BEFORE THE NATIONAL GREEN TRIBUNAL

(EASTERN ZONE BENCH, KOLKATA)

O.A. No. 198 of 2024/EZB

ORIGINAL APPLICATION

under National Green Tribunal Act' 2010

In the matter of:

SubhasDatta .....Applicant

-Versus-

Department of Environment, State of West Bengal and Others .....Respondents

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Applicant

SUBHAS DATTA
Office: 25/1, Guitendal Lane, Howrah-711 101'
Residence: 55/2, Panchanantala Road,
P.O.+P.S.+Dist. - Howrah-711 101(for both)
Telephone : 033 -2638 3526,
Mobile : 09830 752 752

SYNOPSIS OF THE CASE

The Applicant is for the implementation of remote sensing Device that is the most effective method of identifying source of pollution hence, reducing pollution. The state at present under the pollution control certificate programme do periodic physical checks of exhaust emission from vehicles, whereas remote sensing technology will screen the vehicles on road to identify gross and high emitters, catching and removing the worst polluters on the road can give substantial benefit. The Supreme Court of India in Writ Petition (c) No. 13029 /1985 in the matter of M.C. Mehta vs Union of India &Ors vide order dated 26-07-24 have directed MoRTH to implement remote sensing in the National Capital Region to monitor vehicular pollution in addition to PUC tests, for controlling vehicular pollution, which were directed 15 years ago by the Hon'ble High Court Calcutta in W.P. 4183 (W) of 2005 order dated 17.06.2010 but the State Authorities have failed to comply with the Hon'ble High Court's order. The Applicants also seeks to highlight Kolkata being one of the six cities of West Bengal that **have consistently failed to meet the National Ambient Air Quality Standards (NAAQS) for over FIVE years have got the distinction of being termed as Non-Attainment Cities (NAC) and being listed amongst most polluted cities in India. The five other non attainment cities** in the Central Pollution Control Board List i.e. Asansol, Ranigunj, Barrackpore, Durgapur, Haldia are also critically polluted and implementation of Remote Sensing Device is the call of the hour The major entry points of the city of Calcutta and Howrah need to be provided by such device.

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Furthermore night time pollution, which is reportedly more than the day time during October to March, can also be curbed considerably through the deployment of RSD. But there is a gap between the requirement and deployment of the said instrument, which should not be delayed any further..

Hence this Application

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LIST OF DATES

Sl No.	Dates	Particulars
1.	17/06/10	Order of High Court Calcutta for implementation of Remote Sensing Device
2.	10/05/18	The Hon'ble Supreme Court of India in the matter of W.P.(Civil) 13029/1985 appreciated the use of remote sensing device in Kolkata
3.	8/12/23	The Telegraph online reports that there was one remote sensing device and two more devices were handed over to the Transport department by the State Pollution Control Board
4.	6/04/24	Times of India in its news report published a report divulging the fact that the remote sensing devices are lying defunct in the state at present
5.	26/07/24	the Supreme Court of India in Writ Petition (c) No. 13029 /1985 in the matter of M.C. Mehta vs Union of India &Ors have directed MoRTH to implement remote sensing in the NCR to monitor vehicular pollution in addition to PUC tests
6.	09/09/24	Representation sent by the Applicant to the State Respondent

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ORIGINAL APPLICATION

National Green Tribunal Act, 2010

O. A. No. of 2024/EZB

In the matter of:

Subhas Datta .....Applicant

-Versus-

State of West Bengal and Others .....Respondents

IN THE MATTER OF:

1. Subhas Datta

   Son of Late Baneswar Datta,

   25/1, Guitendal Lane,

   P.O. + P.S. + District – Howrah

   Pin code – 711101, West Bengal

   ..... Applicant

1. DEPARTMENT OF ENVIRONMENT,

(Notice through the Principal Secretary),

Govt. of West Bengal,

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Environment Department,

5th Floor, Pranisampad Bhawan,

Block LB-II, Slat Lake, Sec-III,

Bidhannagar, Kolkata - 700 106

Tel-033-2335-2742

psecy.env-wb@gov.in

2. **WEST BENGAL POLLUTION CONTROL BOARD**

(Notice through the Member Secretary),

Paribesh Bhawan, l0A Block L.A, Sec-III,

Salt Lake, Bidhannagar, Kolkata - 700106

Tel-0332335-8213

net.wbpcb-wb@bangla.gov.in.

3. **DEPARTMENT OF TRANSPORT,**

(Notice through the Secretary),

Paribahan Bhawan,

12 R N Mukherjee Road,

Kolkata – 700001,

Tel- 9647570010

Email: sec.transportwb@gmail.com

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..... Respndents

A. The address of the Applicant as given above is for the service of notices of this application and that of their representatives.

B. The addresses and e-mail details of the respondents as given above are for service of notices of this application and that of their representatives.

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C. The Applicant is for the implementation of remote sensing device that is the most effective method of identifying source of pollution (vehicle) hence reducing pollution. The state at present under the pollution control certificate programme do period physical checks of exhaust emission from vehicles, whereas remote sensing technology will screen the vehicles on road to identify gross and high emitters, catching and removing the worst polluters on the road can give substantial benefit. The Supreme Court of India in Writ Petition (c) No. 13029 /1985 in the matter of M.C. Mehta vs Union of India &Ors vide order dated 26-07-24 have directed MoRTH to implement remote sensing in the NCR to monitor vehicular pollution in addition to PUC tests, for controlling vehicular pollution, which were directed 15 years ago by the Hon'ble High Court of Calcutta in W.P. 4183 (W) of 2005 order dated 17.06.2010 but the State Authorities have failed to comply with the Hon'ble High Court's order. The Applicant alsoseeks to highlight Kolkata being one of the six cities of West Bengal that **have consistently failed to meet the National Ambient Air Quality Standards (NAAQS) for over FIVE years have got the distinction of being termed as Non-Attainment Cities (NAC) and being listed amongst most polluted cities in India. The five other non attainment cities** in the Central Pollution Control Board List i.e. Asansol, Ranigunj, Barrackpore, Durgapur, Haldia are also critically polluted and implementation of Remote Sensing Device is the call of the hour. **Hence this Application**

Most Respectfully Sheweth

I, Subhas Datta, aged about 74 years, son of Late Baneswar Datta, by Religion – Hindu, occupation Chartered Accountant, residing at 25/1, Guitendal Lane, P.S+P.O+Dist. - Howrah, Pincode-711101, do hereby solemnly declare and say as follows:-

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FACTS IN BRIEF:

1. That the applicant is the environmental activist and public spirited person. He is engaged in different social, environmental and philanthropic activities since 1977. The applicant is second to none in the fields of ventilating the grievances of the common people. There is hardly any major public issue in the State of West Bengal on which the applicant has not tried to project the peoples' demands before different appropriate authorities.
2. That the applicant has organized series of movements on ecology, environment and on different social aspects of the State of West Bengal. Some of such activities had to face police atrocities, arrests and institution of false and fabricated criminal proceedings against the applicant. On the basis of the Writ Petition (No. 380 of 1995) filed by the applicant in April 1995 before the Hon'ble Supreme Court of India the first Environment Bench, which is popularly called as the Green Bench, had been constituted in the High Court at Calcutta in June 1996.
3. That various activities of the applicant have been recognized by several media giants during the past few decades, brief of which is as follows: -

    a) Times of India, the leading English daily had projected the applicant as the "Hero of the Country" in the year 2007.

    b) India Today, the prestigious English Weekly had recognized the applicant as one of the "fifty pioneers of the country" and published a special edition on 7th July 2008, detailing the activities undertaken by him.

    c) Hindusthan Times, the leading English daily had recognized the applicant in 2012 as one of the "25 change makers of the country" and given felicitation.

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d) Times of India, the English daily, had nominated the applicant as "Hero of Calcutta – 2013."

e) The Telegraph, one leading English daily published from Calcutta and National Insurance Company had given "True Legends Award 2018" to the applicant.

4. That several other forms of recognitions have been given to the applicant from time to time, the brief of some of which is as follows:

a) Research work had been carried out by one German Scholar covering the applicant's activities in 2000, which was afterwards published as book titled "Taking the State to Court" by the Oxford University Press, London.

b) European Green Party leaders had invited the applicant in 2009 to Brussels, Belgium to discuss the possibility of forming Green Party in India. Meeting had been held with U. K. Green Party leader in London in 2009.

c) In order to adopt the same practices for Ganga cleaning the applicant had participated in Thames River cleaning operation in London, organized by Thames 21, in 2005.

d) Several weeklies in different languages have published articles on the applicant's activities during the last few decades.

e) He had visited London/Glasgow in 2013 and met the respective port authorities to ascertain the methodology of dredging by saving the marine bio-diversity for adopting the same process by the Calcutta Port Trust.

f) There are about thirteen thousand newspaper clippings on various news covering the activities of the applicant carried out during the last more than three decades.

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5. That during the past forty years the applicant has been continuously fighting hard to save and protect the environment and ecology of the State of West Bengal and some of the Eastern and North Eastern States of the country. The applicant has brought about one hundred and thirty environmental matters and also various matters of public interest before the Hon'ble Apex Court of the Country, Environment Bench (Green Bench) and Public Interest Litigation Bench of the High Court at Calcutta, National Green Tribunal and also have been interacting on various related issues and assisting/assisted the Hon'ble Courts (High Court and NGT) as Amicus Curiae in some matters.

6. That few of the moves of the applicant have been recognized otherwise by and or before the Judicial forum, the brief of which is as follows:-

a) On the basis of the pleadings/petition before the High Court at Calcutta The West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act 2006 was enacted.

b) Based on his petition before the High Court, Calcutta, compensation under The Public Liability Insurance Act 1994 had been awarded to the victims of air pollution caused by a reputed industrial house for the first time in the country.

c) Six Supreme Court Judges from Thailand came to Calcutta and had interactive sessions with the applicant where the Consulate General of US had also been present. The Hon'ble Judges had visited the High Court at Calcutta to view/hear proceedings and the arguments made by him before the Public Interest Litigation Bench of the High Court at Calcutta.

