268.00	175.41	773.2	NNW
3RD	258.76	399.00	166.25	475.6	NNE
4TH	-713.43	274.25	165.89	764.3	NNW
5TH	270.22	407.25	158.98	488.7	NNE
6TH	-687.41	283.50	157.10	743.6	NNW
7TH	-687.41	283.50	157.10	743.6	NNW
8TH	-675.93	287.00	157.10	734.3	NNW
9TH	281.26	416.25	152.74	502.4	NNE
10TH	-649.07	295.75	151.64	713.3	NNW

Ground Level Concentration of NO_x at Sampling Location at Dharavi for Post Monsoon Season due to all Sources was found to be 50.371 μg/m^3

Table A5.18 : Maximum ten Occurrences of NOx Concentrations at Dharavi for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	248.63	389.25	310.34	461.9	NNE
2ND	-725.32	268.00	302.26	773.2	NNW
3RD	-713.43	274.25	294.37	764.3	NNW
4TH	258.76	399.00	292.09	475.6	NNE
5TH	-675.93	287.00	287.15	734.3	NNW
6TH	-687.41	283.50	285.56	743.6	NNW
7TH	-687.41	283.50	285.56	743.6	NNW
8TH	-649.07	295.75	280.48	713.3	NNW
9TH	270.22	407.25	280.24	488.7	NNE
10TH	-691.82	291.75	276.18	750.8	NNW

Ground Level Concentration of NO_x at Sampling Location at Dharavi for Winter Season due to all Sources Only was found to be 87.316 μg/m^3.

D) KHAR

Table A5.19 : Maximum ten Occurrences of PM_{10} Concentrations at Khar for Summer Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	1025.81	601.00	452.14	1188.9	NE
2ND	1025.81	47.75	403.57	1026.9	E
3RD	1025.81	452.50	376.20	1121.2	ENE
4TH	1025.81	335.75	359.75	1079.4	ENE
5TH	1025.81	178.25	342.61	1041.2	ENE
6TH	1016.81	-469.25	285.28	1119.9	ESE
7TH	1025.81	-329.75	279.37	1077.5	ESE
8TH	1030.31	-177.00	271.92	1045.4	ESE
9TH	1025.81	-640.25	271.33	1209.2	SE
10TH	66.72	-102.00	255.28	121.9	SE

Ground Level Concentration of PM_{10} at Sampling Location at Khar for Summer Season due to Cumulative Sources was found to be 136.87 µg/m³.

Table A5.20 : Maximum ten Occurrences of PM_{10} Concentrations at Khar for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	1025.81	601.00	373.10	1188.9	NE
2ND	1025.81	47.75	327.68	1026.9	E
3RD	1025.81	452.50	313.87	1121.2	ENE
4TH	1025.81	335.75	296.24	1079.4	ENE
5TH	1025.81	178.25	278.83	1041.2	ENE
6TH	1016.81	-469.25	232.14	1119.9	ESE
7TH	1025.81	-329.75	224.73	1077.5	ESE
8TH	1025.81	-640.25	219.35	1209.2	SE
9TH	1030.31	-177.00	216.61	1045.4	ESE
10TH	1021.31	735.75	181.61	1258.7	NE

Ground Level Concentration of PM_{10} at Sampling Location at Khar for Post Monsoon Season due to Cumulative Sources was found to be 77.3 µg/m³.

Table A5.21 : Maximum ten Occurrences of PM_{10} Concentrations at Khar for Winter Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	966.38	-171.00	911.80	981.4	E
2ND	968.69	-70.25	892.59	971.2	E
3RD	947.66	-920.75	865.46	1321.3	SE
4TH	947.66	-957.50	859.16	1347.2	SE
5TH	964.03	-210.00	852.38	986.6	ESE
6TH	951.69	-706.00	852.27	1185.0	SE
7TH	954.69	-553.25	845.26	1103.4	SE
8TH	948.44	-887.25	844.37	1298.7	SE
9TH	950.00	-779.25	843.49	1228.7	SE
10TH	957.00	-518.25	836.94	1088.3	ESE

Ground Level Concentration of PM_{10} at Sampling Location at Khar for Winter Season due to Cumulative Sources was found to be 151.30 µg/m³.

Table A5.22 : Maximum ten Occurrences of NOx Concentrations at Khar for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	1025.81	601.00	164.83	1188.9	NE
2ND	1025.81	47.75	145.08	1026.9	E
3RD	1025.81	452.50	139.10	1121.2	ENE
4TH	1025.81	335.75	133.36	1079.4	ENE
5TH	66.72	-102.00	133.15	121.9	SE
6TH	-552.41	953.75	133.08	1102.2	NNW
7TH	69.97	-74.75	129.98	102.4	SE
8TH	-519.34	975.00	127.16	1104.7	NNW
9TH	1025.81	178.25	126.67	1041.2	ENE
10TH	188.72	-157.00	121.18	245.5	SE

Ground Level Concentration of NOx at Sampling Location at Khar for Summer Season due to Cumulative Sources was found to be 35.1 μg/m^3.

Table A5.23 : Maximum ten Occurrences of NOx Concentrations at Khar for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	1025.81	601.00	130.92	1188.9	NE
2ND	1025.81	47.75	112.33	1026.9	E
3RD	1025.81	452.50	111.79	1121.2	ENE
4TH	1025.81	335.75	105.70	1079.4	ENE
5TH	1025.81	178.25	99.36	1041.2	ENE
6TH	66.72	-102.00	88.08	121.9	SE
7TH	-552.41	953.75	87.13	1102.2	NNW
8TH	69.97	-74.75	82.53	102.4	SE
9TH	1016.81	-469.25	81.01	1119.9	ESE
10TH	188.72	-157.00	80.64	245.5	SE

Ground Level Concentration of NOx at Sampling Location at Khar for Post Monsoon Season due to Cumulative Sources was found to be 42.467μg/m^3.

Table A5.24 : Maximum ten Occurrences of NOx Concentrations at Khar for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	966.38	-171.00	302.53	981.4	E
2ND	968.69	-70.25	285.56	971.2	E
3RD	964.03	-210.00	280.70	986.6	ESE
4TH	947.66	-920.75	276.77	1321.3	SE
5TH	947.66	-957.50	275.59	1347.2	SE
6TH	951.69	-706.00	273.28	1185.0	SE
7TH	954.69	-553.25	272.89	1103.4	SE
8TH	950.00	-779.25	271.31	1228.7	SE
9TH	957.00	-518.25	270.08	1088.3	ESE
10TH	948.44	-887.25	269.84	1298.7	SE

Ground Level Concentration of NOx at Sampling Location at Khar for Winter Season due to Cumulative Sources Only was found to be 68.755 μg/m^3.

E) ANDHERI

Table A5.25 : Maximum ten Occurrences of PM_{10} Concentrations at Andheri for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m³	Distance,m	Direction
1ST	43.75	-607.75	517.14	609.3	S
2ND	56.19	-608.25	511.70	610.8	S
3RD	31.78	-607.75	474.76	608.6	S
4TH	67.72	-609.50	470.00	613.3	S
5TH	-12.43	-634.00	467.24	634.1	S
6TH	-12.43	-634.00	467.24	634.1	S
7TH	85.69	-640.50	465.18	646.2	S
8TH	91.66	-675.00	460.35	681.2	S
9TH	87.07	-649.25	458.96	655.1	S
10TH	99.50	-712.25	456.91	719.2	S

Ground Level Concentration of PM_{10} at Sampling Location at Andheri for Summer Season due to Cumulative Sources was found to be 168.01 μg/m³.

Table A5.26 : Maximum ten Occurrences of PM_{10} Concentrations at Andheri for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m³	Distance,m	Direction
1ST	30.88	-41.00	512.00	51.3	SE
2ND	28.10	-50.75	495.21	58.0	SE
3RD	93.97	-983.75	479.67	988.2	S
4TH	32.25	-30.00	477.55	44.0	SE
5TH	96.75	-975.25	473.49	980.0	S
6TH	194.41	784.50	472.89	808.2	NNE
7TH	99.50	-965.75	471.70	970.9	S
8TH	105.94	-944.00	465.34	949.9	S
9TH	18.91	-95.75	456.50	97.6	S
10TH	20.28	-85.75	453.77	88.1	S

Ground Level Concentration of PM_{10} at Sampling Location at Andheri for Post Monsoon Season due to Cumulative Sources was found to be 176.70 μg/m³.

Table A5.27 : Maximum ten Occurrences of PM_{10} Concentrations at Andheri for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m³	Distance,m	Direction
1ST	576.72	-172.75	546.11	602.0	ESE
2ND	572.13	-183.50	518.13	600.8	ESE
3RD	87.07	-649.25	515.76	655.1	S
4TH	229.60	795.75	508.23	828.2	NNE
5TH	85.69	-640.50	507.39	646.2	S
6TH	589.63	-206.00	507.12	624.6	ESE
7TH	89.38	-659.25	494.73	665.3	S
8TH	589.63	-170.50	491.26	613.8	ESE
9TH	599.75	-216.00	487.67	637.5	ESE
10TH	91.44	-665.75	480.22	672.0	S

Ground Level Concentration of PM_{10} at Sampling Location at Andheri for Winter Season due to Cumulative Sources Only was found to be243.80 μg/m³

Table A5.28 : Maximum ten Occurrences of NOx Concentrations at Andheri for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	30.88	-41.00	233.76	51.3	SE
2ND	93.97	-983.75	229.70	988.2	S
3RD	28.10	-50.75	228.24	58.0	SE
4TH	96.75	-975.25	226.22	980.0	S
5TH	99.50	-965.75	225.23	970.9	S
6TH	105.94	-944.00	221.80	949.9	SSE
7TH	18.91	-95.75	215.66	97.6	S
8TH	15.66	-106.00	215.13	107.2	S
9TH	109.19	-934.00	214.38	940.4	S
10TH	11.53	-129.00	213.09	129.5	S

Ground Level Concentration of NOx at Sampling Location at Andheri for Summer Season due to Cumulative Sources was found to be 43.974 μg/m^3.

Table A5.29 : Maximum ten Occurrences of NOx Concentrations at Andheri for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	229.60	795.75	220.94	828.2	N
2ND	238.22	789.50	204.78	824.7	N
3RD	87.07	-649.25	197.61	655.1	S
4TH	89.38	-659.25	192.17	665.3	S
5TH	91.44	-665.75	187.97	672.0	S
6TH	85.69	-640.50	187.26	646.2	S
7TH	91.66	-675.00	185.00	681.2	S
8TH	97.19	-698.00	184.67	704.7	S
9TH	94.44	-685.00	183.70	691.5	S
10TH	99.50	-712.25	181.93	719.2	S

Ground Level Concentration of NO_x at Sampling Location at Andheri for Post Monsoon Season due to Cumulative Sources was found to be 84.23 μg/m^3.

Table A5.30 : Maximum ten Occurrences of NOx Concentrations at Andheri for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	56.19	-608.25	247.55	610.8	S
2ND	43.75	-607.75	246.15	609.3	S
3RD	67.72	-609.50	226.45	613.3	S
4TH	31.78	-607.75	220.48	608.6	S
5TH	99.50	-712.25	216.16	719.2	S
6TH	91.66	-675.00	214.43	681.2	S
7TH	119.78	-881.50	212.97	889.6	S
8TH	117.00	-894.75	212.80	902.4	S
9TH	114.72	-908.00	212.63	915.2	S
10TH	94.44	-685.00	212.49	691.5	S

Ground Level Concentration of NO_x at Sampling Location at Andheri for Winter Season due to Cumulative Sources Only was found to be 106.5 μg/m^3.

F) MAHUL

Table A5.31 : Maximum ten Occurrences of PM_{10} Concentrations at Mahul for Summer Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	138.10	-985.50	359.64	995.1	S
2ND	136.91	-935.50	350.37	945.5	S
3RD	136.04	-914.50	350.29	924.6	S
4TH	132.50	-793.75	349.99	804.7	S
5TH	136.32	-925.25	349.78	935.2	S
6TH	137.79	-977.75	346.87	987.4	S
7TH	132.79	-784.75	344.88	795.9	S
8TH	132.50	-774.75	344.32	786.0	S
9TH	136.91	-947.00	344.27	956.8	S
10TH	132.19	-764.00	343.85	775.4	S

Ground Level Concentration of PM_{10} at Sampling Location at Mahul for Summer Season due to Cumulative Sources was found to be 170.50 µg/m³.