7. That the applicant states that the implementation of Remote Sensing Device, that is the most effective method of reducing pollution. The State at present under the pollution

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control certificate programme do physical checks of exhaust emission from vehicles, whereas remote sensing device will screen the vehicles on road to identify gross and high emitters, catching and removing the worst polluters on the road can give substantial benefit.

8. That The Applicant submits that the Hon'ble High Court Calcutta in W.P 4183(W) of 2005 in the matter of Subhas Datta vs State of WB & Ors vide order dated 17/06/10 directed the State to procure three more Remote Sensing Device and the State Government submitted before the court that they have already made operational one remote sensing device. Copy of the order of the Hon'ble High Court Calcutta dated 17/06/10 is annexed herewith and marked as Annexure A.

9. That the Applicant states that The Telegraph online dated 8/12/23 reports that there was one remote sensing device and two more devices were handed over to the Transport department by the State Pollution Control Board. The copy of the online newspaper dated 8/12/23 is annexed herewith and marked as Annexure B

10. That The Applicant states that Times of India in its news report dated 6/04/2024 published a report divulging the fact that the remote sensing devices are lying defunct in the state at present. The Applicant through the report of Times of India was apprised of the sorry state of affairs and the reality that the city of Kolkata being one of the six non attainment cities in the State is not worried about the air pollution in the city. The air quality of the city remains very poor or extremely poor during the winter times. Copy of the news report of Times of India dated 6/04/24 and the CPCB's list of non attainment cities are annexed herewith and marked as Annexure C.

11. That The Applicant states that the Action plan 2018 of the city of Kolkata shows that vehicles are the major source of pollution and are responsible for 50 percent P.M.2.5

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pollution in the city. Copies of relevant pages of the clean air action plan Kolkata 2018 ~~2022~~ are annexed herewith and marked as annexure D.

12. That with the implemented Bharat Stage VI (BSVI) norms and fuels in April 2020,the emission standards with the introduction Bharat Stage VI need real-world emissions requirements and management to ensure that vehicles remain low emitting on road. As these new generation vehicles are equipped with more advanced emissions control system, commensurate improvement in emissions inspection and maintenance is needed at the city level. Pollution Under Control certificate programme (PUC) is an old system that is not very effective on the new age vehicles.

13. That the current on-road vehicle inspection programme called pollution under control certificate programme (PUC), is based on simple idle testing of carbon monoxide and hydrocarbon at two speed idle tests along with Lambda test for petrol vehicles and smoke density test for diesel vehicles. PUC is a weak programme as it is difficult to do quality control and ensure credible tests in large number of small and decentralised test centres with poorly skilled staff. The overall compliance level in terms of number of vehicles turning up for tests is also very low in most parts of India.

14. That simply put, remote sensing device includes a light source and a detector that is placed on the side of the road or at a height to transmit a laser beam to measure exhaust emissions remotely via spectroscopy as vehicles pass by and cross the light path. This can measure exhaust plume, and detect a range of pollutants including opacity, nitric oxide, carbon monoxide, hydrocarbons, and carbon monoxide in 0.5 seconds in the exhaust plumes of vehicles. This allows emissions measurements of large number of vehicles when they are being driven on the road and thus, do not require physical tests.

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15. That the Applicant states that The Principal Bench of NGT, New Delhi in its order dated **07.10.2015** in the matter of application No. 21/2014 Vardhaman Kaushik Vs. Union of India &Ors. has directed that, *"The Central Pollution Control Board (CPCB) and the DPCC are hereby directed to purchase and/or arrange proper mechanism and instruments for checking emissions of moving overloaded heavy vehicles, as measuring the emissions of standing vehicles, particularly transportation vehicles, would never depict correct data which are the basic cause for raising particulate matter and carbon content in the air."*

16. That the Supreme Court of India in Writ Petition (c) No. 13029 /1985 in the matter of M.C. Mehta vs Union of India &Ors vide order dated 26-07-24 have directed MoRTH to implement remote sensing in the NCR to monitor vehicular pollution in addition to PUC tests, for controlling vehicular pollution. Copy of the order of the Supreme Court dated 26/07/24 is annexed herewith and marked as annexure E.

17. That The Hon'ble Supreme Court of India vide its earlier order dated **10.05.2018** in the matter of W.P.(Civil) 13029/1985 on the *issue of Improvement in Testing parameters in vehicles under Pollution Under Control (PUC) Program* **have appreciated the outcome of the 17.06.2010 directions of the Hon. High Court of Calcutta** stating that, *"With regard to remote sensing, it is stated that remote sensing screening of emissions has been found to be extremely effective in Kolkata and it would be of considerable utility in so far as Delhi and Pune are concerned". Copy of Order of* Hon'ble Supreme Court *dated 10/05/18 is annexed herewith and marked as annexure F.*

18. That the Supreme Court in in the matter of W.P.(Civil) 13029/1985 directed the Environment Control Pollution Authority to submit a proposal after consulting various stakeholders, on 26thjuly 26, 2019, the Authority submitted a report favouring remote

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sensing device as it can be used to measure emissions of different type of vehicles and evaluate hundreds of vehicles per day, moreover it can measure emissions like NOx and others that is not possible for PUC. Copies of relevant pages of the Environment ~~Control~~ Control Pollution Authority Report is annexed herewith and marked as Annexure G

19. That the Applicant states that to reduce air pollution the State Pollution Control Board must effectively utilise remote sensing devices by installing the devices at the main junctions of the city and at the entry points of the city to monitor pollution from moving vehicles that includes cars and heavy vehicles.

20. That the Applicant states that the Applicant submitted a representation dated 9/09/24 before the Chief Secretary government of West Bengal for taking measures to mitigate air pollution by use of remote sensing device. Copy of the representation dated 09/09/24 is annexed herewith and marked as Annexure H.21.

21. That the Applicant submits that it is of utmost importance that the Transport Department, the West Bengal Pollution Control Board (WBPCB), and the State Police are directed to adopt and implement the use of Remote Sensing Devices (RSD) duly certified by the Automotive Research Association of India (ARAI) or the National Physical Laboratory (NPL) or the International Centre for Automotive Technology (ICAT) to monitor and control pollution emitted by running vehicles. Additionally, it may be pointed out that it is also required, to amend the Central Motor Vehicle Rules to incorporate the mandatory testing of running vehicles through RSD machines. MoRTH should also standardize AIS 170 to enable comprehensive testing, ensuring that vehicular pollution is addressed effectively across the country.The RSD Guidelines isued by the MoRTH is enclosed as Annexure I

GROUNDS

i. For that the respondent authorities failed to appreciate that that the implementation of remote sensing device, is the most effective method of reducing pollution. The State at present under the pollution control certificate programme do periodical physical checks of exhaust emission from vehicles, whereas remote sensing device will screen the vehicles on road to identify gross and high emitters, catching and removing the worst polluters on the road can give substantial benefit

ii. For that the respondent authorities failed to implement the order of the Hon'ble High Court in W.P 4183(W) of 2005 in the matter of Subhas Datta vs State of WB & Ors vide order dated 17/06/10 directed the State to procure three more mobile remote sensing Device as the state government submitted before the court that already the state have made operation Remote Sensing Device.

iii. For that the respondent authorities failed to appreciate that the Action Plan 2018 of the city of Kolkata shows that vehicles are the major source of pollution and are responsible for 50 percent P.M.2.5 pollution in the city.

iv. For that the respondent authorities failed to appreciate that The Principal Bench of NGT, New Delhi in its order dated **07.10.2015** in the matter of application No. 21/2014 Vardhaman Kaushik Vs. Union of India &Ors. has directed that, *"The Central Pollution Control Board (CPCB) and the DPCC are hereby directed to purchase and/or*

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arrange proper mechanism and instruments for checking emissions of moving overloaded heavy vehicles, as measuring the emissions of standing vehicles, particularly transportation vehicles, would never depict correct data which are the basic cause for raising particulate matter and carbon content in the air."

v. For that the respondent authorities failed to appreciate that the Supreme Court of India in Writ Petition (c) No. 13029 /1985 in the matter of M.C. Mehta vs Union of India &Ors vide order dated 26-07-24 have directed MoRTH to implement remote sensing in the NCR to monitor vehicular pollution in addition to PUC tests, for controlling vehicular pollution

vi. For that the respondent authorities failed to appreciate that with the implemented Bharat Stage VI (BSVI) norms and fuels in April 2020, the emission standards with the introduction Bharat Stage VI need real-world emissions requirements and management to ensure that vehicles remain low emitting on road. As these new generation vehicles are equipped with more advanced emissions control system, commensurate improvement in emissions inspection and maintenance is needed at the city level. Pollution under control certificate programme (PUC) is an old system that is not very effective on the new age vehicles.

vii. For that the respondent authority failed to appreciate that remote sensing is a light source and a detector that is placed on the side of the

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road or at a height to transmit a laser beam to measure exhaust emissions remotely via spectroscopy as vehicles pass by and cross the light path. This can measure exhaust plume, and detect a range of pollutants including opacity, nitric oxide, carbon monoxide, hydrocarbons, and carbon monoxide in 0.5 seconds in the exhaust plumes of vehicles. This allows emissions measurements of large number of vehicles when they are being driven on the road and thus, do not require physical tests.

viii. For that the respondent authority failed to act on the representation dated 9/09/24 before the Chief Secretary government of West Bengal for taking measures to mitigate air pollution by use of remote sensing device.

ix. For that the inaction on the part of the respondent authorities in failing to prevent air pollution is otherwise bad, illegal and cannot sustain the test of legality;

LIMITATION

22. The applicant declares that the cause of action in the instant case, accrues and continues from day-to-day. Such cause of action is renewing on a day-to-day basis and as such the question of applicability of the limitation prescribed in Section 14 (3) of the National Green Tribunal Act, 2010 does not arise. The applicant submitted the representation dated 9/09/24 before the respondent authorities but they failed to consider the representation.

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PRAYERS

This application is made bonafied and for the ends of justice.

Your applicant therefore humbly prays Your Honour for the following orders:-

i) To direct the respondents each one of them and their men, agents, assigns and subordinates to certify and transmit to this Hon'ble Tribunal all records forming the basis of their inaction regarding implementation of Remote Sensing Device for abatement of air pollution, so that conscionable justice may be rendered ;

ii) To ~~direct the~~ issue a direction to the respondent authorities for the immediate procurement of remote sensing devices for abatement of air pollution in the city of Kolkata and for the entire state of West Bengal;

iii) To direct the respondent authorities to install remote sensing device at the major junctions and/or streets in the city of Kolkata and Howrah for mitigation of pollution and also at the major entry points of the city of Kolkata and Howrah and other parts of West Bengal specifically the non attainment cities of West Bengal in the Central Pollution Control Board List i.e.

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Asansol, Ranigunj, Barrackpore, Durgapur, Haldia ;

iv) Such other and/or further order or orders be made and/or direction or directions be given as Hon'ble Tribunal may deem fit and proper.

Subhas Datta

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VERIFICATION

SL. NO. I 2582

I, Sri Subhas Datta, son of Late Baneswar Datta, aged about 74 years, by occupation Chartered Accountant, by religion Hinduism, residing at 25/1, Guitendal Lane, Post Office, Police Station and District - Howrah, Pin code - 711101, do hereby declare and state that the contents of the paragraph nos. 1 to 6, 8 to 11, 15 to 17, 18 - 21 are true to the best of knowledge and the contents of the paragraph nos. 7, 12, 13 & 14 are my information derived from the relevant records which I verily believe to be true and the rests are my respectful submissions before the Hon'ble Tribunal.

Subhas Datta
DEPONENT

Prepared by me in my office

Subhas Datta
(Subhas Datta)
Applicant-in-person

IDENTIFICATION BY ME &
SIGNED/L.T.I. TAKEN IN MY PRESENCE

Advocate
JIBANJIB CHAKRABORTY
Advocate
Howrah Judges Court
WB/1448/2000

Date : 19.09.2024
Place: Howrah.

SOLEMNLY AFFIRMED & DECLARED
BEFORE ME ON IDENTIFICATION
19.9.24
SALIL SINHA ROY
NOTARY HOWRAH

NOTARY
SALIL SINHA ROY
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Annexure-A

Signature by Office or Advocate	Serial No.	Date	Office notes, reports, Orders or proceedings with signature
	05	17.06.10	W.P. 4183 (W) of 2005

Mr. Subhas Datta.
... Petitioner (in person),

Mr. D.P. Mukherjee,
Mr. Smriti Kana Mukherjee,
Mr. Debjit Mukherjee,
Mr. Bhagbat Chaudhuri.
... For H.M.C.

Mr. Kallol Basu.
... For W.B.P.C.B.

Mr. Balai Chandra Ray ...Ld. Adv. General.
Mr. Sandip Srimani,
Mr. Dilip Kumar De.
... For the State.

Relying on the order dated 3rd June, 2010 of the Additional Chief Secretary, Transport Department, Govt. of West Bengal, the learned Advocate General states that Mobile Remit Sensing Device (R.S.D) has already been made operational and that the device is being used for testing the auto emission level at different places in four districts on different week days.

Having regard to the number of vehicles which are being plied in and around the city, it would appear that one such Mobile Remit Sensing Device could not be sufficient for the four districts of Calcutta, North 24-Parganas, South 24-Parganas and Howrah.

We, therefore, direct that the respondents State-authorities shall procure three more Mobile Remit Sensing Device (R.S.D) so that each of the four districts above named has a Mobile Remit

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Filing by Office or Advocate	Serial No.	Date	Office notes, reports, Orders or proceedings with signatures

Sensing Device (R.S.D). This shall be done within three months from date.

In the meantime, the respondent-authorities shall continue to operate the Mobile Remit Sensing Device already available for all the four districts as indicated in the aforesaid order dated 3rd June, 2010 of the Additional Chief Secretary of the Transport Department, Government of West Bengal. It is clarified that the above direction is providing for minimum one Mobile Remit Sensing Device for each district and it would obviously not preclude the authorities from employing more that one Mobile Remit Sensing Device in one district.

Learned Advocate General further states that the status report on checking the pollution level will be submitted along with an affidavit, which shall be filed within two weeks from today.

The State Government shall issue appropriate instructions to all the Superintendent of Police, R.T.I. and also other Government departments to provide necessary assistance to the West Bengal Pollution Control Board and its officers for implementation of the directions issued by this Court and also for enforcement of all the statutory provisions regarding of vehicle pollution.

Let the matter be listed for hearing four weeks hence.

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ing by Office / Advocate	Serial No.	Date	Office notes, reports, Orders or proceedings with signature
			Photostat plain copy of this order duly countersigned by the Assistant Registrar (Court) be given to the learned counsel for the parties on usual undertaking.

(MOHIT S. SHAH, CHIEF JUSTICE)

(K. J. SENGUPTA, J.)

NOTARY
SALIL SINHA ROY
HOWRAH
Regn. No.-9 [illegible] 994
Exp. Dt.- 02.10.2028
GOVT. OF WEST BENGAL

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Annexure - B

The Telegraph online

Saturday, 07 September 2024

Another 18 vehicle monitors in queue

2 more remote sensing devices to check tailpipe emission levels of moving vehicles

The state pollution control board handed the two devices to the transport department and pledged, in an MoU, 18 more over the next few months

Debraj Mitra, Subhajoy Roy | Calcutta | Published 08.12.23, 07:24 AM

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Representational image
File image

The state transport department on Thursday received two remote sensing devices that can check the tailpipe emission levels of moving vehicles.

The state pollution control board (PCB) handed the two devices to the transport department and pledged, in an MoU, 18 more over the next few months.

The transport department had one such device until now. "We have received two more and will get another 18. These will be used across the state and will help strengthen the monitoring of vehicular emission," said Dibyendu Das, director of the state transport department.

A remote sensing device can spot the emission from the tailpipes of moving vehicles. The lone such device that was at the disposal of the transport department is usually mounted on a van parked on Red Road, among other places.

"We will not stop faulty vehicles (whose emissions breach the permissible pollution level) on the road. It will slow the traffic down. The owners of the vehicles will be sent notices and fined accordingly," said an officer in the traffic department.

An air pollution source apportionment study — a survey of the relative contribution of pollution sources to particulate matter in the air — done a few years ago found vehicular emission to be a major contributor to the pollution load in Calcutta.

Diesel-powered vehicles, most of which are in commercial use and ill-maintained, are the principal contributor to the city's vehicular emission, the report said.

Transport department officials have in the past said they received reports that vehicles with a valid pollution-under-control certificate are failing the pollution test.

"We have observed the same during random checks on vehicles using our remote sensing device. Some of the vehicle owners were found to be carrying valid certificates," an official of the transport department had told **Metro**.

"We suspect that a number of emission testing units are fudging test results by using pirated software or through improper use of the smoke meter inserted in the exhaust pipe of a vehicle. More sensing devices will help us track such centres," said the official.

A study by the National Environmental Engineering Research Institute in 2017-18 found that vehicles contributed 23.5 per cent of PM2.5 in Calcutta's air during winter. In Howrah, vehicles accounted for 31 per cent of PM2.5.

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RELATED TOPICS

Air Pollution | Vehicle Emission

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Annexure-C

THE TIMES OF INDIA, KOLKATA
SATURDAY, APRIL 6, 2024

Remote sensor to monitor vehicular emission lying defunct since Nov

Krishnendu.Bandyopadhyay
@timesgroup.com

Kolkata: Many polluting vehicles plying on city streets are feared to have gone scot-free since the city's only sophisticated remote sensing device (RSD), which monitors vehicle emissions in motion, has been out of service since Nov 16. This revelation comes amidst growing concerns over the city's deteriorating air quality and a failure to comply with high court and NGT orders, said green crusader Subhas Datta

However, the transport department officials said that two new RSDs received from the West Bengal Pollution Control Board are all set to start operations after a trial, even though they are awaiting approval of the accredited agencies like the Automotive Research Association of India (ARAI). Additionally, the transport department will receive 18 more such devices from the PCB to revolutionise the way the emission of vehicles in motion is measured.

Kolkata became the first city to implement remote sensing programme on a limited scale. This was catalysed by the directive from Calcutta High Court in 2009 in response to the case by Datta concerning the phase-out of older vehicles. This has also directed improvement in in-use emissions surveillance. Currently, Kolkata has two RSDs and one mobile RSD unit. However, despite a court directive in May 2010 to procure three additional RSDs for each district, it's yet to be implemented.

According to the transport department, it is possible to collect approximately 4,000 data-points daily and measure the emissions of CO, CO2, HC, NOx, and smoke. These devices operate for eight working hours and five days a week at strategic locations.

Datta said that proper utilisation of the device has been crucial for controlling pollution in the city and that any deviation would amount to disregard for the HC and NGT directives. "Not utilising these devices to monitor vehicle pollution is a clear violation of court orders," Datta said, underscoring the urgency of the situation.

Importance of monitoring vehicle emissions during normal operation cannot be overstated in combating pollution. Such monitoring helps identify discrepancies between certification-test performance by auto emission testers (who always carried out the state in idle condition) and actual emissions, providing regulators with insights into real-world vehicle performance and effectiveness of pollution control measures.

Datta also highlighted that the transport department collected approximately Rs 9 crore from polluting vehicles over the past three years.

Remote sensing systems, like the RSD, employ absorption spectroscopy to measure pollutant concentrations in vehicle exhaust plumes without intrusion. By measuring various pollutants' relative concentrations, these systems provide valuable data for assessing and mitigating air pollution.