Table A5.32 : Maximum ten Occurrences of PM_{10} Concentrations at Mahul for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	-544.00	711.25	269.60	895.4	NW
2ND	-435.37	763.25	266.16	878.7	NNW
3RD	-531.65	717.75	261.26	893.2	NW
4TH	-423.03	769.00	260.82	877.7	NNW
5TH	-520.03	723.50	259.28	891.0	NW
6TH	-387.43	786.25	255.46	876.5	NNW
7TH	-568.34	699.25	245.22	901.1	NW
8TH	-471.34	746.25	244.55	882.6	NW
9TH	-557.43	705.00	242.89	898.8	NW
10TH	-459.71	752.00	240.22	881.4	NW

Ground Level Concentration of PM_{10} at Sampling Location at Mahul for Post Monsoon Season due to Cumulative Sources was found to be 106.3 µg/m³.

Table A5.33 : Maximum ten Occurrences of PM_{10} Concentrations at Mahul for Winter Season due to all sources

	X length,m	Y length,m	Concentration µg/m³	Distance,m	Direction
1ST	-544.00	711.25	402.09	895.4	NW
2ND	-435.37	763.25	394.50	878.7	NNW
3RD	-531.65	717.75	389.37	893.2	NW
4TH	-520.03	723.50	386.35	891.0	NNW
5TH	-423.03	769.00	386.10	877.7	NW
6TH	-387.43	786.25	378.24	876.5	NNW
7TH	-568.34	699.25	365.26	901.1	NW
8TH	-471.34	746.25	362.22	882.6	NW
9TH	-557.43	705.00	361.62	898.8	NW
10TH	-623.56	673.50	358.78	917.8	NW

Ground Level Concentration of PM_{10} at Sampling Location at Mahul for Winter Season due to Cumulative Sources Only was found to be 262.28 µg/m³.

Table A5.34 : Maximum ten Occurrences of NOx Concentrations at Mahul for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	138.10	-985.50	276.76	995.1	S
2ND	136.91	-935.50	269.65	945.5	S
3RD	136.04	-914.50	269.50	924.6	S
4TH	136.32	-925.25	269.16	935.2	S
5TH	132.50	-793.75	268.59	804.7	S
6TH	137.79	-977.75	267.24	987.4	S
7TH	136.91	-947.00	265.17	956.8	S
8TH	132.79	-784.75	264.82	795.9	S
9TH	132.50	-774.75	264.35	786.0	S
10TH	137.50	-957.50	264.35	967.3	S

Ground Level Concentration of NOx at Sampling Location at Mahul for Summer Season due to Cumulative Sources was found to be 101.72 μg/m^3.

Table A5.35 : Maximum ten Occurrences of NOx Concentrations at Mahul for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-544.00	711.25	210.49	895.4	NW
2ND	-435.37	763.25	204.46	878.7	NNW
3RD	-531.65	717.75	204.44	893.2	NW
4TH	-520.03	723.50	202.72	891.0	NW
5TH	-423.03	769.00	200.38	877.7	NNW
6TH	-387.43	786.25	195.99	876.5	NNW
7TH	-568.34	699.25	192.28	901.1	NW
8TH	-557.43	705.00	190.65	898.8	NW
9TH	-471.34	746.25	189.18	882.6	NW
10TH	-578.50	695.00	188.47	904.3	NW

Ground Level Concentration of NOx at Sampling Location at Mahul for Post Monsoon Season due to Cumulative Sources was found to be 73.69 μg/m^3.

Table A5.36 : Maximum ten Occurrences of NOx Concentrations at Mahul for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-544.00	711.25	313.88	895.4	NW
2ND	-531.65	717.75	304.62	893.2	NW
3RD	-435.37	763.25	302.83	878.7	NNW
4TH	-520.03	723.50	301.94	891.0	NW
5TH	-423.03	769.00	296.41	877.7	NNW
6TH	-387.43	786.25	289.97	876.5	NNW
7TH	-568.34	699.25	286.36	901.1	NW
8TH	-557.43	705.00	283.80	898.8	NW
9TH	-578.50	695.00	280.95	904.3	NW
10TH	-623.56	673.50	280.87	917.8	NW

Ground Level Concentration of NO_x at Sampling Location at Mahul for Winter Season due to Cumulative Sources Only was found to be 111.86 μg/m^3.

G) MULUND

Table A5.37 : Maximum ten Occurrences of PM_{10} Concentrations at Mulund for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m³	Distance,m	Direction
1ST	821.87	100.25	528.38	828.0	E
2ND	832.47	100.50	527.45	838.5	E
3RD	812.03	100.50	526.46	818.2	E
4TH	842.68	101.25	525.99	848.7	E
5TH	804.00	100.50	517.17	810.3	E
6TH	855.50	102.00	515.68	861.6	E
7TH	921.22	102.00	512.98	926.9	E
8TH	794.15	100.25	512.68	800.5	E
9TH	866.81	102.00	512.63	872.8	E
10TH	921.93	102.75	509.38	927.6	E

Ground Level Concentration of PM_{10} at Sampling Location at Mulund for Summer Season due to Cumulative Sources was found to be 240.71 μg/m³.

Table A5.38 : Maximum ten Occurrences of PM_{10} Concentrations at Mulund for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m³	Distance,m	Direction
1ST	832.47	100.50	466.72	838.5	E
2ND	821.87	100.25	466.66	828.0	E
3RD	842.68	101.25	466.38	848.7	E
4TH	921.22	102.00	465.73	926.9	E
5TH	912.81	102.75	464.85	918.6	E
6TH	812.03	100.50	464.53	818.2	E
7TH	901.50	102.50	462.81	907.3	E
8TH	921.93	102.75	461.38	927.6	E
9TH	889.81	102.00	460.60	895.6	E
10TH	855.50	102.00	459.85	861.6	E

Ground Level Concentration of PM_{10} at Sampling Location at Mulund for Post Monsoon Season due to Cumulative Sources was found to be 215.913 μg/m³

Table A5.39 : Maximum ten Occurrences of PM_{10} Concentrations at Mulund for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m³	Distance,m	Direction
1ST	-318.97	380.50	609.64	496.5	NW
2ND	-313.03	388.00	608.25	498.5	NW
3RD	-321.47	372.00	600.38	491.7	WNW
4TH	-253.07	341.25	600.21	424.8	WNW
5TH	-302.53	323.50	600.15	442.9	WNW
6TH	-308.57	396.25	589.94	502.2	WNW
7TH	-244.66	332.50	589.68	412.8	WNW
8TH	-323.85	362.75	576.35	486.3	WNW
9TH	-262.00	350.75	574.83	437.8	WNW
10TH	-324.44	362.50	573.71	486.5	WNW

Ground Level Concentration of PM_{10} at Sampling Location at Mulund for Winter Season due to Cumulative Sources Only was found to be 158.5 μg/m³.

Table A5.40 : Maximum ten Occurrences of NOx Concentrations at Mulund for Summer Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	821.87	100.25	282.57	828.0	E
2ND	832.47	100.50	282.03	838.5	E
3RD	812.03	100.50	281.58	818.2	E
4TH	842.68	101.25	281.21	848.7	E
5TH	804.00	100.50	276.66	810.3	E
6TH	855.50	102.00	275.67	861.6	E
7TH	794.15	100.25	274.30	800.5	E
8TH	921.22	102.00	274.10	926.9	E
9TH	866.81	102.00	274.00	872.8	E
10TH	921.93	102.75	272.22	927.6	E

Ground Level Concentration of NOx at Sampling Location at Mulund for Summer Season due to Cumulative Sources was found to be 115.882 μg/m^3.

Table A5.41 : Maximum ten Occurrences of NOx Concentrations at Mulund for Post Monsoon Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	-318.97	380.50	320.69	496.5	NW
2ND	-313.03	388.00	320.59	498.5	NW
3RD	-253.07	341.25	316.24	424.8	WNW
4TH	-321.47	372.00	315.21	491.7	WNW
5TH	-302.53	323.50	314.70	442.9	WNW
6TH	-308.57	396.25	312.34	502.2	WNW
7TH	-244.66	332.50	310.81	412.8	WNW
8TH	-262.00	350.75	303.36	437.8	WNW
9TH	-269.94	358.25	302.36	448.6	WNW
10TH	-323.85	362.75	302.27	486.3	WNW

Ground Level Concentration of NO_x at Sampling Location at Mulund for Post Monsoon Season due to Cumulative Sources was found to be 83.509μg/m^3.

Table A5.42 : Maximum ten Occurrences of NOx Concentrations at Mulund for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3	Distance,m	Direction
1ST	821.87	100.25	254.37	828.0	E
2ND	832.47	100.50	254.27	838.5	E
3RD	842.68	101.25	253.96	848.7	E
4TH	812.03	100.50	253.28	818.2	E
5TH	921.22	102.00	252.38	926.9	E
6TH	912.81	102.75	251.28	918.6	E
7TH	901.50	102.50	250.42	907.3	E
8TH	921.93	102.75	250.17	927.6	E
9TH	855.50	102.00	250.12	861.6	E
10TH	889.81	102.00	249.67	895.6	E

Ground Level Concentration of NO_x at Sampling Location at Mulund for Winter Season due to Cumulative Sources Only was found to be 127.15 μg/m^3.

MUMBAI CITY

Table A5.43 : Maximum ten Occurrences of PM_{10} Concentrations at Mumbai City for Summer Season due to all sources

	X Coordinates	Y Coordinates	Concentration $\mu g/m^3$
1^{ST}	279088.25	2102257.75	844.58
2^{ND}	279281.44	2102589.00	485.37
3^{RD}	275125.22	2123728.75	468.20
4^{TH}	275237.19	2123557.50	463.61
5^{TH}	278688.06	2102630.50	439.91
6^{TH}	279405.66	2101903.25	426.87
7^{TH}	274861.69	2123511.50	413.77
8^{TH}	278674.25	2102041.25	376.88
9^{TH}	275382.13	2123696.00	371.03
10TH	275085.69	2123406.00	347.63

Table A5.44 : Maximum ten Occurrences of PM_{10} Concentrations at Mumbai City for Post Monsoon Season due to all sources

	X Coordinates	Y Coordinates	Concentration $\mu g/m^3$
1^{ST}	279709.25	2102920.25	798.31
2^{ND}	275849.88	2123900.25	687.36
3^{RD}	279419.44	2102851.25	687.02
4^{TH}	280150.88	2102961.75	550.88
5^{TH}	275592.94	2123814.50	534.53
6^{TH}	280081.84	2102671.75	527.19
7^{TH}	276080.44	2123913.25	482.06
8^{TH}	280675.25	2103016.75	411.93
9^{TH}	279281.44	2102589.00	411.46
10TH	275434.84	2124018.75	409.00

Table A5.45 : Maximum ten Occurrences of PM_{10} Concentrations at Mumbai City for Winter Season due to all sources

	X Coordinates	Y Coordinates	Concentration $\mu g/m^3$
1^{ST}	279405.66	2101903.25	1247.25
2^{ND}	279088.25	2102257.75	1189.92
3^{RD}	279281.44	2102589.00	743.71
4^{TH}	275474.38	2123379.75	564.14
5^{TH}	275085.69	2123406.00	563.87
6^{TH}	279019.25	2101848.00	559.83
7^{TH}	275560.00	2123544.50	516.67
8^{TH}	275237.19	2123557.50	501.75
9^{TH}	275658.81	2123195.25	467.65
10TH	275270.13	2123162.25	466.12

Table A5.46 : Maximum ten Occurrences of NOx Concentrations at Mumbai City for Summer Season due to all sources

	X Coordinates	Y Coordinates	Concentration μg/m^3
1ST	279088.25	2102257.75	8977.76
2ND	279281.44	2102589.00	5169.17
3RD	278688.06	2102630.50	4630.50
4TH	279405.66	2101903.25	4546.08
5TH	278674.25	2102041.25	3952.74
6TH	278232.66	2102358.50	3312.95
7TH	279019.25	2101848.00	2004.11
8TH	279419.44	2102851.25	1515.83
9TH	278660.44	2102934.00	1119.44
10TH	277321.84	2102234.50	1026.47

Table A5.47 : Maximum ten Occurrences of NOx Concentrations at Mumbai City for Post Monsoon Season due to all sources

	X Coordinates	Y Coordinates	Concentration μg/m^3
1ST	279709.25	2102920.25	8285.38
2ND	279419.44	2102851.25	7100.76
3RD	280150.88	2102961.75	5636.08
4TH	280081.84	2102671.75	5384.36
5TH	279281.44	2102589.00	4156.44
6TH	280675.25	2103016.75	4145.00
7TH	280426.88	2102727.00	3534.49
8TH	281185.88	2103210.00	3370.34
9TH	281213.47	2103568.75	3283.00
10TH	280482.06	2103417.00	3264.31

Table A5.48 : Maximum ten Occurrences of NOx Concentrations at Mumbai City for Winter Season due to all sources

	X Coordinates	Y Coordinates	Concentration μg/m^3
1ST	279405.66	2101903.25	13256.38
2ND	279088.25	2102257.75	12657.84
3RD	279281.44	2102589.00	7975.93
4TH	279019.25	2101848.00	5877.69
5TH	279419.44	2102851.25	1697.77
6TH	278425.84	2103430.75	1042.28
7TH	279626.44	2101875.50	851.13
8TH	279709.25	2103196.25	773.35
9TH	279709.25	2102920.25	770.60
10TH	279226.25	2103458.50	691.29

Annexure 6

Ten Highest Concentrations of PM_{10} and NOx of BaU 2012, 2017 and After Control Options

A) Business as Usual 2012

Table A6.1: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	273270.00	2104630.00	445.89
2^{ND}	272970.00	2104630.00	445.49
3^{RD}	272670.00	2104630.00	440.87
4^{TH}	272970.00	2104030.00	440.82
5^{TH}	273270.00	2104030.00	440.77
6^{TH}	273570.00	2104630.00	438.76
7^{TH}	272670.00	2104030.00	436.04
8^{TH}	273570.00	2104030.00	433.20
9^{TH}	272370.00	2104630.00	432.25
10TH	273270.00	2105230.00	429.70

Table A6.2 : Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	279270.00	2102230.00	350.2
2^{ND}	279270.00	2101630.00	277.3
3^{RD}	279270.00	2101030.00	197.5
4^{TH}	279270.00	2100430.00	154.0
5^{TH}	273270.00	2104030.00	143.5
6^{TH}	273270.00	2104630.00	143.5
7^{TH}	272970.00	2104030.00	142.9
8^{TH}	272970.00	2104630.00	142.8
9^{TH}	273570.00	2104630.00	142.3
10TH	273570.00	2104030.00	142.2

B) Business as Usual 2017

Table A6.3: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3
1ST	273270.00	2104630.00	612.29
2ND	272970.00	2104630.00	611.85
3RD	272670.00	2104630.00	605.50
4TH	272970.00	2104030.00	605.42
5TH	273270.00	2104030.00	605.29
6TH	273570.00	2104630.00	602.59
7TH	272670.00	2104030.00	598.87
8TH	273570.00	2104030.00	594.93
9TH	272370.00	2104630.00	593.65
10TH	273270.00	2105230.00	589.96

Table A6.4: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources

	X length,m	Y length,m	Concentration μg/m^3
1ST	279270.00	2102230.00	366.74
2ND	279270.00	2101630.00	291.11
3RD	279270.00	2101030.00	210.55
4TH	273270.00	2104030.00	196.88
5TH	273270.00	2104630.00	196.83
6TH	272970.00	2104030.00	196.10
7TH	272970.00	2104630.00	195.87
8TH	273570.00	2104630.00	195.18
9TH	273570.00	2104030.00	195.08
10TH	273270.00	2102230.00	194.92

C.1) Control Option I -2012

Table A6.5: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -I

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	273270	2104630	441.32
2ND	272970	2104630	440.93
3RD	272670	2104630	436.36
4TH	272970	2104030	436.27
5TH	273270	2104030	436.21
6TH	273570	2104630	434.24
7TH	272670	2104030	431.56
8TH	273570	2104030	428.70
9TH	272370	2104630	427.85
10TH	273270	2105230	425.27

Table A6.6: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -I

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	279270	2102230	330.32
2ND	279270	2101630	260.78
3RD	279270	2101030	181.73
4TH	279270	2100430	138.83
5TH	279270	2099830	110.98
6TH	279270	2099230	92.90
7TH	278970	2101630	91.92
8TH	278970	2101030	89.61
9TH	279270	2102830	89.40
10TH	278970	2100430	83.00

C.2) Control Option I -2017

Table A6.7: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -I

	X length,m	Y length,m	Concentration μg/m³
1ST	273270	2104630	606.00
2ND	272970	2104630	605.58
3RD	272670	2104630	599.31
4TH	272970	2104030	599.17
5TH	273270	2104030	599.02
6TH	273570	2104630	596.37
7TH	272670	2104030	592.70
8TH	273570	2104030	588.75
9TH	272370	2104630	587.61
10TH	273270	2105230	583.86

Table A6.8: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -I

	X length,m	Y length,m	Concentration μg/m³
1ST	279270	2102230	338.96
2ND	279270	2101630	267.99
3RD	279270	2101030	188.59
4TH	279270	2100430	145.47
5TH	279270	2099830	116.90
6TH	273270	2104030	107.83
7TH	273270	2104630	107.82
8TH	272970	2104030	107.37
9TH	272970	2104630	107.24
10TH	273570	2104630	106.89

D) Control Option II -2017 (2012 is same as Control Option I)

Table A6.9: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -II

	X length,m	Y length,m	Concentration μg/m³
1ST	273270	2104630	599.08
2ND	272970	2104630	598.69
3RD	272670	2104630	592.50
4TH	272970	2104030	592.30
5TH	273270	2104030	592.13
6TH	273570	2104630	589.53
7TH	272670	2104030	585.92
8TH	273570	2104030	581.94
9TH	272370	2104630	580.96
10TH	273270	2105230	577.16

Table A6.10: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -II

	X length,m	Y length,m	Concentration μg/m³
1ST	279270	2102230	335.35
2ND	279270	2101630	264.96
3RD	279270	2101030	185.71
4TH	279270	2100430	142.68
5TH	279270	2099830	114.41
6TH	278970	2101630	96.16
7TH	279270	2099230	96.12
8TH	273270	2104630	95.57
9TH	273270	2104030	95.57
10TH	272970	2104030	95.14

E) Control Option III -2017
(2012 is same as Control Option I and PM10 for 2017 is same as Control Option II)

Table A6.11: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -III

	X length,m	Y length,m	Concentration μg/m^3
1ST	279270.00	2102230.00	338.95
2ND	279270.00	2101630.00	267.98
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.89
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.36
9TH	272970.00	2104630.00	107.23
10TH	273570.00	2104630.00	106.88

F.1) Control Option IV -2012

Table A6.12: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -IV

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	279270.00	2102230.00	349.19
2ND	279270.00	2101630.00	276.49
3RD	279270.00	2101030.00	196.67
4TH	279270.00	2100430.00	153.28
5TH	273270.00	2104030.00	140.29
6TH	273270.00	2104630.00	140.27
7TH	272970.00	2104030.00	139.71
8TH	272970.00	2104630.00	139.55
9TH	273570.00	2104630.00	139.08
10TH	273570.00	2104030.00	139.01

F.2) Control Option IV -2017

Table A6.13: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -IV

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	273270.00	2104630.00	606.00
2ND	272970.00	2104630.00	605.58
3RD	272670.00	2104630.00	599.31
4TH	272970.00	2104030.00	599.17
5TH	273270.00	2104030.00	599.02
6TH	273570.00	2104630.00	596.37
7TH	272670.00	2104030.00	592.70
8TH	273570.00	2104030.00	588.75
9TH	272370.00	2104630.00	587.61
10TH	273270.00	2105230.00	583.86

Table A6.14: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -IV

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	279270.00	2102230.00	338.96
2ND	279270.00	2101630.00	267.99
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.90
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.37
9TH	272970.00	2104630.00	107.24
10TH	273570.00	2104630.00	106.89

G.1) Control Option V -2012

Table A6.15: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -V

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	273270.00	2104630.00	441.32
2^{ND}	272970.00	2104630.00	440.93
3^{RD}	272670.00	2104630.00	436.36
4^{TH}	272970.00	2104030.00	436.27
5^{TH}	273270.00	2104030.00	436.21
6^{TH}	273570.00	2104630.00	434.24
7^{TH}	272670.00	2104030.00	431.56
8^{TH}	273570.00	2104030.00	428.70
9^{TH}	272370.00	2104630.00	427.85
10TH	273270.00	2105230.00	425.27

Table A6.16: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -V

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	279270.00	2102230.00	330.32
2^{ND}	279270.00	2101630.00	260.78
3^{RD}	279270.00	2101030.00	181.73
4^{TH}	279270.00	2100430.00	138.83
5^{TH}	279270.00	2099830.00	110.98
6^{TH}	279270.00	2099230.00	92.90
7^{TH}	278970.00	2101630.00	91.92
8^{TH}	278970.00	2101030.00	89.61
9^{TH}	279270.00	2102830.00	89.40
10TH	278970.00	2100430.00	83.00

G.2) Control Option V -2017

Table A6.17: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -V

	X length,m	Y length,m	Concentration μg/m^3
1ST	273270.00	2104630.00	606.00
2ND	272970.00	2104630.00	605.58
3RD	272670.00	2104630.00	599.31
4TH	272970.00	2104030.00	599.17
5TH	273270.00	2104030.00	599.02
6TH	273570.00	2104630.00	596.37
7TH	272670.00	2104030.00	592.70
8TH	273570.00	2104030.00	588.75
9TH	272370.00	2104630.00	587.61
10TH	273270.00	2105230.00	583.86

Table A6.18: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -V

	X length,m	Y length,m	Concentration μg/m^3
1ST	279270.00	2102230.00	338.96
2ND	279270.00	2101630.00	267.99
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.90
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.37
9TH	272970.00	2104630.00	107.24
10TH	273570.00	2104630.00	106.89

H.1) Control Option VI -2012

Table A6.19: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -VI

	X length,m	Y length,m	Concentration μg/m^3
1ST	273270.00	2104630.00	441.32
2ND	272970.00	2104630.00	440.93
3RD	272670.00	2104630.00	436.36
4TH	272970.00	2104030.00	436.27
5TH	273270.00	2104030.00	436.21
6TH	273570.00	2104630.00	434.24
7TH	272670.00	2104030.00	431.56
8TH	273570.00	2104030.00	428.70
9TH	272370.00	2104630.00	427.85
10TH	273270.00	2105230.00	425.27

Table A6.20: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -VI

	X length,m	Y length,m	Concentration μg/m^3
1ST	279270.00	2102230.00	330.32
2ND	279270.00	2101630.00	260.78
3RD	279270.00	2101030.00	181.73
4TH	279270.00	2100430.00	138.83
5TH	279270.00	2099830.00	110.98
6TH	279270.00	2099230.00	92.91
7TH	278970.00	2101630.00	91.92
8TH	278970.00	2101030.00	89.61
9TH	279270.00	2102830.00	89.40
10TH	278970.00	2100430.00	83.00

H.2) Control Option VI -2017

Table A6.21: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -VI

	X length,m	Y length,m	Concentration μg/m^3
1ST	273270.00	2104630.00	606.00
2ND	272970.00	2104630.00	605.58
3RD	272670.00	2104630.00	599.31
4TH	272970.00	2104030.00	599.17
5TH	273270.00	2104030.00	599.02
6TH	273570.00	2104630.00	596.37
7TH	272670.00	2104030.00	592.70
8TH	273570.00	2104030.00	588.75
9TH	272370.00	2104630.00	587.61
10TH	273270.00	2105230.00	583.86

Table A6.22: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -VI

	X length,m	Y length,m	Concentration μg/m^3
1ST	279270.00	2102230.00	338.96
2ND	279270.00	2101630.00	267.99
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.90
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.37
9TH	272970.00	2104630.00	107.24
10TH	273570.00	2104630.00	106.89

I.1) Control Option VII -2012

Table A6.23: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -VII

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	441.32
2ND	272970.00	2104630.00	440.93
3RD	272670.00	2104630.00	436.36
4TH	272970.00	2104030.00	436.27
5TH	273270.00	2104030.00	436.21
6TH	273570.00	2104630.00	434.24
7TH	272670.00	2104030.00	431.56
8TH	273570.00	2104030.00	428.70
9TH	272370.00	2104630.00	427.85
10TH	273270.00	2105230.00	425.27

Table A6.24: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -VII

	X length,m	Y length,m	Concentration μg/m³
1ST	279270.00	2102230.00	330.32
2ND	279270.00	2101630.00	260.78
3RD	279270.00	2101030.00	181.73
4TH	279270.00	2100430.00	138.83
5TH	279270.00	2099830.00	110.98
6TH	279270.00	2099230.00	92.90
7TH	278970.00	2101630.00	91.92
8TH	278970.00	2101030.00	89.61
9TH	279270.00	2102830.00	89.40
10TH	278970.00	2100430.00	83.00