KOL'S ONLY DEVICE

- Remote sensing data is generated as vehicles are being driven on the road
- If measured properly, remote sensing data truly represents emission levels from a sample of vehicle in a given programme area
- Remote sensing measurement can be implemented at a fraction of the cost as compared to vehicle inspection and maintenance programmes
- Emissions can be tested in a wide range of driving conditions which is not possible through other means of emission testing
- Vehicles that often cannot be tested due to size on dynamometers can be tested using this equipment
- On-road data can evaluate the extent to which owners are maintaining vehicles prior to emission testing

A file pic of the set-up

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Annexure-D

GOVERNMENT OF WEST BENGAL

Comprehensive Air Quality Action Plan for Kolkata

Prepared in connection to the order passed by Hon'ble National Green Tribunal on 08.10.2018 in respect of order dated OA 681 of 2018 (in matter of News Item Published in "The Times of India" authorized by Shri Vishwa Mohan Titled "NCAP with Multiple Timelines to Clear Air in 102 Cities to be released around) August 15th 2019

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by

Air Quality Monitoring Committee (AQMC)

(Constituted vide notification No. EN/3678(1-10)/3C-38/2018 Dated 05/12/2018)

12/31/2018

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Notification on Constitution of the Air Quality Monitoring Committee (AQMC)

Department of Environment

Government of West Bengal

Notification

No. 3678/EN/(1-10)/3C-38/2018 Date: 05/12/2018

Whereas air quality of Kolkata has not attained National Ambient Air Quality Standards (NAAQS)

And whereas the Hon'ble Principal Bench in its order dated the 8th October, 2018 has directed the State Government to constitute an Air Quality Monitoring Committee (AQMC) for preparation of an appropriate action plan for attaining NAAQS

Now therefore, a ten member AQMC is constituted for preparation of Air Quality Action plan for Kolkata for attaining NAAQS with following members:

- Additional Chief Secretary, Environment **Chairman**
- Secretary or his nominee, Transport
- Secretary or his nominee, Urban Development &Municipal Affairs (UD&MA)
- Secretary or his nominee, Industry, Commerce & Enterprise
- Secretary or his nominee, Micro Small and Medium Enterprises (MSME)
- Secretary or his nominee, Agriculture
- Commissioner or his nominee, Kolkata Police
- Commissioner or his nominee, Kolkata Municipal Corporation (KMC)
- Member Secretary, West Bengal Pollution Control Board (WBPCB)
- Chief Environment Officer, Environment **Convenor**

The nominee of any department should be a senior level officer at least in the rank of Joint Secretary/ Joint Commissioner/ Director

The Committee shall start functioning with immediate effect and shall submit the action plan to Central Pollution Control Board by 31.12.2018.

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Sd/-
Chief Secretary
Government of West Bengal

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Convenor

1. Constitution of an Air Quality Monitoring Committee (AQMC)

Hon'ble National Green Tribunal was pleased to pass an order on 08.10.2018 in respect of order dated OA 681 of 2018 (*in matter of News Item Published in "The Times of India" authorized by SHri Vishwa Mohan Titled "NCAP with Multiple Timelines to Clear Air in 102 Cities to be released around August 15"*) for :

1) constitution of Air Quality Monitoring Committee (AQMC) by every state
2) preparation of air quality action plan by AQMC for the "Non Attainment City" in the state with an objective to meet the national ambient air quality standards (NAQQS) within six months of finalization of the said action plan.

Accordingly, a committee has been constituted with members from department of Environment, Transport, Industries, Commerce and Enterprises, Medium Small and Micro Enterprises, Urban Development & Municipal Affairs, Agriculture, Kolkata Municipal Corporation, Kolkata Police and Member Secretary State PCB under direct supervision of Additional Chief Secretary, Environment and further supervision and intra-sectoral co-ordination by Chief Secretary.

2. Meeting of the Committee

The meeting of the Air Quality Monitoring Committee (AQMC) was conducted on 27th December, 2018 and the Comprehensive Action Plan has been prepared on basis of the feedback received from various departments.

3. Air Quality of Kolkata

3.1 Status of Air Quality Monitoring

The WBPCB has already made all semi-automatic air monitoring stations functional with effect from 01.01.2016, which were in operation till 2011. These monitoring stations operate in such a way that the air quality of Kolkata is being monitored every day. WBPCB is also operating two Continuous Ambient Air Quality Stations.

The semi-automatic stations provide data every 8 hourly for PM_{10}, daily for $PM_{2.5}$ and 4 hourly for SO_2 and NO_2. Each semi-automatic station operates on two days a week for 24 hours on each day of monitoring and on 104 days a year as per the guidelines of the Ministry of Environment, Forest and Climate Change, Government of India through the NAAQS, 2009. Each automatic station, however, operates round the clock and the data from the automatic stations can be obtained for user-selected intervals. The data from the automatic monitoring stations (operated on all days of the year) and the semi-automatic ones (operated twice a week) are made available in the web site of the WBPCB (http://emis.wbpcb.gov.in/airquality/citizenreport.do). All Air Quality Index data for Kolkata is already integrated with National AQI portal. Locations of stations are provided in Table 1.

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Table 1: Kolkata–locations of the Ambient Air Quality Monitoring Stations and the parameters monitored in Kolkata

Station name and location	Parameters monitored
Automatic Monitoring stations	
Rabindra Bharati University	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, C_6H_6, O_3
Victoria Memorial	$PM_{2.5}$, PM_{10}, SO_2, NO_2, CO, C_6H_6, O_3
Semi Automatic monitoring stations	
Dunlop Bridge	PM_{10}, SO_2, NO_2
Behala	PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, C_6H_6, O_3, NH_3, As, B(a)P, Pb, Ni
Salt Lake	PM_{10}, SO_2, NO_2
Baishnabghata	PM_{10}, SO_2, NO_2
Ultadanga	PM_{10}, SO_2, NO_2
Moulali	PM_{10}, $PM_{2.5}$, SO_2, NO_2
Shyambazar	PM_{10}, $PM_{2.5}$, SO_2, NO_2, CO, C_6H_6, O_3, NH_3, As, B(a)P, Pb, Ni
Minto Park	PM_{10}, $PM_{2.5}$, SO_2, NO_2
Paribesh Bhawan	PM_{10}, SO_2, NO_2
Picnic Garden	PM_{10}, SO_2, NO_2
Tollygunge	PM_{10}, SO_2, NO_2
Hyde Road	PM_{10}, SO_2, NO_2
Beliaghata	PM_{10}, SO_2, NO_2
Topsia	PM_{10}, SO_2, NO_2
Mominpore	PM_{10}, SO_2, NO_2
Gariahat	PM_{10}, SO_2, NO_2
Rajarhat	PM_{10}, SO_2, NO_2

Source: Air Pollution Control Action Plan for Kolkata and Howrah prepared by WBPCB (for Winter 2017)

The air quality data from CESC Chakmir automatic monitoring station is also made available through WBPCB website.

Station name and location Automatic Monitoring stations	Parameters monitored
CESC Chakmir (new station)	$PM_{2.5}$, PM_{10}, NO_2, SO_2, O_3, CO

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3.2 Status of air quality

Kolkata is the centre of the major urban metropolis of West Bengal. Vehicular emissions, emission from construction sector, road dust re-suspension, industrial emission, trans-boundary pollution etc continue to pollute the city air. The situation aggravates in winter months when typical weather conditions like temperature inversions entraps pollutants in lower levels of atmosphere. Recent analysis of air quality data shows that as per the National Air Quality Index (NAQI) followed in India, the ambient air quality index of Kolkata remains in "poor or very poor or severe" category for about 18-20 days in winter. The two air quality parameter PM_{10}, NO_2, which have been listed as Non-attainment pollutant in NGT order dated 8.10.2018 and which exceed National Ambient Air Quality Standards (NAAQS) for Kolkata are shown in Figure 1. The long-term annual average of criteria air quality parameter also does not indicate any significant downward trend (Figure 1).

Figure 1 shows that the annual average concentrations of pollutants like PM_{10}, and NO_2 are above the respective prescribed standards. The level of SO_2, Pb, NH_3, C_6H_6, B(a)P, As and Ni were found to be well within the respective standard values. These pollutants were not observed to cross the standard even at shorter (daily, 8-hourly, etc.) time intervals during these three years.

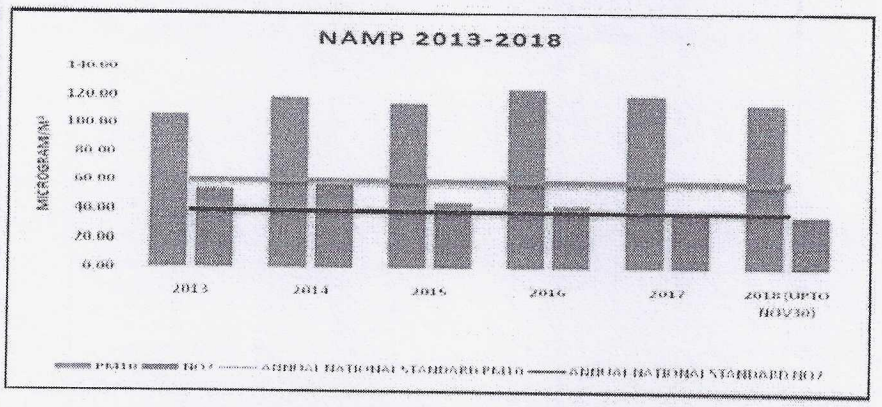

Figure 1 **Year wise trend of average concentration of criteria air pollutants in Kolkata** ***(data from semi-automatic stations *)***

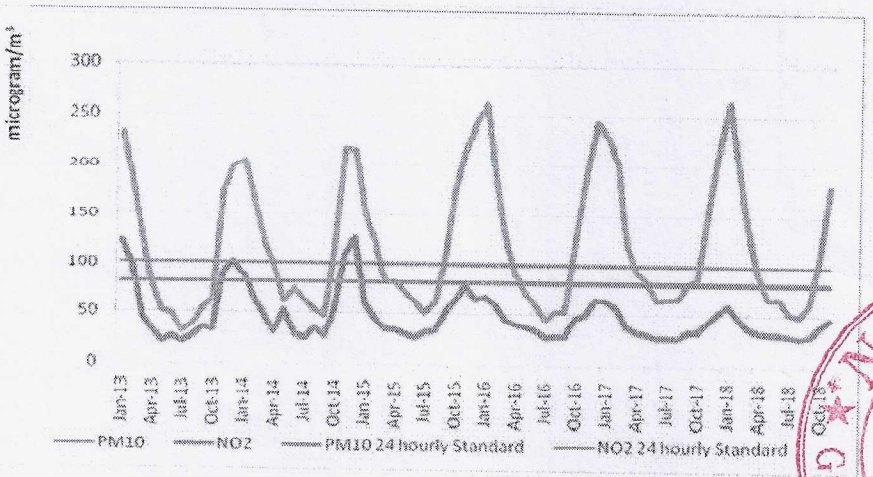

Figure 2 **NAAQS for PM_{10} and NO_2 is not attained from Mid October to Mid March**

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4. Major Source of Air Pollution in KolKata

Any air pollution control strategy will need baseline information on the sources and their relative contribution to ambient air pollution concentration as well as population exposure. WBPCB, along with NEERI, are currently carrying out a source apportionment study which is expected to bring greater precision in understanding of the recent pollution profile of Kolkata. After the completion of the study the plans can be further refined as action in several sectors is already underway. The available information on the assessment of pollution sources and their relative contribution have been taken into consideration for current action planning process.

In early 2000, it was found that the contribution from transport, industries and domestic sectors are 50%, 48% and 2%. About 56 per cent of the industrial emissions were contributed by the large- and medium-scale industries whereas about 44 per cent were contributed by the small-scale units operating within the city limit. These small units were using age-old technologies and were operating small coal fired energy inefficient heating installations like boilers or furnaces. Besides, coal-fired ceramic kilns-which were operating in the fringe areas of the city were also contributing to the city air.

The WBPCB decided that these industries should change to clean fuel (oil or gas) to reduce the particulate emission load from their operations. The regulatory frameworks for these changes were i) Regulating fuel quality (use of oil or gas in place of coal as mandatory); ii) Stricter emission standard 150 mg/Nm^3 for PM (the national standard was 1,200 mg/Nm^3) was enacted by the WBPCB for boilers (=2 t/hr steam generation capacity) and down-draft kilns. *Fuel conversion and mandatory use of cleaner fuel in those small-scale units reduced the emission from small scale industries by 98%.* The major contributor in medium and large-scale category was from CESC New Cossipur. Closing down of CESC New Cossipur (due to its vintage and derated capacity) has reduced the contribution from large and medium industries by 94%. The WBPCB also introduced stricter industrial siting policy and there was hardly and scope of addition of new industrial emission sources in following years. The benefit of 95% reduction of industrial emission is primarily offset by emergence of large-scale construction activities like construction of fly overs, large buildings and metro railways from middle of the last decade.

Vehicles are a dominant source of pollution in Kolkata and can remain a daunting challenge with growing motorization. Along with motorization, use of diesel has also increased in the city due to growth in the number of high mileage commercial vehicles and dieselization of the personal vehicle segment. This is not only contributing to the particulate and NO_x load in the city but also to the toxic risk as, according to the WHO, diesel emissions are classified as Class I carcinogens.

The contribution of vehicles to air pollution is expected to be significantly high. In 2005, ADB source apportionment study had reported that vehicles were responsible for 50 per cent of $PM_{2.5}$ in KMA. Subsequently, a report released by Central Pollution Control Board in March 2015 computed the emissions from road transport in six mega cities in India. The emission inventory of road transport referred by CPCB in six mega city report states that that the road transport sector contributes almost 4.6 MT of particulate matter and 44.3 MT of NO_x per day in Kolkata. The emission data mentioned

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above is being used till improved estimates are made available. About 45 per cent of NO_x and 32 per cent of particulate emissions are from use of diesel in city buses and vehicles.

Data on traffic count in eleven intersections in southern section, twenty two in central and 17 in northern sections of Kolkata, as available from the final report of the expert committee that was constituted by the National Green Tribunal for Kolkata, shows massive build-up of congestion during November 2014 (see *Table 1: Vehicles type distribution on road in different sections of Kolkata*).

Table 1: Vehicles type distribution on road in different sections of Kolkata

Kolkata	Southern area		Central area		Northern area	
	Traffic volume	(In per cent)	Traffic volume	(In per cent)	Traffic volume	(In per cent)
Private cars and taxis	265,987	45	788,058	58	267,347	39
Motor cycles and scooters	44,191	7	101,791	8	45,186	7
Buses	106,081	18	249,521	19	150,253	22
Mini- and midi-buses	22,194	4	48,657	4	28,230	4
Tram and trailers	14,391	2	25,240	2	12,264	2
Auto rickshaws	86,521	15	57,447	4	101,739	15
Heavy and light trucks	27,579	5	32,698	2	45,834	7
Van and others	28,841	5	45,108	3	40,125	6
Total	595,785	100	1,374,777	100	697,069	100

Note: 8 a.m. to 8 p.m. as on November 2014 (in passenger car units)

Source: Final Report of the Expert Committee constituted by the National Green Tribunal, Eastern India Bench, Kolkata

It is established that the strength of Kolkata is public transport, where approximately 88 per cent people are dependent on bus, tram, rail, metro, IPT, ferry etc. against only 12 per cent that are dependent on private vehicles like car and two-wheelers. In Kolkata 60 per cent of the trips have trip length of three–four km and it has a very vast network of streets and lanes that facilitate walking and movement of non-motorized modes. The compact structure of the city makes it more walkable and cycle-friendly. This is the inherent advantage that Kolkata needs to build on.

The unique advantage of Kolkata is its inherent link between zero emissions electric mobility with public transport systems that include network of metro rail and tramways. Both the systems have leveraged to move sizeable sections of daily trips to zero emissions modes. Tramways will need modernization, further strengthening, and network development to build on the unique advantage.

Roadside eateries, emission from diffused sources, trans-boundary emissions is also contributing to the deterioration of air quality in winter.

Several policy measures have already been implemented. Actions has also been initiated in connection to order of Hon'ble Eastern Bench of NGT in OA-33/ 2014/EZ, which are mostly provided in section 5 and considering the observations of Hon'ble Principal Bench of NGT in OA-681/2018, a comprehensive action programmes are provided in Tabular form in section 8.

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ITEM NO.15 COURT NO.6 SECTION PIL-W

S U P R E M E C O U R T O F I N D I A
RECORD OF PROCEEDINGS

WRIT PETITION(S)(CIVIL) NO(S). 13029/1985

M.C. MEHTA Petitioner(s)

VERSUS

UNION OF INDIA & ORS. Respondent(s)

(IN RE: SOLID WASTE DISPOSAL AND IA NOS. 134634/2018 (APPEAL AGAINST ORDER PASSED BY REGISTRAR(J-I) ON B/O GENERAL INSURANCE COUNCIL) AND REPORT OF COMMISSION FOR AIR QUALITY MANAGEMENT NAME OF THE FOLLOWING ADVOCATES MAY BE TREATED TO HAVE BEEN SHOWN IN THE LIST: MR. HARISH N. SALVE, SR. ADVOCATE (A.C.) MS. APARAJITA SINGH, SR. ADVOCATE (A.C.) MR. A.D.N. RAO, SR. ADVOCATE (A.C.) MR. SIDDHARTHA CHOWDHURY, ADVOCATE (A.C.) PETITIONER-IN-PERSON MR. G.S. MAKKER, MR. AMRISH KUMAR, MR. M. K. MARORIA, MR. SANJAY KR. VISEN, MR. SUDEEP KUMAR, MS. ROOHE HINA DUA, MR. SANDEEP KR. JHA, MR. JYOTI MENDIRATTA MR. RAJIV M. ROY, ADVOCATES)

Date: 26-07-2024 This matter was called on for hearing today.

CORAM :
HON'BLE MR. JUSTICE ABHAY S. OKA
HON'BLE MR. JUSTICE AUGUSTINE GEORGE MASIH

Mrs. Aparajita Singh, Sr. Adv. (A.C.)
Mr. A.D.N. Rao, Sr. Adv. (A.C.)
Mr. Siddhartha Chowdhury, Adv.
Ms. Shibani Ghosh, Adv.
Mr. Aditya Bharat Manubarwala, Adv.

For Applicant(s) Mr. Tushar Mehta, Solicitor General
Mr. Rajeev M. Roy, AOR

For Parties Ms. Aishwarya Bhati, A.S.G.
Ms. Archana Pathak Dave, Sr. Adv.
Mr. Gurmeet Singh Makker, AOR
Ms. Suhashini Sen, Adv.
Mr. Rajesh K. Singh, Adv.
Mr. S.S. Rebello, Adv.
Mr. Subharanshu Padi, Adv.
Mr. Wasim Qadri, Adv.
Ms. Ruchi Kohli, Adv.
Mr. Rohan Gupta, Adv.

Ms. Menaka Guruswamy, Sr. Adv.

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Mr. S. Wasim A Quadri, Sr. Adv.
Ms. Suvangana Agarwal, Adv.
Mr. Praveen Swarup, Adv.
Mr. Lavkesh Bhambhani, Adv.
Mr. Utkarsh Pratap, Adv.
Mr. Ameet Siingh, Adv.
Mr. Nityanand Mahato, Adv.
Mr. Devesh Maurya, Adv.
Mr. Praveen Swarup, AOR

Petitioner-in-person

Mr. P. K. Jain, AOR

Mr. Ramesh Babu M.R., AOR

Mr. Rajesh Kumar Chaurasia, AOR

Ms. Manjula Gupta, AOR

Mr. S.S. Shroff, AOR

Mr. Sushil Kumar Jain, AOR

Mr. Aniruddha Deshmukh, AOR

M/S. Khaitan & Co., AOR

Mr. Surya Kant, AOR

Mrs. B. Sunita Rao, AOR
Mr. Gunmaya S Mann, Adv.
Mr. Roop Narain, Adv.
Mr. Vineet Kumar, Adv.
Mr. Hokesh Kumar, Adv.
Mr. Kuldeep, Adv.
Mr. Sambhav Jain, Adv.

Mr. Abhishek, AOR

Mr. Nishe Rajen Shonker, AOR
Mrs. Anu K Joy, Adv.
Mr. Alim Anvar, Adv.