I.2) Control Option VII -2017

Table A6.25: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -VII

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	273270.00	2104630.00	606.00
2ND	272970.00	2104630.00	605.58
3RD	272670.00	2104630.00	599.31
4TH	272970.00	2104030.00	599.17
5TH	273270.00	2104030.00	599.02
6TH	273570.00	2104630.00	596.37
7TH	272670.00	2104030.00	592.70
8TH	273570.00	2104030.00	588.75
9TH	272370.00	2104630.00	587.61
10TH	273270.00	2105230.00	583.86

Table A6.26: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -VII

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	279270.00	2102230.00	338.96
2ND	279270.00	2101630.00	267.99
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.90
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.37
9TH	272970.00	2104630.00	107.24
10TH	273570.00	2104630.00	106.89

J.1) Control Option VIII -2012

Table A6.27: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -VIII

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	273270.00	2104630.00	441.32
2^{ND}	272970.00	2104630.00	440.93
3^{RD}	272670.00	2104630.00	436.36
4^{TH}	272970.00	2104030.00	436.27
5^{TH}	273270.00	2104030.00	436.21
6^{TH}	273570.00	2104630.00	434.24
7^{TH}	272670.00	2104030.00	431.56
8^{TH}	273570.00	2104030.00	428.70
9^{TH}	272370.00	2104630.00	427.85
10TH	273270.00	2105230.00	425.27

Table A6.28: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -VIII

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	279270.00	2102230.00	330.32
2^{ND}	279270.00	2101630.00	260.78
3^{RD}	279270.00	2101030.00	181.73
4^{TH}	279270.00	2100430.00	138.83
5^{TH}	279270.00	2099830.00	110.98
6^{TH}	279270.00	2099230.00	92.90
7^{TH}	278970.00	2101630.00	91.92
8^{TH}	278970.00	2101030.00	89.61
9^{TH}	279270.00	2102830.00	89.40
10TH	278970.00	2100430.00	83.00

J.2) Control Option VIII -2017

Table A6.29: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -VIII

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	606.00
2ND	272970.00	2104630.00	605.58
3RD	272670.00	2104630.00	599.31
4TH	272970.00	2104030.00	599.17
5TH	273270.00	2104030.00	599.02
6TH	273570.00	2104630.00	596.37
7TH	272670.00	2104030.00	592.70
8TH	273570.00	2104030.00	588.75
9TH	272370.00	2104630.00	587.61
10TH	273270.00	2105230.00	583.86

Table A6.30: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -VIII

	X length,m	Y length,m	Concentration μg/m³
1ST	279270.00	2102230.00	338.96
2ND	279270.00	2101630.00	267.99
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.90
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.37
9TH	272970.00	2104630.00	107.24
10TH	273570.00	2104630.00	106.89

K.1) Control Option IX -2012

Table A6.31: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option - IX

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	441.32
2ND	272970.00	2104630.00	440.93
3RD	272670.00	2104630.00	436.36
4TH	272970.00	2104030.00	436.27
5TH	273270.00	2104030.00	436.21
6TH	273570.00	2104630.00	434.24
7TH	272670.00	2104030.00	431.56
8TH	273570.00	2104030.00	428.70
9TH	272370.00	2104630.00	427.85
10TH	273270.00	2105230.00	425.27

Table A6.32: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option - IX

	X length,m	Y length,m	Concentration μg/m³
1ST	279270.00	2102230.00	330.32
2ND	279270.00	2101630.00	260.78
3RD	279270.00	2101030.00	181.73
4TH	279270.00	2100430.00	138.83
5TH	279270.00	2099830.00	110.98
6TH	279270.00	2099230.00	92.90
7TH	278970.00	2101630.00	91.92
8TH	278970.00	2101030.00	89.61
9TH	279270.00	2102830.00	89.40
10TH	278970.00	2100430.00	83.00

K.2) Control Option IX -2017

Table A6.33: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option - IX

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	606.00
2ND	272970.00	2104630.00	605.58
3RD	272670.00	2104630.00	599.31
4TH	272970.00	2104030.00	599.17
5TH	273270.00	2104030.00	599.02
6TH	273570.00	2104630.00	596.37
7TH	272670.00	2104030.00	592.70
8TH	273570.00	2104030.00	588.75
9TH	272370.00	2104630.00	587.61
10TH	273270.00	2105230.00	583.86

Table A6.34: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option - IX

	X length,m	Y length,m	Concentration μg/m³
1ST	279270.00	2102230.00	338.96
2ND	279270.00	2101630.00	267.99
3RD	279270.00	2101030.00	188.59
4TH	279270.00	2100430.00	145.47
5TH	279270.00	2099830.00	116.90
6TH	273270.00	2104030.00	107.83
7TH	273270.00	2104630.00	107.82
8TH	272970.00	2104030.00	107.37
9TH	272970.00	2104630.00	107.24
10TH	273570.00	2104630.00	106.89

L.1) Control Option XI -2012

Table A6.35: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option - XI

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	273270.00	2104630.00	441.32
2ND	272970.00	2104630.00	440.93
3RD	272670.00	2104630.00	436.36
4TH	272970.00	2104030.00	436.27
5TH	273270.00	2104030.00	436.21
6TH	273570.00	2104630.00	434.24
7TH	272670.00	2104030.00	431.56
8TH	273570.00	2104030.00	428.70
9TH	272370.00	2104630.00	427.85
10TH	273270.00	2105230.00	425.27

Table A6.36 : Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option - XI

	X length,m	Y length,m	Concentration $\mu g/m^3$
1ST	279270.00	2102230.00	330.32
2ND	279270.00	2101630.00	260.78
3RD	279270.00	2101030.00	181.73
4TH	279270.00	2100430.00	138.83
5TH	279270.00	2099830.00	110.98
6TH	279270.00	2099230.00	92.90
7TH	278970.00	2101630.00	91.92
8TH	278970.00	2101030.00	89.61
9TH	279270.00	2102830.00	89.40
10TH	278970.00	2100430.00	83.00

L.2) Control Option XI -2017

Table A6.37: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option - XI

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	605.9995
2ND	272970.00	2104630.00	605.5826
3RD	272670.00	2104630.00	599.3068
4TH	272970.00	2104030.00	599.1741
5TH	273270.00	2104030.00	599.0224
6TH	273570.00	2104630.00	596.3718
7TH	272670.00	2104030.00	592.7036
8TH	273570.00	2104030.00	588.7484
9TH	272370.00	2104630.00	587.6108
10TH	273270.00	2105230.00	583.864

Table A6.38: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option - XI

	X length,m	Y length,m	Concentration μg/m³
1ST	279270.00	2102230.00	338.9578
2ND	279270.00	2101630.00	267.9872
3RD	279270.00	2101030.00	188.5897
4TH	279270.00	2100430.00	145.4676
5TH	279270.00	2099830.00	116.898
6TH	273270.00	2104030.00	107.8328
7TH	273270.00	2104630.00	107.8248
8TH	272970.00	2104030.00	107.366
9TH	272970.00	2104630.00	107.2361
10TH	273570.00	2104630.00	106.8856

M) Control Option XII- 2012 and 2017

Table A6.39: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XII

	X length,m	Y length,m	Concentration μg/m^3
1ST	273270.00	2104630.00	382.48
2ND	272970.00	2104630.00	382.08
3RD	272670.00	2104630.00	378.11
4TH	272970.00	2104030.00	378.10
5TH	273270.00	2104030.00	378.09
6TH	273570.00	2104630.00	376.34
7TH	272670.00	2104030.00	374.00
8TH	273570.00	2104030.00	371.59
9TH	272370.00	2104630.00	370.71
10TH	273270.00	2105230.00	368.65

Table A6.40: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XII

	X length m	Y length m	Concentration μg/m^3
1ST	273270.00	2104630.00	525.14
2ND	272970.00	2104630.00	524.71
3RD	272670.00	2104630.00	519.25
4TH	272970.00	2104030.00	519.23
5TH	273270.00	2104030.00	519.15
6TH	273570.00	2104630.00	516.80
7TH	272670.00	2104030.00	513.60
8TH	273570.00	2104030.00	510.28
9TH	272370.00	2104630.00	509.08
10TH	273270.00	2105230.00	506.05

N.1) Control Option XIII- 2012

Table A6.41: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIII

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	370.02
2ND	272970.00	2104630.00	369.67
3RD	272670.00	2104630.00	365.85
4TH	272970.00	2104030.00	365.72
5TH	273270.00	2104030.00	365.68
6TH	273570.00	2104630.00	364.02
7TH	272670.00	2104030.00	361.78
8TH	273570.00	2104030.00	359.34
9TH	272370.00	2104630.00	358.74
10TH	273270.00	2105230.00	356.58

Table A6.42: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIII

	X length m	Y length m	Concentration μg/m³
1ST	279270.00	2102230.00	323.24
2ND	279270.00	2101630.00	254.87
3RD	279270.00	2101030.00	176.13
4TH	279270.00	2100430.00	133.41
5TH	279270.00	2099830.00	106.14
6TH	279270.00	2099230.00	88.37
7TH	278970.00	2101630.00	85.95
8TH	278970.00	2101030.00	83.94
9TH	279270.00	2102830.00	82.37
10TH	278970.00	2100430.00	77.51

N.2) Control Option XIII- 2017

Table A6.43: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIII

	X length,m	Y length,m	Concentration μg/m^3
1ST	273270.00	2104630.00	504.09
2ND	272970.00	2104630.00	503.73
3RD	272670.00	2104630.00	498.54
4TH	272970.00	2104030.00	498.32
5TH	273270.00	2104030.00	498.19
6TH	273570.00	2104630.00	496.00
7TH	272670.00	2104030.00	492.96
8TH	273570.00	2104030.00	489.57
9TH	272370.00	2104630.00	488.85
10TH	273270.00	2105230.00	485.66

Table A6.44: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIII

	X length m	Y length m	Concentration μg/m^3
1ST	279270.00	2102230.00	326.32
2ND	279270.00	2101630.00	257.44
3RD	279270.00	2101030.00	178.56
4TH	279270.00	2100430.00	135.77
5TH	279270.00	2099830.00	108.25
6TH	279270.00	2099230.00	90.34
7TH	278970.00	2101630.00	88.55
8TH	278970.00	2101030.00	86.41
9TH	279270.00	2102830.00	85.43
10TH	278970.00	2100430.00	79.90

O.1) Control Option XIV- 2012

Table A6.45: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIV

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	223.69
2ND	272970.00	2104630.00	223.34
3RD	273270.00	2104030.00	221.07
4TH	272670.00	2104630.00	221.02
5TH	272970.00	2104030.00	221.01
6TH	273570.00	2104630.00	219.99
7TH	272670.00	2104030.00	218.61
8TH	273570.00	2104030.00	217.21
9TH	272370.00	2104630.00	216.71
10TH	273270.00	2105230.00	215.70

Table A6.46: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIV

	X length m	Y length m	Concentration μg/m³
1ST	279270.00	2102230.00	328.13
2ND	279270.00	2101630.00	258.94
3RD	279270.00	2101030.00	179.99
4TH	279270.00	2100430.00	137.15
5TH	279270.00	2099830.00	109.48
6TH	279270.00	2099230.00	91.50
7TH	278970.00	2101630.00	90.07
8TH	278970.00	2101030.00	87.85
9TH	279270.00	2102830.00	87.22
10TH	278970.00	2100430.00	81.30

O.2) Control Option XIV- 2017

Table A6.47: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIV

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	306.93
2ND	272970.00	2104630.00	306.56
3RD	272670.00	2104630.00	303.38
4TH	273270.00	2104030.00	303.37
5TH	272970.00	2104030.00	303.35
6TH	273570.00	2104630.00	301.95
7TH	272670.00	2104030.00	300.07
8TH	273570.00	2104030.00	298.13
9TH	272370.00	2104630.00	297.46
10TH	273270.00	2105230.00	295.87

Table A6.48: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XIV

	X length m	Y length m	Concentration μg/m³
1ST	279270.00	2102230.00	336.42
2ND	279270.00	2101630.00	265.85
3RD	279270.00	2101030.00	186.55
4TH	279270.00	2100430.00	143.50
5TH	279270.00	2099830.00	115.14
6TH	273270.00	2104630.00	99.01
7TH	273270.00	2104030.00	99.00
8TH	272970.00	2104030.00	98.57
9TH	272970.00	2104630.00	98.46
10TH	273570.00	2104630.00	98.15