Mr. Ravindra Bana, AOR

Mr. R.P. Gupta, AOR

Mr. P. Parmeswaran, AOR

Mr. Mohit D. Ram, AOR

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Mr. Sarvam Ritam Khare, AOR

Mr. Satya Mitra, AOR

M/S. M.V. Kini & Associates, AOR

Mr. Pramod Dayal, AOR

Mr. Parijat Sinha, AOR

M/S. Saharya & Co., AOR

Mr. Rakesh Kumar-I, AOR

M/S. S. Narain & Co., AOR

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Mr. Pavan Kumar, AOR

Mr. Prashant Kumar, AOR

Mrs. Aishwarya Bhati, A.S.G.
Mrs. Archna Pathak Dave, Sr. Adv.
Mr. Mukesh Kumar Maroria, AOR
Mrs. Suhasini Sen, Adv.
Mr. Rajesh Kr. Singh, Adv.
Mr. Subhranshu Padhi, Adv.
Mrs. Ruchi Kohli, Adv.
Mr. Wasim Qadri, Adv.
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Mr. Mahesh Agarwal, Adv.
Mr. E.C. Agrawala, AOR

Mr. Pradeep Kumar Bakshi, AOR

Mr. Ashok Mathur, AOR

Mr. V.K. Verma, AOR

Mr. Radha Shyam Jena, AOR

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Ms. Adviteeya, Adv.
Mr. Rakesh K. Sharma, AOR

Ms. Sujeeta Srivastava, AOR

Mr. Ajit Pudussery, AOR

Mr. Mukesh K. Giri, AOR

M/S. Parekh & Co., AOR

Mr. Sudhir Mendiratta, AOR

Mr. Anil Kumar Jha, AOR

Mrs. Anil Katiyar, AOR

Mr. Hardeep Singh Anand, AOR

Mr. Sandeep Narain, AOR

Mr. Sushil Kumar Singh, AOR

Mrs. Rani Chhabra, AOR

Mr. G. Prakash, AOR

Ms. Shalini Kaul, AOR

Ms. Nandini Gidwaney, AOR

Mr. Shri Narain, AOR

Mr. Umesh Kumar Khaitan, AOR

Mrs. Priya Puri, AOR
Mr. Sharad Kumar Puri, Adv.
Ms. Pinki Aggarwal, Adv.
Ms. Parul Sharama, Adv.

Mr. K.R. Sasiprabhu, AOR

Mrs. K. Sarada Devi, AOR

Mr. Sanjay Kumar Visen, AOR

Mr. Rajiv Ranjan Dwivedi, AOR
Mr. Vishal, Adv.

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Mr. Kapil Chaturvedi, Adv.
Mr. Amit Trivedi, Adv.
Mrs. Subhadra Dwivedi, Adv.

Mr. Lokesh Sinhal, Sr. A.A.G.
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UPON hearing the counsel the Court made the following

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ORDER

IN RE: PUC CERTIFICATE

IA NO.134634/2018

1. We have perused the order dated 10th August, 2017. The said order accepts the recommendations submitted by the Environment Pollution (Prevention & Control) Authority (EPCA). Based on the recommendations of the EPCA, the following direction was issued:

> "There is now no dispute or disagreement about this. However, it is made clear that the Insurance Companies will not insure a vehicle unless it has a valid PUC Certificate on the date of renewal of the insurance policy.
> This should be implemented at the earliest."

2. No provision under the Motor Vehicles Act, 1988, or any other enactment and rules framed thereunder provides that a motor vehicle insurance policy cannot be renewed unless the vehicle has a valid PUC certificate. As rightly submitted by the learned Solicitor General, if the said direction is implemented in its letter and spirit, it will have disastrous consequences. Many vehicles will continue to ply without third-party insurance. Therefore, we are inclined to allow this Application by deleting the direction described above.

3. Obviously, the direction was issued to ensure that every motor vehicle always has a valid PUC certificate. If motor vehicles are allowed to ply on roads without valid PUC certificates, it adds to the existing pollution. Therefore, there has to be some effective

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and practical solution. An attempt was made to find an effective solution, as seen from the Note dated 15th July 2024, submitted by Ms Aparajita Singh, learned Senior Advocate appointed as Amicus Curiae. The suggestion is based on Report No.99 of the EPCA, which notes the limitations of the PUC tests and has recommended the introduction of remote sensing technology in addition to PUC tests for controlling vehicular pollution. A direction was issued by this Court on 19th August 2019 to the Ministry of Road Transport and Highways (MoRTH) as well as the Ministry of Law to take a final decision in the matter and to file a status report. The learned Amicus Curiae submitted that yesterday a report has been filed, which, according to her, is disappointing in the sense that the technology which can be effectively used to control the pollution caused by the vehicles has not appealed to MoRTH. When a body like EPCA had recommended the use of remote sensing technology in addition to PUC tests, MoRTH ought to have taken the suggestion seriously. The learned Solicitor General assures the Court that MoRTH will reconsider the issue. This issue has been hanging fire for the last four years. We are of the view that somewhere a beginning has to be made by commencing the use of remote sensing technology. Therefore, to begin with, it will be appropriate if the use of remote sensing technology can commence in NCR States. MoRTH shall seek the cooperation of the concerned Authorities of the NCR States for this purpose. If MoRTH finds that the concerned Authorities of the NCR States are not cooperating, we permit MoRTH to move this Court so that a notice can be issued to the concerned

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Authorities of the NCR States.

4. We grant MoRTH two months to reconsider its position and make an appropriate decision based on our suggestions above.

5. Needless to add, the Secretary of the Ministry of Road Transport and Highways shall immediately convene a meeting of his counterparts and Secretaries of the concerned Departments of the NCR States. MoRTH shall forward copies of this order to the relevant departments of the NCR States to ensure their full cooperation.

6. This Application stands allowed accordingly.

IN RE: SOLID WASTE MANAGEMENT

1. We have perused the affidavit filed by the Municipal Corporation of Delhi (MCD). We agree with the submission made by Ms Aparajita Singh, learned Senior Advocate appointed as Amicus Curiae, that in Delhi, the prevailing situation may lead to a health emergency as the generation of solid waste per day in the capital city is above 11000 metric tonnes and the capacity of the processing plants made available by the MCD is only 8073 metric tonnes per day. Therefore, about 3000 metric tonnes of untreated solid waste is accumulating daily in the capital city, and we are sure this figure will gradually increase with every passing day. In the affidavit filed by the MCD, they have come up with the timelines for setting up additional facilities or for enhancing the capacity of the existing facilities. It is pointed out that

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litigations are pending. We do not see the light at the end of the tunnel as going by the affidavit of the MCD and assuming that the timelines mentioned therein are abided by, there is no possibility of creating required facilities in the capital city even till 2027, which will have the capacity to deal with 11000 metric tonnes of solid waste per day. No guesswork is required to state that by that time, the generation of solid waste will multiply. We agree with the learned Amicus Curiae that this will lead to a public health emergency. This is a sorry state of affairs when it comes to the implementation of the Solid Waste Management Rules, 2016 (for short, "2016 Rules") in the capital city.

2. We, therefore, direct the Secretary of the Ministry of Environment, Forest and Climate Change (MoEFCC) of the Government of India to immediately convene a meeting of all the concerned State Government officials, the Commissioner of the Municipal Corporation of Delhi and its officials for working out an immediate solution to the issue. We direct the Secretary of the MoEFCC of the Government of India to submit a report to this Court about immediate measures required to be taken for ensuring that non-compliance with the 2016 Rules does not create serious health emergency in the capital city of Delhi.

3. Our attention is invited to an affidavit filed on behalf of the Swachh Bharat Mission (SBM), Ministry of Housing and Urban Affairs (MoHUA), Government of India. It is stated that on 10th July 2024, the MCD moved the Government of NCT of Delhi to delegate

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financial power to the MCD as per the provisions of Section 202 of the Delhi Municipal Corporation Act, 1957, to approve the rates and agency contracts beyond a sum of Rs.5 crores relating to solid waste management projects. We direct the Government of NCT of Delhi to immediately consider the said proposal dated 10th July, 2024 and take an appropriate decision within three weeks from today. The Registry shall forward a copy of this order to the Chief Secretary of the Government of NCT of Delhi. The proposal dated 10th July, 2024 clearly states that it is limited to solid waste management projects. Considering the prevailing situation, if this relief is not granted to the MCD, it will not be able to comply with the 2016 Rules. The Government shall take note of this factual position

4. The situation within the limits of Gurugram, Faridabad and Greater NOIDA is equally bad. For example, the total generation of solid waste in Gurugram is 1200 metric tonnes per day, but the processing capacity of the plants is only of 254 metric tonnes per day. Regarding Faridabad, the total generation of solid waste is 1000 metric tonnes per day, and the processing capacity of plants is approximately of 410 metric tonnes per day. The situation in the Greater NOIDA is slightly better. We, therefore, direct the Secretary of the Ministry of Environment, Forest and Climate Change of the Government of India to immediately convene a meeting with the Secretary of the Ministry of Housing and Urban Affairs (MoHUA), the Commissioners of the Municipal Corporations at Gurugram and

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Faridabad, officials of the Greater NOIDA and the Secretaries of the Department of Environment of the State Governments of Haryana and Uttar Pradesh and come out with immediate solutions to deal with the crisis which will lead to public health emergency. The report regarding Delhi and these three areas of Gurugram, Faridabad and Greater NOIDA shall be submitted by the Secretary of the MoEFCC of the Government of India within one month from today.

5. For considering the issue regarding solid waste management, list on 6th September, 2024.

(ASHISH KONDLE)
COURT MASTER (SH)

(AVGV RAMU)
COURT MASTER (NSH)

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Annexure-F

ITEM NO.10 COURT NO.4 SECTION PIL-W

S U P R E M E C O U R T O F I N D I A
RECORD OF PROCEEDINGS

Writ Petition(s)(Civil) No(s). 13029/1985

M.C. MEHTA Petitioner(s)

VERSUS

UNION OF INDIA & ORS. Respondent(s)

ISSUE OF ON BOARD DIAGNOSTIC

Date : 10-05-2018 This petition was called on for hearing today.