P.1) Control Option XV- 2012

Table A6.49: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XV

	X length,m	Y length,m	Concentration μg/m³
1ST	273270.00	2104630.00	357.71
2ND	272970.00	2104630.00	357.33
3RD	272670.00	2104630.00	353.63
4TH	272970.00	2104030.00	353.60
5TH	273270.00	2104030.00	353.59
6TH	273570.00	2104630.00	351.94
7TH	272670.00	2104030.00	349.77
8TH	273570.00	2104030.00	347.50
9TH	272370.00	2104630.00	346.73
10TH	273270.00	2105230.00	344.79

Table A6.50: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season due to all sources after implementing Control Option -XV

	X length m	Y length m	Concentration μg/m³
1ST	279270.00	2102230.00	341.72
2ND	279270.00	2101630.00	270.27
3RD	279270.00	2101030.00	190.76
4TH	279270.00	2100430.00	147.56
5TH	279270.00	2099830.00	118.77
6TH	273270.00	2104030.00	116.28
7TH	273270.00	2104630.00	116.27
8TH	272970.00	2104030.00	115.78
9TH	272970.00	2104630.00	115.65
10TH	273570.00	2104630.00	115.27

P.2) Control Option XV- 2017

Table A6.51: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XV

	X length,m	Y length,m	Concentration $\mu g/m^3$
1^{ST}	273270.00	2104630.00	489.90
2^{ND}	272970.00	2104630.00	489.48
3^{RD}	272670.00	2104630.00	484.40
4^{TH}	272970.00	2104030.00	484.34
5^{TH}	273270.00	2104030.00	484.27
6^{TH}	273570.00	2104630.00	482.08
7^{TH}	272670.00	2104030.00	479.10
8^{TH}	273570.00	2104030.00	475.96
9^{TH}	272370.00	2104630.00	474.92
10TH	273270.00	2105230.00	472.08

Table A6.52: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season due to all sources after implementing Control Option -XV

	X length m	Y length m	Concentration $\mu g/m^3$
1^{ST}	279270.00	2102230.00	354.51
2^{ND}	279270.00	2101630.00	280.93
3^{RD}	279270.00	2101030.00	200.88
4^{TH}	273270.00	2104030.00	157.54
5^{TH}	273270.00	2104630.00	157.52
6^{TH}	279270.00	2100430.00	157.36
7^{TH}	272970.00	2104030.00	156.90
8^{TH}	272970.00	2104630.00	156.72
9^{TH}	273570.00	2104630.00	156.18
10TH	273570.00	2104030.00	156.10

Annexure 7.1 : Control Options Evaluation -CPCB

Source Category	Control Options	Expected % Reduction in Emissions (Factor)	Source Information	Scenario for 2012	Scenario for 2017
Vehicles	**Technology based**				
	1.Implementation of BS – IV norms	• Difference between BS – III and BS – IV (as currently BS – III is in use): • Gasoline – NOx: 47% • Diesel – PM: 45%, NOx: 50%	ARAI	BS – IV from 2010 (adopt progressive increment)	BS – IV from 2010 (adopt progressive increment)
	2. Implementation of BS – V norms	• Difference between BS – IV and BS – V: • Gasoline – NOx: 25% • Diesel – PM: 90%, NOx: 28%	ARAI*	BS – IV from 2010 (adopt progressive increment)	• BS – IV from 2010 (adopt progressive increment) • BS – V from 2015 (adopt progressive increment)
	3. Implementation of BS – VI norms	• Difference between BS – V and BS – VI: • Diesel – NOx: 55%	ARAI*	BS – IV from 2010 (adopt progressive increment)	• BS – IV from 2010 (adopt progressive increment) • BS – VI from 2015 (adopt progressive increment)
	4. Electric Vehicles	NOx and PM: 100% (Zero emissions)	ARAI*	• Share of Electric vehicles in total city fleet • Two wheeler: 1%, • Auto Riksha and Taxi: 5% • Public buses: 5%	• Share of Electric vehicles in total city fleet – • Two wheeler: 2%, • Auto Riksha and Taxi: 10% • Public buses: 10%
	5. Hybrid vehicles	NOx: 50%	ARAI*	Share of Hybrid vehicles in total city fleet (Gasoline powered four-wheelers only) – 1%	Share of Hybrid vehicles in total city fleet (Gasoline powered four-wheelers only) – 2%
	6. CNG/LPG to commercial (all 3 and 4-wheelers)	• Public Transport (Buses) PM: 75% • NOx: 12.5% • (as compared to BS – II and BS – III vehicles)	ARAI*	25% conversion	100% conversion
	7. Ethanol blending (E10 – 10% blend)	NOx: 5%	ARAI*	Share of Ethanol blended fuel – 10%	Share of Ethanol blended fuel – 10%

Source Category	Control Options	Expected % Reduction in Emissions (Factor)	Source Information	Scenario for 2012	Scenario for 2017
Vehicles	**Technology based**				
	8. Bio-diesel (B5/ B10: 5–10% blend)	PM: 10% NOx: + 2.5% (increase)	ARAI*	Share of Bio-diesel fuel – 5%	Share of Bio-diesel fuel – 10%
	9. Hydrogen – CNG blend (H10/H20: 10 – 20% blend)	NOx: 10%	ARAI*		Share of Hydrogen blended (H%)fuel - 10% (for vehicles on CNG)
	10. Retrofitment of Diesel Oxidation Catalyst (DOC) in 4-wheeler public transport (BS – II)	PM: 22.5 % (as compared to BS – II vehicles)	ARAI*	50% conversion	100% conversion
	11. Retrofitment of Diesel Particulate Filter in 4-wheeler public transport(BS – III city buses)	PM: 70 % (as compared to BS – II and BS – III vehicles)	ARAI*	50% conversion	100% conversion
	Management based				
	1. Inspection/ maintenance	• BS – II & BS – III public transport vehicles – PM: 12.5% • 2 and 3-wheelers (gasoline) – NOx: 10% • 3-wheelers (diesel) – NOx: 5%, PM: 12.5% • 4-wheelers (gasoline) – NOx: 7.5% • 4-wheelers (diesel) – NOx: 7.5%, PM: 7.5%		New I&M regulation introduced and compliance by 50% anticipated	Strict compliance by 100%

Source Category	Control Options	Expected % Reduction in Emissions (Factor)	Source Information	Scenario for 2012	Scenario for 2017
Vehicles	**Management based**				
	2. Banning of 10 year old commercial vehicles	100% reduction of off-road vehicles	-	Old vehicles (10 years +): nos. to be worked out	Old vehicles (10 years +): nos. to be worked out
	3. Banning of 15 year old private vehicle	100% reduction of off-road vehicles		Old vehicles (10 years +): nos. to be worked out	Old vehicles (10 years +): nos. to be worked out
	4. Synchronization of traffic signals	20% reduction in pollution load for the roads on which it is implemented.		Effective synchronization on all major roads (or about 10% of the prime roads)	Effective synchronization on all major & minor roads, excluding feeder roads (or about 20% of the prime roads)
	5(a). Improvement of public transport: as per existing plan for the city	Refer DPR or EIA reports or any other suitable document for percentage shift in VKT and off road personal transport vehicles for calculating reduction in PM & NOx emissions.		Incorporate city specific proposals on public transport with respect to Metro/mono rail, BRT, large buses contingent etc	Incorporate city specific proposals on public transport with respect to Metro/mono rail, BRT, large buses contingent etc.
	5(b). Improvement of public transport: % share (VKT of cars, 2-wheelers and buses)	For percentage shift in VKT calculate off-road personal transport vehicles for calculating reduction in PM and NOx emissions.		10% shift in VKT	20% shift in VKT
	6. Fiscal incentives /disincentives like increased parking fee, proper fuel pricing policy, incentives for car pool, etc				
	7. Scattered business timings				
	8. Banning odd/even vehicles on particular roads	Zero emissions from the vehicles off the roads			

Source Category	Control Options	Expected % Reduction in Emissions (Factor)	Source Information	Scenario for 2012	Scenario for 2017
Industries					
	1. Fuel change	• Appropriate EF to be used • Zero PM emissions in case of NG		All solid fuel fired combustion converted to LSHS	All solid fuel or HSD fired combustion converted to NG
	2. Cleaner technology change	Based on data on type of industrial units and possible conversion to cleaner technology and information on expected emission reduction due to use of cleaner technology		Clean production option implemented in all feasible industries	Clean production option implemented in all feasible industries
	3. Fugitive emission control	80% PM reduction in fugitive emissions for the industries in which implemented.		50% of the industries having effective control implementations	100% of the industries having effective control implementations
	4. Particulate control system (cyclone, BF etc)	Bag Filters to have 95% collection efficiency of PM		Bag Filters adopted for combustion emissions	Bag Filters adopted for combustion emissions
	5. Shifting of air polluting industries	Deduct emission load from shifted industries		50% air polluting industries shifted out	100% air polluting industries shifted out
	6. Ban of new industries in existing city limit			No addition of industries	No addition of industries
	7. Voluntary measures like ISO 14000, ISO 18000	Quantification of impact may not be possible. Could make some assumption	-	-	100% industries with ISO 14000
	8. Compliance monitoring	Quantification of impact may not be possible. Could make some assumption	-	100% compliance	100% compliance

Source Category	Control Options	Expected % Reduction in Emissions (Factor)	Source Information	Scenario for 2012	Scenario for 2017
Area Sources					
Combustion (Domestic, Bakeries, Open Eatouts, Hotels, etc.)	1. Use of Natural Gas/LPG	Appropriate EF to be used Zero PM emissions in case of NG	-	• 50% of solid fuel, kerosene for domestic use to be shifted to LPG/NG • 100% of other sources to NG/LPG	• 75% of solid fuel, kerosene for domestic use to be shifted to LPG/NG • 100% of other sources to NG/LPG
DG sets	1. Inspection & Maintenance of large DG sets				
Airport	1. Provision of aerobridge			Use current developmental plans (if any) on air transport	Assume all flights are connected with aerobridge
	2. Inside airport transportation by clean fuel or electric vehicle				
Port	1. Engine running not on full capacity, during docked				
Road side dust	1. Converting unpaved roads to paved roads	Use appropriate EF for emissions from respective roads		50% of all unpaved roads to paved	100% of all unpaved roads to paved
	2. Wall to wall paving (brick)	Use appropriate EF [leads to 15% reduction on paved roads, 40% on unpaved roads for SPM]	NEERI	All major roads	All major roads; and minor roads with heavy traffic excluding feeder roads
	3. Sweeping and watering (mechanized)	Use appropriate EF		All major roads	All major roads; and minor roads with heavy traffic excluding feeder roads
Open Burning	Strict compliance to ban of open burning			50% compliance	100% compliance
All sources in hotspots	1. Zero polluting activities in hotspots				

* Information provided by ARAI is based on available international literature.

ANNEXURE 7.2

Recommendations of Lal Committee

This annexure lists out all the recommendations made by the Committee. These recommendations have been arranged under each term of reference given by Hon'ble High Court. A separate chapter (from Chapter III to Chapter XVII) deals with each term of reference and gives the reasoning and background behind the recommendations made. Chapter XVIII deals with the general recommendations made in addition to the specific terms of reference given by the Hon'ble High Court. Some of the material, which has been taken into consideration for arriving at the recommendations, has been annexed as Part II of the Report at the end.

The recommendations made have been serially numbered. They also have a distinctive number with relation to the term of reference. For example, the recommendations that Mahanagar Gas Limited should open at least 5 Compressed Natural Gas (CNG) outlets in South Mumbai by 30th September 2000 are recommendation No. 8 or recommendation No. B (iv).

A) <u>Improvement in quality of fuel with particular reference to reduction of sulphur content of diesel and Benzene content of petrol to acceptable limits.</u>

1) i) The sulphur content in the entire diesel to be supplied in Mumbai city at all the petrol pumps should be reduced to 0.05% by 1st October, 2000. This should be extended to the entire State of Maharashtra by 1st Jaunary, 2001

2) ii) The Benzene content in all the petrol supplied in Mumbai city at all the petrol pumps should be reduced from the present level of 3% to less than 1% by 1st October, 2000. This should be extended to the entire State of Maharasthra by 1st January, 2001.

3) iii) Only reformulated petrol should be supplied at all petrol pumps in Mumbai city with effect from 1st October, 2000 and in Mumbai Metropolitan Region by 1st January, 2001.