CORAM :
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HON'BLE MR. JUSTICE DEEPAK GUPTA

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Petitioner-In-Person

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UPON hearing the counsel the Court made the following

O R D E R

ISSUE OF ON BOARD DIAGNOSTIC AND REPORT NO. 85 DATED 25.04.2018 ON IMPROVEMENT IN TESTING PARAMETERS IN VEHICLES UNDER POLLUTION UNDER CONTROL (PUC) PROGRAMME

EPCA has filed the report on improvement in testing parameters in vehicles under PUC programme.

With regard to petrol vehicles, it is recommended by EPCA that no further steps are required to be taken. Some steps have been suggested but it has been recorded that it is not practicable or not possible to introduce those steps such as introduction of

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dynamometer in testing in PUC Centre for NOx measurements.

With regard to diesel vehicles, some recommendations have been made. The learned ASG says that he would like to take instructions in this regard and get back within six weeks.

With regard to remote sensing, it is stated that remote sensing screening of emissions has been found to be extremely effective in Kolkata and it would be of considerable utility in so far as Delhi and Pune are concerned.

We have requested Mr. Goburdhan to take instructions in this regard for NCT of Delhi. It is stated by learned Amicus that the entire cost of purchasing would be in the region of Rs.25 crores in total. Mr Goburdhan will take instructions within six weeks.

List the matter on 2nd August, 2018.

(MEENAKSHI KOHLI)
COURT MASTER

(KAILASH CHANDER)
COURT MASTER

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EPCA Report No 99

Recommendation for an implementation plan for use of remote sensing for on-road emissions monitoring as per directions of the Hon'ble Court on 8.7.2019

July 26, 2019

In the context of the on-going deliberations on the potential application of remote sensing technology for monitoring on-road vehicular emissions, the Hon'ble Supreme Court has directed Environment Pollution (Prevention and Control) Authority (EPCA) as follow:

> "With respect to remote sensing technology a report has been filed by International Centre for Automotive Technology (ICAT). It is pointed out by Amicus Curiae that remote sensing technology has been found to be helpful in reducing the pollution level and it is a finding of the ICAT that it is effective method to check pollution. As to put it into operation, time prayed on behalf of the EPCA to consider and submit a report. As the matter is urgent and is in connection with the reduction of pollution, we grant only fifteen days time to the EPCA to submit a proposal after consulting various stakeholders."

In view of this direction from the Hon'ble Supreme Court, EPCA convened a meeting on July 16, 2019 with all concerned agencies including the Union Ministry of Road Transport and Highways (MoRTH) and Transport Department of National Capital Territory of Delhi to identify the key steps needed for implementation.

EPCA has detailed out the steps that are required for implementation and identified the agencies and schedule for action. **The Hon'ble Supreme Court is requested to direct the agencies as detailed in the plan (page 9) to undertake the outlined work so that remote sensing technology can be deployed for checking pollution from vehicles.**

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1. Steps to be taken by Union Ministry of Road Transport and Highways (MoRTH)

1.1 Define the scope and role of remote sensing programme vis a vis on-going pollution control certificate (PUC) programme: The Ministry of Road Transport and Highways needs to frame rules under Central Motor Vehicle Act and Rules to define the scope and use of remote sensing programme for monitoring and enforcement of on-road emissions. This needs to state how this would co-exist with the ongoing pollution under control certificate (PUC) programme for physical checking of emissions. Both the programmes have different objectives and scope but they are complimentary and this needs to be clarified. While under the PUC programme periodic physical checks of exhaust emissions from vehicles will continue to assess compliance with limits imposed on idling emissions, remote sensing programme will screen vehicles on the road to identify gross or very high emitters. Catching and removing the worst polluters on the road can give substantial emissions benefit. It is possible that some vehicles may escape or even pass PUC tests and yet experience technical anomalies that may make them high emitters between two scheduled PUC tests. Moreover, PUC is not a very effective way of assessing real magnitude of emissions from vehicles.

Adding remote sensing test has become necessary as PUC is a very simple and basic test that lacks quality control and is not appropriate for screening vehicles with more advanced emissions control systems as under BSIV and BSVI regime. Not only do the results of these tests do not correlate well with dynamometer tests (that are used at the time of vehicle certification), they are also increasingly not reliable for BS IV and beyond vehicles. They also fail to capture NOx emissions which contribute to ozone formation, and contribute to secondary particulate matter formation. It may be noted that as present, the PUC program relies upon idle speed testing mode for petrol/LPG/CNG vehicles and free acceleration mode (FAS) or smoke opacity test for diesel vehicles. These tests measure carbon monoxide (CO), and hydrocarbon (HC) concentration in exhaust from petrol/LPG/CNG vehicles, and peak smoke opacity for diesel vehicles that is meant to be a proxy for particulate emissions. If vehicles tested cross the prescribed limit values, they have to go for repair.

Rules to be defined by MoRTH will make it clear that remote sensing can be used to identify vehicles which in all probability have either a defective

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emissions control system or one that has been tampered with. The big advantage of remote sensing is that it can be carried out in a non-intrusive fashion, and without vehicles having to report physically to centralized test center or PUC stations. The same remote sensing setup can be used to measure emissions from different vehicle types and evaluate hundreds to thousands of vehicles each day.

The purpose of remote sensing as opposed to PUC will be to identify only a limited number of vehicles identified as high emitters that can then be selectively required to report for a more improved loaded test at centralized, and possibly automated testing centers. ICAT report has also recommended a loaded test. As a result, a remote sensing program can dramatically improve the effectiveness of inspection and maintenance program.

This programme will also have to be aligned with further upgradation of the centralized inspection and maintenance centres that have come up in Jhuljhuli and Burari in Delhi. These can be equipped with simple dynamometers to measure emissions like NOx and others that is not possible under PUC. These measurements are possible in loaded tests that are more capable of identifying high emission malfunctions as the air-fuel control and emission after-treatment systems evolve. The loaded tests are carried out on a dynamometer, and thus require centralized testing centers. However, it is not possible to test each and every vehicle in the fleet to identify gross polluters due to the sheer number of vehicles involved. For this purpose, commercial vehicles can be prioritized for further tests in these centers. Personal vehicles will have to be issued challans to be taken for repair in workshops.

Eventually, a remote sensing program can also be used support a "clean screen" program that lets drivers skip a periodic tailpipe emissions recertification test by verifying that their vehicle emissions are within a limit range. Real-world emissions factors developed using remote sensing can significantly improve the accuracy of outputs of emissions models, and air-quality forecast tools.[1],[2]

[1] https://theicct.org/publications/remote-sensing-briefing-dec2018
[2] ICAT 2019, New Delhi Real World Emission Study (NDRWES) using remote sensing technology, Final Report submitted to Ministry of Heavy Industries and Public Enterprises, GOI, February

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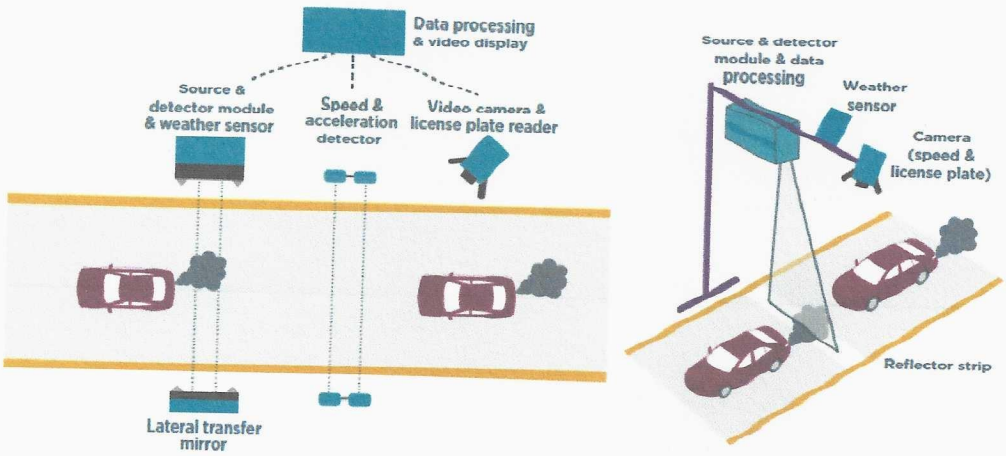
Figure 1: Approaches to remote sensing measurements



Source: ICCT 2019, Worldwide use of remote sensing to measure motor vehicle emissions

Notification of enforcement actions: MoRTH would need to specify deterrence for these vehicles for effective enforcement. It is recommended that MoRTH should notify that insurance coverage of vehicles that are identified as gross polluter under the remote sensing program should be revoked in 30-60 days unless the vehicle has undergone repairs and if a commercial vehicle has passed the advanced test including loaded mode test at Jhuljhuli or other preferably automated I/M stations.

The notification should specify that passing of PUC tests under idle mode will not be a reason to invalidate the gross polluter identification by remote sensing. The notification should clarify that traffic police may stop and inspect vehicles if they have been found to fail the high emitter thresholds in remote sensing measurements.

1.2 Notification of gross polluter thresholds, and enforcement action under Central Motor Vehicle Rules: MoRTH may take on board the recommendation of the ICAT report that recommends setting of a pollutant-specific cut point per fuel-type, technology group, and/or Bharat emission norms. These cut-points as specified in the ICAT report should be notified by MoRTH as threshold limits for catching highly polluting vehicles on road. A high threshold (e.g. 99th percentile of values in ICAT report) should be classified as "Extreme polluters", and a moderately high

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threshold (e.g. 95th percentile of values in ICAT report) should be classified as "high emitters" as shown in table 1 and table 2.

Table 1: Cut-points for Extreme Polluters

Vehicle Type	CO Percent	HC ppm	NO ppm	UV Smoke
HDV	3.637	2258	3966	1.517
LDV	2.752	1356	2223	0.608

Table 2; Cut-points for High Emitters

Vehicle Type/Fuel/Bharat Stage	CO Percent	HC ppm	NO ppm	UV Smoke
HDV/Diesel/Bharat St IV	1.377	1104	2685	0.766
LDV/Diesel/Bharat St IV	0.617	385	1508	0.335
LDV/CNG-Petrol/Bharat St IV	1.259	631	1399	0.099
LDV/Petrol/Bharat St IV	0.92	561	766	0.083

Note: ICAT needs to work out similar cut-points for BSI, BSII, BSIII vehicles based on their RSD testing.
Source: ICAT Report, 2019

The suggested cut-points can be adopted at the start of the programme and revised after 12 months based on collected data (see Annexure 1 for details)

1.3 Issue guidance on industry standard on remote sensing: Ministry of Road transport and Highways would need to provide a technical guidance on remote sensing equipment, remote sensing data reporting which specifies design, construction, networking and data sharing of motor vehicle. Remote sensing monitoring platform will have to developed to allow broader adoption of remote sensing beyond Delhi. The standard should also include technical requirements related to remote sensing location selection, construction, operation and maintenance.