4) iv) The sulphur content in diesel to be supplied in Mumbai city should be further reduced to 0.035% by 1st April, 2003 and to 0.005% by 1st April, 2005. The corresponding dates for supplying diesel with the above levels of sulphur content for the entire State of Maharashtra should be 1st October, 2003 and 1st October, 2005 respectively.

5) v) The sulphur content in diesel supplied all over the country should be reduced to 0.05% by 1st October, 2001.

B) <u>Use of alternative fuel such as CNG/ reformulated gasoline etc. Administrative and regulatory measures that would be required for setting additional pumps for dispensing CNG.</u>

6) vi) The Development Control Regulations, 1991 of the Municipal Corporation of Greater Mumbai should be amended in order to enable setting up of CNG outlets at some of the existing petrol pumps which are locate in residential areas.

7) iii) The Brihan Mumbai Municipal Corporation should create a suitable mechanism of single window clearance to expeditiously clear the proposal of Mahanagar Gas Limited for opening new CNG outlets.

8) iv) Mahanagar Gas Limited should open at least 5 CNG outlets in South Mumbai latest by 30th September, 2000.

9) v) At least one of the existing retail outlets of each of the public sector oil company located in South Mumbai should be converted to supply CNG exclusively by 31st October, 2000. Further if any existing petrol pump desires to convert to supplying CNG exclusively, it should be permitted to do so by the companies within 2 months of receipt of the application.

10) iv) The BEST Undertaking should make space available at all its depots to Mahanagar Gas Limited for setting up CNG filling stations in such a manner that BEST's buses can use the CNG filling stations from within the depot and private vehicles can use it from outside the depot. All such CNG filing stations should become operational by 31st March, 2001.

11) vii) The Central Government, the State Government, the Municipal Corporation of Greater Mumbai and Mahanagar Gas Limited should ensure that the retail price of CNG is kept at a significantly lower level than the price of the High Speed Diesel.

12) viii) Mahangar Gas Limited should provide sufficient gas pressure and appropriate equipments at all their CNG dispensing outlets so as to ensure that the maximum filling time for buses does not exceed 8 minutes and for other vehicles 4 minutes.

13) ix) Mahanagar Gas Limited should draw up a progarmme of opening around ten new CNG outlets every year for the next 5 years in such a manner that the waiting time for any vehicle for filling up CNG at any such CNG outlet does not exceed 5 minutes. Such outlets should be spread all over the city.

14) x) Use of LPG as an automobile fuel must be permitted by the Ministry of Surface Transport by 30th June, 2000. The safety standards and the specifications for the equipment must also be laid down before 30th June, 2000.

15 xi) The oil industry should come out with its plan for supply of reformulated petrol for all the Metropolitan cities by 1st October, 2000.

C) Desirability and feasibility of converting existing buses / taxi to CNG

16) i) With effect from 1st May 2000, all new buses to be purchased by BEST, should be CNG operated until EURO II compliant engines become available in these new vehicles. BEST may exercise an option either to have CNG operated buses (which should be preferred) or EURO II or higher version diesel engine buses in such a manner that by 1st April 2005, at least 1000 buses are operated on CNG.

17) ii) Engines of all the existing BEST buses which are not even EURO I compliant, must be changed to EURO II compliant engines by 1st October 2002

18) iii) All Maharashtra State Road Transport Corporation buses operating in and out of Mumbai should have EURO II compliant engines by 1st October 2002.

19) iv) All the private contract buses registered and operating in the Mumbai Metropolitan Region should replace their existing engines by CNG engines or EURO II compliant engines by 1st January 2002.

20) v) With effect from 1st January 2001, all taxis above the age of 15 years must be converted to CNG or any other clean fuel (which means CNG or LPG, as and when allowed, throughout this report). Further, with effect from 1st January 2002, all diesel taxis above the age of 8 years should be converted to clean fuel.

21) vi) With effect from 1st January 2001, all 3 wheelers above the age of 10 years should be converted on CNG or any other clean fuel. Further with effect from 1st January 2002, all 3 wheelers above the age of 8 years should run on clean fuel.

D) Assessment of whether the existing emission norms require to be revised for Mumbai city and if so, at what levels should they be fixed -

22) i) The present permissible limit of 4.5% carbon monoxide emission in respect of 2 and 3 wheelers should be reduced to 3% with effect from 1st October 2000 for Mumbai city to bring it on par with the carbon monoxide emission levels for 4 wheelers. The Ministry of Surface Transport, Govt. of India should adopt this revised norm of 3 % for the entire country by 1st April 2001.

23) ii) The present permissible limit of 65 Hartridges Smoke Units (HSU) for diesel vehicles should be reduced to 45 HSU in Mumbai city with effect form 1st July 2000. The Ministry of Surface Transport, Govt. of India should take necessary steps for prescribing the above limits for the entire country by 1st July 2001.

24) iii) Norms for other vehicular exhaust pollutants like NOx, PM, smoke density of petrol vehicles etc. should be prescribed by Ministry of Surface Transport, Govt. of India by 31st October 2000 for the Metropolitan cities. Suitable machines to measure and record above pollutants should also be approved by the appropriate agencies under the Motor Vehicles Act.

E) Applicability of EURO I and EURO II norms to commercial (non-private) vehicles -

25) i) The Ministry of Surface Transport, Govt. of India should lay down Bharat State II mass emission norms (equivalent to EURO II norms) for all categories of vehicles by 30th September 2000. Subsequent mass emission norms equivalent to EURO III and EURO IV should also be prescribed by Ministry of Surface Transport, Government of India by 1st April 2002 so that EURO IV norms become applicable in India with effect from 1st April 2005 on par with European cities.

26) ii) All heavy commercial vehicles as well as light goods vehicles to be registered in the Mumbai Metropolitan Region from 1st April 2001 must be Bharat Stage II compliant.

F) Desirability and feasibility of phasing out vehicles (private cars, trucks, buses, taxis, auto rickshaws and 2 wheelers) over a certain age limit -

27) i) The Ministry of Surface Transport, Govt. of India should take action under Section 59 of Motor Vehicles Act, 1988 to prescribe the maximum age of all types of vehicles plying in the Metropolitan cities as well as in the rest of the country latest by 31st December 2000.

28) ii) With effect from 1st January 2001 all 2 wheelers registered in Mumbai Metropolitan Region and which are more than 15 years old shall be scrapped and their registration deemed to have been cancelled.

29) iii) With effect from 1st January 2001, all 3 wheelers registered in Mumbai Metropolitan Region and above the age of 10 years shall be scrapped unless converted to clean fuel.

30) iv) With effect from 1st January 2001, all transport vehicles except 3 wheelers and BEST buses over the age of 15 years shall be scrapped unless converted to clean fuel.

31) v) With effect from 1st January 2001, all private cars older than 20 years shall be scrapped unless converted to clean fuel.

32) vi) With effect from 1st January 2002 all transport vehicles over 8 years of age and plying in Mumbai city (except BEST buses) would be scrapped unless converted to clean fuel. The above-stipulated age of 8 years would be subject to modification, if any, as per the age prescribed by the Ministry of Surface Transport, Government of India under Sec. 59 of Motor Vehicles Act, 1988.

33) vii) The above age restrictions will not apply to the Vintage and Classic cars registered with the Vintage and Classic Car Club of India.

34) viii) With effect form 1st January 2001, all BEST buses older than 20 years shall be scrapped or converted to CNG. Similarly, with effect from 1st January 2002, all BEST buses older than 15 years would be scrapped unless converted to CNG. Further, with effect from 1st January 2002, all BEST buses older than 8 years would be scrapped unless they operate on CNG or have EURO II compliant engine. BEST should have at least 1000 buses operating on CNG by 1st April 2005.

35) ix) No vehicle registered outside the state, will be registered in Mumbai if it does not meet the age stipulations or does not operate on clean fuel. Conversion of vehicles from transport to non-transport category should be strictly regulated.

36) x) The Municipal Corporation of Greater Mumbai will set up a scrap yard where old vehicles would be dumped as "scrap" latest by 31st December 2000. Such scrapped and dumped vehicle may be disposed of by Municipal Corporation of Greater Mumbai as per their policy of disposal.

37) xi) The vehicle manufacturers should implement a scheme to take back their old vehicles under a "buy back scheme" for scrapping with effect from 1st January 2001.

G) Measures for improvement of emission levels of in use vehicles correspondingly -

38) i) The Ministry of Surface Transport, Govt. of India should be directed to prescribe by 31st December 2000 norms and standards of road worthiness for all transport vehicles manufactured in India. The Ministry should also lay down standards for fitment of diesel traps.

39) ii) The annual fitness certificates for all transport vehicles should be granted by the Motor Vehicles Department on the production of a certificate from an authorized testing station approved under Section 56 of Motor Vehicles Act, 1988 or from an Inspection and Maintenance Centre possessing modern and computerized equipment needed to inspect and certify fitness of such vehicles duly authorized by the Motor Vehicles Department. This system should be brought in force by the Motor Vehicles Department with effect from the 1sst April 2002. The system should be extended to cover private vehicles older than 15 years also with effect from 1st April 2005.

40) iii) All private vehicles older than 15 years after 1st April 2005 will have to carry a fitness certificate obtained form one of the I & M Centres approved by the Motor Vehicles Department or an authorized testing station under the Motor Vehicles Act, 1988 about the road worthiness of their vehicles. Such a certificate would be valid for a period of one year.

41) iv) For all the new vehicles manufactured after 1st April 2001, the vehicle manufacturers will have to give an emission warranty over the life of the vehicle through a scheme of Annual Maintenance Contract which will have to be compulsorily entered into by the vehicle owner if he wants to avail of the emission warranty of the manufacturer. The vehicle manufacturers will also ensure that inspection camps are organized periodically for those vehicles, which are not covered under the Annual Maintenance Contract. Sale of spurious spare parts should be made a cognizable and non-bailable offence.

42) v) All government, semi-government and local authority owned vehicles in-use in Mumbai should fit catalytic converters or convert their existing vehicles to a clean fuel by 1st July 2001.

43) vi) All two stroke two and three wheelers in use vehicles in Mumbai should be fitted with catalytic converters by 1st July 2001.

44) vii) All petrol driven vehicles registered in Mumbai prior to 1st April 1995 should fit catalytic converters by 1st July 2001.

45) viii) All catalytic converters supplied by the manufacturers for 2 wheelers will carry a warranty of effective working of the catalytic converter over a distance of 30,000 kms.

H) <u>Financial incentives that can be made available for replacement of old taxis and auto rickshaws with new vehicles running on clean fuel -</u>

46) i) The Government of Maharashtra and Municipal Corporation of Greater Mumbai shall grant the following concessions to the owners of taxis and auto rickshaws for replacing their old vehicles with <u>new</u> vehicles and which run on a clean fuel :

a) The applicable rate of sales tax would be reduced by 4%;
b) The applicable octroi would be reduced by 50%;
c) The rate of interest would be sustained by 4% on the loans taken from banks/financial institutions etc.

47) viii) The above concessions will be permissible to all such new vehicles purchased as replacements upto 31st October 2001.

48) viii) The Municipal Corporation of Greater Mumbai should extend full financial support to BEST to carry out the engine and vehicle replacement programme.

I) <u>Action required to be taken in respect of two wheelers and there wheelers utilizing two stroke engines -</u>

49) i) With effect from 1st October 2000, only 4 stroke engine two and three wheelers shall be registered in Mumbai Metropolitan Region. Till that date two and three wheelers having two stroke engines, as a transitional measure, should be permitted to be registered provided such vehicles are also fitted with catalytic converters guaranteed for 30,000 kms. By the manufacturers.

50) ii) After 1st July 2001 all 3 wheelers would have to be fitted with catalytic converters. The vehicle owner shall carry a proof of having fitted a catalytic converter on his vehicle.

51) iii) After 1st July 2001 all two wheelers having tow stroke engines registered in Mumbai Metropolitan Region will have to necessarily fit a catalytic converter. The vehicle owner shall carry a proof of having fitted a catalytic converter on his vehicle.

52) iv) The retail outlets of the oil companies would sell pre-mixed petrol only to the two wheelers and three wheelers with effect from 1st October 2000. Use of higher percentage of oil than prescribed by the manufacturers (2% for 2 wheelers and 3% for 3 wheelers) would make the vehicle owner liable to a fine of Rs. 1000/-.

53) v) Any two or three wheeler owner / driver found adding Kerosene or any other unauthorized petrol like product in the fuel tank of the vehicle, would be liable for criminal action under Environment Protection Act, 1986.

J) Measures to Prevent Fuel Adulteration

54) i) All oil companies should ensure that their diesel / petrol sold at their retail outlets, owned by the oil company or operated under franchise, is unadulterated.

55) ii) All tankers carrying petrol or diesel must be painted wholly in bright Maroon colour. All tankers engaged in transporting Kerosene, Naptha, NGL, SKO, OCS-93, C-9, Benzene or other solvents should be painted wholly in bright Yellow colour. All tankers carrying petroleum products other than the above should be painted wholly in bright Green colour. Petroleum products should be carried in a tanker of the appropriate colour only. Tankers not carrying petroleum products should not use any of the above 3 colours. This scheme should com into force in Maharashtra State with effect from 1st October 2000. This scheme should be given wide publicity throughout Maharashtra.

56) iii) Sale of Naptha and Benzene, which are used for adulteration should be strictly monitored to ensure sale of these items to actual end-users only. Similarly, retail sales of these products should not be permitted. The total quantity imported in Mumbai and its sale to actual end-users should be strictly monitored by the controller of Rationing, Mumbai.

57) iv) The Central and the State Govt. should ensure that the price of imported Kerosene is on par with the price of diesel.

58) v) All the refineries in the public and private sector should implement the ‘Marker’ system for detecting adulteration in fuels and lubricants buy 31st December 2000 within Mumbai city and by 31st March 2001 in the rest of Maharashtra.

59) vi) Adulteration of fuel / lubricants should be a cognizable and non-bailable offence punishable under the Environment Protection Act, 1986.

60) vii) The sale of petroleum products such as Patrex, Rexon, Cixon etc. which are not authorized to be used as vehicle fuels, to vehicle owners for use in the vehicles should be prohibited with immediate effect. The vehicle owner who buys this product and puts it in the fuel tank of vehicle, should be liable for criminal action under Environment Protection Act, 1986.

61) viii) The oil industry must set up one more full-fledged lab in Mumbai by 30th June 2001 for testing the samples of petrol / diesel / lubricants collected from retail outlets. Additional 4 mobile fuel-testing vans should be provided by the oil industry by 30th June 2001 for use in Mumbai for periodical testing of fuel quality.

62) ix) The Ministry of Petroleum and Natural Gas, Govt. of India should be directed to rationalize the price structure of different petroleum products so that the monetary incentive for adulteration is eliminated. Similarly, the large gap in the prices of petrol and diesel should be substantially bridged.

K) <u>Effect of the use of unleaded petrol without catalytic converters -</u>

63) i) It has separately been recommended that the existing vehicles using unleaded petrol should use catalytic converters with a view to reduce harmful HC and CO emissions from the exhaust.

L) <u>Incentive for conversion to cleaner technologies including particular reduction on imports duties and other levies on CNG kits and catalytic converters -</u>

64) i) The customs duties, sales tax, excise duty and octroi should be totally waived on both the CNG conversion kits including cylinders as well as on the catalytic converters upto 31st March 2003.

M) <u>Desirability and feasibility of ensuring pre-mixed oil, petrol and 2 T and banning supply of loose 2 T oil -</u>

65) i) There should be a ban on sale of loose 2 T oil in all petrol pumps in Mumbai Metropolitan Region with effect from 1st October 2000.

66) ii) All the retail outlets in Mumbai Metropolitan Region should sell only pre-mixed petrol through dispensers to two and three wheelers with effect from 1st October 2000. Sealed oil sachets, could be sold at the retail outlets.

67) iii) Sale of spurious oil should be a cognizable and non-bailable offence under the Environment Protection Act, 1986.

N) <u>Proper management and regulation of traffic with a view to reducing vehicular pollution -</u>

68) i) The Municipal Corporation of Greater Mumbai shall set up a central control room latest by 30th June 2000 where citizens could lodge complaints regarding pot-holes, unauthorized and non-conforming speed breakers, unauthorized repairs of vehicles on road, non-use or abandoned vehicles parked along the road side etc. All such complaints should be serially registered and complainant given a specific token number. All such complaints should be attended to within 72 hours (excluding holidays, if any) and corrective action taken. Any failure in this regard should make the concerned ward officer personally responsible.

69) ii) The control room of the Traffic Police should also record complaints from citizens about illegal construction of speed breakers, illegal parking of non-use or abandoned vehicles, unauthorized repairs of vehicles on the road and registration number of polluting vehicles latest by 30th June 2000. All such complaints should be attended to within 72 hours (excluding holidays, if any) after receiving the complaint. Any failure in this regard would make the concerned Assistant Commissioner of Police (Traffic) personally responsible.

70) iii) A control room should be set up by the Motor Vehicles Department latest by 30th June 2000 for recording complaints from citizens about polluting vehicles and mechanically defective vehicles or any other vehicle offending the provisions of the Motor Vehicles Act. All such complaints must be attended to within 72 hours failing which the concerned Regional Transport Officer would be personally responsible.

71) iv) All the 3 control rooms of the Municipal Corporation of Greater Mumbai, Traffic Police and the Motor Vehicles Department should be provided with toll free numbers and should be inter-connected with the help of computers to ensure proper coordination. This must be ensured latest by 31st December 2000.

72) v) A High Power Coordination Committee to be chaired by the Municipal Commissioner himself should be set up to coordinate the road digging activity of different utility services such as Mahanagar Telephone Nigam Limited, Mahanagar Gas Ltd., Brihan Mumbai Electric Supply and Transport Undertaking, Bombay Suburban Electric Supply, Road Department of Municipal Corporation of Greater Mumbai, Maharashtra State Road Development Corporation etc. This Committee should meet at least once a month and should have Addl. Commissioner of Police (Traffic) as one of its Members apart from the Chief Executives of the concerned utility services. This committee should become operational latest by 1st June 2000.

73) vi) The road markings with thermo plastic paint should be carried out by the Traffic Police Department including proper painting of the sign boards as per the Indian Road Congress specifications with a view to ensure proper lane discipline and thereby efficient use of the carriageway. With effect from 1st June 2000, a monthly review of the road markings and signboards should be carried out by the Addl. Commissioner of Police (Traffic). The road markings should also identify the lane for fast moving traffic wherever feasible.

74) vi) All the traffic signals in Mumbai should be systematically synchronized. The Traffic Police Department should take a 6 monthly review of signal timings during different traffic phases and update the same on a regular basis. All the traffic signals should function as automatic signals all the times. Any decisions to switch over to manual signaling should be taken only by an officer not below the rank of Asst. Commissioner of Police. The authority

permitting such a switch over to manual signaling should maintain a record of the special circumstances, which necessitated such a manual switching over, and the duration for which it was allowed.

75) vii) The Area Traffic Control system prepared for 37 identified traffic signals by the Traffic Police Department should be made operational latest by 1st April 2001. A Committee under the Metropolitan Commissioner, Mumbai Metropolitan Region Development Authority having Additional Commissioner of Police (Traffic) and the Municipal Commissioner, Municipal Corporation of Greater Mumbai as its members would be responsible to ensure implementation of the above scheme by the stipulated date.

76) ix) The Metropolitan Commissioner, MMRDA should ensure that the Wadala Truck Terminus becomes fully operational by 31st December 2000.

77) x) With effect from 1st January 2001, all tourist buses would terminate at and operate from Wadala Truck Terminus.

78) xi) The scheme of providing exclusive BEST buses lanes with synchronized signals giving preference to public transport buses should be enforced by the Traffic Police Department on all major arterial roads in a shaped manner by 31st March 2002.

79) xii) On all the major roads, as defined in the development plan, parking should be totally banned from 0900 hours to 1200 hours and 1700 hours to 2000 hours in the peak direction of the traffic with effect from 1st June 2000. The Traffic Police Department should give adequate publicity to this and ensure its strict compliance.

80) xiii) No morchas should be allowed on any public roads. The marriage processions should also not be permitted on public roads. However, traditional religious processions going on for at least 5 years may alone be permitted. No new religious processions should be allowed on public roads.

81) xiv) Speed breakers of the approved design and at approved locations only should be permitted in the entire Mumbai Metropolitan Region with effect from 1st June 2000. All non-conforming speed breakers shall be removed before that date by Municipal Corporation of Greater Mumbai and other concerned local authorities. Putting up unauthorized speed breakers should be a cognizable and non – bailable offence.

82) xv) A traffic restraint scheme as per the details given below will be brought in force on an experimental basis for a period of 6 months. with effect from 1st October 2000 after giving wide publicity. A committee under the Principal Secretary (Transport) and having Transport Commissioner, Additional Commissioner of Police (Traffic), Head of Transportation Planning, Mumbai Metropolitan Region Development Authority and Head of Traffic Engineering, Municipal Corporation of Greater Mumbai as members would monitor implementation of the scheme and submit a report to the High Court on the expiry of the pilot project. During the period of implementation of the Pilot project, this Committee will have the powers to make suitable modifications for proper implementation of the scheme, provided all such decisions taken by this committee are reported to the High Court.

a) All private vehicles including 2 and 3 wheelers (non-commercial) having registration numbers ending with digits 1 or 2 shall not be allowed to ply in the limits of island city of Mumbai on Mondays. Similarly, vehicles with registration numbers ending with digits 3 or 4 shall not be allowed to ply on Tuesdays, 5 or 6 on Wednesdays, 7 or 8 on Thursdays and 9 or 0 on Fridays. On Saturdays, Sundays and public holidays all vehicles would be permitted to ply. Vehicles of police, fire brigade, ambulances, cranes and government vehicles entitled to a red or amber dome light would not be subject to restrictions under this scheme. Specially designed vehicles driven by handicapped persons themselves shall also be exempted.

b) The island city comprises of area south of Mahim Causeway, Mahim Junction, Mori Road, Senapati Bapat Marg Extension, Mahim Rail Over Bridge, Sant Rohidas Marg, Dharavi Road, Sion Railway Station, Sion Circle and Road No.29 beyond Barkat Ali Road Junction on Wadala Anik Link Road.

c) The vehicles will be restricted from plying within the limits of the island city as specified above, from 0900 hrs. to 1600 hrs.

d) The scheme should be enforced by Constables and other senior officers of the Traffic Police Department as well as by Asst. Inspector of Motor Vehicles and senior officers of the Motor Vehicles Department.

e) Any vehicle violating the scheme will be detained at an appropriate location without obstructing the smooth flow of traffic and would be released only after 1600 hrs. after laying a fine of Rs.l,000/

f) Vehicles coming from outside Mumbai, would also be covered under the scheme.

83) xvi) The public transport system should be further strengthened. Brihan Mumbai Electric Supply and Transport Undertaking should introduce at least 500 Air-conditioned buses by 31st March 2002. In case Brihan Mumbai Electric Supply and Transport Undertaking finds it difficult to do so, private operators with a fleet of 50 or 100 vehicles should be permitted to ply their Air-conditioned buses as stage carriages to supplement Brihan Mumbai Electric and Transport Undertaking's efforts.

84) xvii) For upgrading and improving public transport (including railways through MUTP II, introduction of LRT / MRT etc.) and other traffic restraint techniques an expert Committee of traffic and transport experts should be constituted which should give its recommendations to the High Court. within a period of 3 months.

O) Effective methods of monitoring and improving prescribed emission norms -

86) i) The Govt. of Maharashtra should provide additional funds needed by the Maharashtra Pollution Control Board for continuous air quality monitoring at the 5 monitoring stations and for purchase of mobile pollution testing vans.

87) ii) These continuous air quality monitoring stations should become operational by 1st January 2001.

88) iii) Three continuous air quality monitoring stations should be equipped to monitor the levels of CO and Benzene also. Facilities necessary for measuring ground level Ozone concentration should also be provided by the Maharashtra Pollution Control Board by 1st January 2001.

89) iv) The Maharashtra Pollution Control Board and the Municipal Corporation of Greater Mumbai should each provide 2 additional mobile pollution testing vans latest by 31st December 2800. These mobile vans should be equipped with a continuous monitoring display system mounted on the roof of the van.

90) v) The ambient air quality readings should be publicized by the MPCB as well as by the Municipal Corporation of Greater Mumbai at prominent places including petrol pumps within the limits of the Municipal Corporation of Greater Mumbai.

P) General Recommendations

91) i) All the petrol pump owners of the city in Mumbai should install new automatic petrol dispensing nozzle with in-built vapour recovery system latest by 31st December 2000.

92) ii) No new registration of any taxi / auto rickshaw (as replacement) operating on diesel should be permitted in the city of Mumbai after 1st May 2000.

93) iii) All private diesel vehicles registered in Mumbai Metropolitan Region after 1st October 2000, should pay an additional one time levy of Rs.20,000/-. All existing private vehicles having authorized diesel engines and which are older than 15 years would have to pay one time cess of Rs.10,000/- in the office of the respective Regional Transport Officer in case they want to continue to ply their vehicle after 1st October 2000 without converting to a clean fuel.

94) iv) The present method of certifying the mass emission standards by the approving agencies, based on a deteriorating factor of 1.2, needs to be revised to a higher factor taking into consideration the Indian conditions. The Ministry 'Of Surface Transport, Government of India should issue revised standards about the appropriate deterioration factor for such certifications, for all categories of vehicles, latest by 31st December 2000.

95) v) The Department of Environment; Government of Maharashtra should set up an authority to be known as Vehicular Pollution (Prevention and Control) Authority for the Mumbai Metropolitan Region to monitor progress of all agencies involved in reducing vehicular pollution. The Authority should comprise of Government representatives, Non-Government. Organizations and appropriate experts etc.

For controlling vehicular pollution, the Authority should take all necessary steps to ensure compliance of specified emission standards by vehicles including proper calibration of the equipment for testing vehicular pollution, ensuring compliance of fuel quality standards, monitoring and coordinating action for traffic planning and management.

The Authority shall have powers to issue directions in respect of complaints relating to the violation of an order by any authority or measure specified pertaining to all aspects of vehicular pollution.

96) vi) In order to facilitate smooth flow of traffic, a separate transportation link should. be provided from Haji Ali to Nariman Point area in South Mumbai.

97) vii) To facilitate smooth flow of traffic, all encroachments on carriageways and footpaths should be removed by the Municipal Corporation of Greater Mumbai and the Mumbai Police.

98) viii) The Central and State Governments should waive all duties on battery operated vehicles including on the battery pack for a period of 3 years.

99) ix) For effective implementation of the provisions of the Motor Vehicles Act 1988 and the directions of the Hon'ble High Court on measures to control pollution, the Motor Vehicle Department should be provided with an efficient and modern wireless network, inter-linked and fully computerized field offices to cover issuance of license, fitness certificates, vehicle registration, memos for offences, notices for recovery of government dues etc., additional staff and equipment etc.

100) Volunteers accompanying flying squads should be paid an honorarium of Rs.100 per day, or such amount as this Hon'ble Court deems fit, to cover their out of pocket expenses.

101) A unified Urban Transport Authority should be set up by 1st January 2001 to effectively coordinate and implement a proper urban transport system.

Annexure 7.3

Future Development Plans for Mumbai

Projects	Corridors	Year of Completion	Implementing agency	Remarks
MRTS (Mass Rapid Transit System)	Charkop-Bandra-Mankhurd	Evaluation exercise is in progress	MMRDA	• Carries same amount of traffic as 6-lane bus or 26 lane Private cars (Either way). • Reliable, Comfortable and Safe • Reduces time by 50-75% as compared to road • No Air pollution and less noise levels • Energy efficient; Consumes 1/5th Energy per road passenger km. • Occupies no road space if underground and only about 2m width of road if elevated
Mumbai Monorail	• Malbar Hill – BKC • Chembur – Mahul • Lokhandwala complex – Kanjurmarg • Thane – Kalyan, Bhivandi	September 2008 to March 2010.	MMRDA	• 10,000 PPHPD (Passenger per hour per direction) (20-segment vehicles X 500 pass on average, at three minute headways.)
BRTS (Bus Rapid Transit System)	• Western Express Highway • Eastern Express Highway	Evaluation exercise is in progress	MMRDA / BEST	• For 30 meters lane - 4200 PPHPD (Passenger per hour per dispatch). • For 5.5 meters lane – 210 PCU (Passenger car Unit).
Bandra – Worli Sea Link	Bandra - Worli	December 2008	MSRDC	• Estimated savings in Vehicle Operating Costs Rs. 100 Crores per annum. • Considerable savings in travel time (20 to 30 minutes) due to increased speed and reduced delays (23 signals avoided). • Reduction in traffic on existing roads because of traffic diversion to the Sea Link. • Reduction in Carbon Monoxide and Nitrogen Oxide Levels in Mahim, Dadar, Prabhadevi and Worli along existing roads • Reduced noise pollution in Mahim, Dadar, Prabhadevi and Worli along existing roads • 1,20,000 vehicles expected to travel.

Contd..

Projects	Corridors	Year of Completion	Implementing agency	Remarks
MTHL (Mumbai Trans Harbour Link)	Sewri - Nhava	N.A.		• Expected to be a catalyst of development of the city by promoting horizontal growth as against the vertical growth experienced over the past few years. • The link will help reduce the problems of congestion and pollution in Mumbai. Apart from the beneficial impact of the MTHL on connectivity, population dispersal and savings to commuters, other project beneficiaries include Mumbai Port Trust, JNPT, Navi Mumbai Municipal Corporation, CIDCO, MMRDA, Navi Mumbai SEZ and various industries in the hinterland.
Western Railways	• 5th line - Borivali to Mahim • Borivali - Virar Additional pair of tracks			• Complete segregation of main line and suburban trains during the peak hours in Borivali - Mumbai Central section. • Almost double carrying capacity during peak hours in Virar - Borivali section, which is the second heaviest section in Mumbai suburban network.
Central Railways	Kurla - Thane additional pair of tracks			• Segregation of main line and suburban train in Kurla - Thane section. • All main line Passenger trains to or from Kurla terminus and fright trains to or from Trombay or Kurla yard will not interfere with suburban train operation in CSTM - Thane section.
Metro	• Versova-Andheri-Ghatkopar • Charkop Dahisar • BKC – Kanjurmarg via Airport	Phase I (2006 – 2011) Phase II (2011 – 2016) Phase-III (2016-2021)	MMRDA	• The effect of providing the metro network is to off-load travel from the suburban rail network and because of the greater geographical rail transit coverage, to facilitate the “walk to station” rather than having to use autos and buses thereby relieving vehicle congestion at stations. • The cost of accessing stations by auto or bus is typically several times the cost of the train ride.
Pedestrian skywalk	50 locations spread across the city connecting to suburban railway stations	In progress	MMRDA and MSRDC	• Overall improvement of transport infrastructure that would help pedestrian’s safety and mobility. • Reduction in dependency on intermediate public transport like auto, taxi and short bus trips.

Contd..

Projects	Corridors	Year of Completion	Implementing agency	Remarks
Flyovers	• Haji Ali, • S.V. Marg: • Connect to WEH, Siddhi Vinayak, Barfiwala Junction, Juhu Airport Subway	(The work of these flyovers has not commenced)	MSRDC	• It would ensure faster, safer movement of traffic along the highways.. • It would improve the traffic on cross roads and will also lead to safer pedestrian movement across highways
Inland passenger Water Transport System along West Coast of Mumbai	• Borivali, • Marve, • Versova, • Juhu, • Bandra and • Nariman Point	N.A.	MSRDC	• It would relieve the existing congested transport system in Mumbai. • It is energy efficient and environment friendly transport system.
Station Area Traffic Improvement Scheme (SATIS)	• Borivali, • Ghatkopar, • Chembur • Dadar and • Andheri • **Railway Works** includes Additional Foot Over Bridges (FOB) within Station Area, Extension and inter-connection of existing FOBs, Additional / improved entry /exit to stations, Pedestrian Subway across platforms, Platform Improvements (new) • **Road Works** includes additional through FOB's, skywalks etc., Road / Foot path improvements, Traffic circulation management, BEST integration, Parking control management	N.A.	MMRDA	• Improved commuter and pedestrian dispersal facilities. • Transport integration, parking management, intersection improvements. • Traffic circulation and management in the suburban station area.

Annexure 7.4

Ten Highest Concentrations of PM_{10} and NOx of Preferred Option I and II for 2012 and 2017

A.1) Preferred Option – I : 2012

Table A7.4.1: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season after Implementing Preferred Option –I

	X coordinate	Y coordinate	Concentration $\mu g/m^3$
1ST	273270	2104630	370.02
2ND	272970	2104630	369.67
3RD	272670	2104630	365.85
4TH	272970	2104030	365.72
5TH	273270	2104030	365.68
6TH	273570	2104630	364.02
7TH	272670	2104030	361.78
8TH	273570	2104030	359.34
9TH	272370	2104630	358.74
10TH	273270	2105230	356.58

Table A7.4.2: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season after Implementing Preferred Option –I

	X coordinate	Y coordinate	Concentration $\mu g/m^3$
1ST	279270	2102230	143.26
2ND	279270	2101630	113.28
3RD	279270	2101030	78.89
4TH	279270	2100430	60.46
5TH	273270	2104630	56.40
6TH	273270	2104030	56.39
7TH	272970	2104030	56.13
8TH	272970	2104630	56.07
9TH	273570	2104630	55.87
10TH	273570	2104030	55.84

A.2) Preferred Option – I : 2017

Table A7.4.3: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season after Implementing Preferred Option –I

	X coordinate	Y coordinate	Concentration μg/m^3
1ST	273270	2104630	503.79
2ND	272970	2104630	503.72
3RD	272670	2104630	498.53
4TH	272970	2104030	498.30
5TH	273270	2104030	498.00
6TH	273570	2104630	495.95
7TH	272670	2104030	492.96
8TH	273570	2104030	489.50
9TH	272370	2104630	488.85
10TH	273270	2105230	485.14

Table A7.4.4: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season after Implementing Preferred Option –I

	X coordinate	Y coordinate	Concentration μg/m^3
1ST	279270	2102230	146.34
2ND	279270	2101630	115.85
3RD	279270	2101030	81.33
4TH	273270	2104630	66.30
5TH	273270	2104030	66.29
6TH	272970	2104030	66.01
7TH	272970	2104630	65.93
8TH	273570	2104630	65.70
9TH	273570	2104030	65.66
10TH	273270	2102230	65.60

B.1) Preferred Option –II : 2012

Table A7.4.5: Maximum ten Occurrences of PM_{10} Concentrations in 2012 at Mumbai City for Winter Season after Implementing Preferred Option –II

	X coordinate	Y coordinate	Concentration $\mu g/m^3$
1ST	272796.06	2104359.5	104.34
2ND	273624.06	2104249.25	103.39
3RD	272755.72	2104051.5	101.90
4TH	273527.47	2104649.5	101.49
5TH	272892.66	2104801.25	101.41
6TH	272768.47	2105132.5	99.02
7TH	273518.81	2103988	98.99
8TH	273202.75	2103871.25	98.53
9TH	273202.75	2103871.25	98.53
10TH	272960.53	2102412.25	97.97

Table A7.4.6: Maximum ten Occurrences of NOx Concentrations in 2012 at Mumbai City for Winter Season after Implementing Preferred Option –II

	X coordinate	Y coordinate	Concentration $\mu g/m^3$
1ST	279405.66	2101903.25	119.50
2ND	279088.25	2102257.75	114.29
3RD	279281.44	2102589	71.00
4TH	279019.25	2101848	53.51
5TH	273624.06	2104249.25	16.95
6TH	272796.06	2104359.5	16.82
7TH	273527.47	2104649.5	16.58
8TH	278425.84	2103430.75	16.57
9TH	272755.72	2104051.5	16.51
10TH	272892.66	2104801.25	16.35

B.2) Preferred Option –II : 2017

Table A7.4.7: Maximum ten Occurrences of PM_{10} Concentrations in 2017 at Mumbai City for Winter Season after Implementing Preferred Option –II

	X coordinate	Y coordinate	Concentration μg/m^3
1ST	272796.06	2104359.5	126.01
2ND	273624.06	2104249.25	124.86
3RD	272755.72	2104051.5	123.05
4TH	273527.47	2104649.5	122.55
5TH	272892.66	2104801.25	122.47
6TH	272768.47	2105132.5	119.57
7TH	273518.81	2103988	119.51
8TH	273202.75	2103871.25	118.96
9TH	273202.75	2103871.25	118.96
10TH	272960.53	2102412.25	118.25

Table A7.4.8: Maximum ten Occurrences of NOx Concentrations in 2017 at Mumbai City for Winter Season after Implementing Preferred Option –II

	X coordinate	Y coordinate	Concentration μg/m^3
1ST	279405.66	2101903.25	120.49
2ND	279088.25	2102257.75	115.45
3RD	279281.44	2102589	72.15
4TH	279019.25	2101848	54.50
5TH	273624.06	2104249.25	20.30
6TH	272796.06	2104359.5	20.15
7TH	273527.47	2104649.5	19.85
8TH	272755.72	2104051.5	19.78
9TH	272892.66	2104801.25	19.59
10TH	273518.81	2103988	19.56