2. Steps to be taken by the Department of Transport, NCT Delhi

Department of Transport, NCT Delhi should be responsible for implementation of the programme in the city. Once successful, transport departments of other NCR districts can be directed to implement similar programmes. The Department of Transport, NCT Delhi needs to do the following:

2.1 Issue global tender for procurement of remote sensing equipment and its operations: A global tender should be issued within three months to procure five remote sensing setups immediately as suggested in the

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ICAT report. Ten additional setups should be procured after the first five units have been operational for a full year. The systems should be capable of measuring NO, NO_2, HC, CO, CO_2, and opacity at a minimum. The operator of equipment should be asked to procure data processing hardware and necessary software needed to operationalize the remote sensing equipment and linking it with the centralized database.

Availability of equipment: According to data sourced from the International Council on Clean Transportation[3], there are at least half a dozen manufacturers of remote sensing equipment globally. US companies first manufactured and commercialized this equipment. But currently, Chinese authorities test far more vehicles using remote sensing than US or Europe. Chinese companies are also manufacturing this equipment (see table on equipment).

Table 1: Main remote sensing technologies and manufacturers.

Type	Position	Provider / Inventor	Equipment name	Measurement	Measures
Open path	Cross-road	University of Denver	FEAT	Arc lamp light beam with mirror reflector	CO, HC, CO_2, NO, NO_2, NH_3, SO_2, opacity
	Cross-road	Opus	RSD 4600 and older	Arc lamp light beam with mirror reflector	CO, HC, CO_2, NO, opacity
			RSD 5000		CO, HC, CO_2, NO, NO_2, NH_3, opacity
	Cross-road	Environmental Technology Consultants	R-series S650	Arc lamp light beam with mirror reflector	CO, CO_2, HC, NO, NO_2
	Cross-road; Overhead	Dopler Eco Technologies	DPL7000 Series	Laser light beam with mirror reflector	CO, CO_2, HC, NO, opacity
	Overhead	HEAT LLC	EDAR	Laser curtain with strip reflector	CO, total and speciated HC, CO_2, NO, NO_2, opacity
	Overhead	Anhui Baolong		Arc lamp light beam with mirror reflector	CO, CO_2, HC, NO, opacity
Extractive	Overhead sampling	University of California, Berkeley		Exhaust plume sample	CH_4, NO, NO_2, NH_3, BC, PM, PN, PN size,
	Overhead sampling	CARB	Portable Emissions Acquisition System (PEAQS)	Exhaust plume sample	Black carbon and NO_x
	Overhead sampling in Shed	University of Denver	OHMS	Exhaust plume sample	CO, CO_2, HC, NO, NO_2, N_2O, PM, PN, Black Carbon
	Roadside sampling	Czech Technical University		Exhaust plume sample	CO, CO_2, NO_x, PM, PN
	Roadside sampling	University of Münster		Exhaust plume sample	NO_x, CO_2, PN
	Plume chaser	University of Heidelberg	ICAD	Exhaust plume sample	NO, NO_2, CO_2
	Plume chaser	University of Birmingham	SNIFFER	Exhaust plume sample	NO, NO_2, CO_2
	Plume chaser	CARB	Mobile Measurement Platform (MMP)	Exhaust plume sample	CO, CO_2, HC, NO_x, PM, PN, Black Carbon

Source: ICCT 2019, Worldwide use of remote sensing to measure motor vehicle emissions

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[3] https://theicct.org/publications/worldwide-use-remote-sensing-measure-motor-vehicle-emissions

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2.2 Do a site selection and sampling plan: Delhi transport department should assess site selection and sampling plan for remote sensing. This has strong bearing on emissions. EPCA is recommending that the sites for use of this equipment could be at the entry to Delhi, to check on emissions from heavy-duty vehicles.

2.3 Set up system for management of data and network: The data processing system for remote sensing consists of telemetry equipment, display equipment, data server, video data server, backup server, router, network printer, mobile workstation, firewall, etc. The data collected from remote sensing should be stored in secure locations, and linked with the VAAHAN database so that detailed vehicle details could be obtained on the basis of license plate. Further, the software should automatically issue a warning to all vehicle owners whose vehicles exceed high emitter threshold even once. If the vehicle in question is deemed to be a high emitter or an extreme polluter, then a challan through the Delhi police e-challan system should be issued. National Informatics Centre (NIC) may be asked with development of the integrated platform necessary for this purpose with key operational and legal inputs from Delhi Traffic Police. Consistent with the Open Government Data (OGD) initiative, a version of the emissions data, without the license plate and vehicle owner details, but identifying the make, model, fuel type, and year of vehicle should be released to the public so that researchers may be analyze the data for trends in vehicle emissions, and/or identify systemic problems with vehicles of certain make or type.

Further technical details needed for implementation are summarized in Annexure-I.

3. Proposed plan for implementation of remote sensing for pollution testing of vehicles in the city submitted for the consideration of the Hon'ble Supreme Court

The objective is to identify and penalize gross polluters – vehicles with high pollution levels. Many countries in the world are using this technology to combat pollution from vehicles (see table below)

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Table 2: Overview of the different remote sensing technologies, type of vehicles measured, and programs that took place in different countries since 2010.

Country	Technology				Type of vehicles measured					Use of remote-sensing					Number of individual measurements since 2010
Argentina	C				PC	LCV	HDV	MC			MO				10,000 - 100,000
Australia	C				PC	LCV	HDV			R	MO				10,000 - 100,000
Austria	C				PC	LCV	HDV			R	MO	H			10,000 - 100,000
Bulgaria	C				PC	LCV	HDV	MC			MO	H			10,000 - 100,000
Canada	C	O	A		PC	LCV	HDV			R	MO	H		MS	10,000 - 100,000
Chile	C				PC	LCV	HDV	MC			MO				10,000 - 100,000
China	C	O		S	PC	LCV	HDV			R		H			>1,000,000
Colombia	C				PC	LCV	HDV	MC			MO				10,000 - 100,000
Czech Republic			A		PC	LCV	HDV	MC	OFF	R					10,000 - 100,000
Denmark	C				PC	LCV	HDV			R	MO	H			10,000 - 100,000
Finland				S			HDV			R					<10,000
France	C	O			PC	LCV	HDV	MC		R	MO				100,000 - 1,000,000
Germany	C		A	S	PC	LCV	HDV	MC		R	MO	H		MS	10,000 - 100,000
Ghana	C				PC	LCV	HDV	MC		R	MO				10,000 - 100,000
Hong Kong	C				PC	LCV	HDV			R	MO	H		MS	>1,000,000
India	C				PC	LCV	HDV	MC		R	MO				>1,000,000
Iran	C				PC	LCV	HDV			R	MO	H			10,000 - 100,000
Japan	C				PC	LCV	HDV	MC			MO				100,000 - 1,000,000
Korea	C				PC							H			>1,000,000
Mexico	C		A	S	PC	LCV	HDV	MC		R	MO	H	L		100,000 - 1,000,000
New Zealand	C				PC	LCV	HDV								100,000 - 1,000,000
Slovenia				S	PC	LCV	HDV			R					<10,000
Spain	C				PC	LCV	HDV	MC		R	MO	H			>1,000,000
Sweden	C		A		PC	LCV	HDV			R	MO				10,000 - 100,000
Switzerland	C				PC	LCV	HDV	MC		R	MO			MS	100,000 - 1,000,000
UK	C	O		S	PC	LCV	HDV	MC		R	MO			MS	100,000 - 1,000,000
USA	C	O	A	S	PC	LCV	HDV	MC	OFF	R	MO	H	L	MS	>1,000,000

C: Cross-road (open path) system
O: Overhead (open path) system
A: Extractive air sampling at a fixed location
S: Extractive air sampling from a car (plume chaser or sniffer)
PC: Passenger Car
LCV: Light-commercial vehicles, such as vans and pickup trucks
HDV: Heavy-duty vehicles
MC: Motorcycles
OFF: Off-road equipment
R: Research
MO: Monitoring of fleet emissions
H: Identification of individual high emitters for inspections or tampering
L: Identification of individual low emitters for a "clean screen" program
MS: Identifying groups of high emitting vehicles for market surveillance

Source: ICCT 2019, Worldwide use of remote sensing to measure motor vehicle emissions

The equipment for testing is mobile – can be moved from place to place as the need arises. It would be best if the testing is done on elevated areas, like flyovers as this is where the pollution is the highest. EPCA suggests that the first testing sites should be close to the major entry points (toll gates) into Delhi so as to identify gross polluters from heavy vehicles.

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Figure 3a: Schematic setup of a plume chaser installed in vehicle measuring the exhaust emissions from the truck in front

Figure 3b: Schematic setup of a stationary air sampling system.

Source: ICCT 2019, Worldwide use of remote sensing to measure motor vehicle emissions

The following needs to be done in order to implement the plan. This plan is based on the report of ICAT, which was submitted to the Hon'ble Court at its directions.

Plan for implementation of use of Remote Sensing technology for monitoring vehicle emissions with suggested agencies and time-lines

Sno	Recommended action	Agency	Deadline
1	Frame rules under CMVR for use of remote sensing for PUC, including penalties so that enforcement is possible	MoRTH	3 months
2	Notify the gross polluter threshold under CMVR as recommended by ICAT	MoRTH	3 months
3	Issue technical guidance on design of programme, including equipment, networking and data sharing	MoRTH	2 months
4	Global tender for purchase of 5 machines and its operation	Delhi Transport Department	3 months
5	Finalisation of site and sampling plan	Delhi Transport Department	3 months

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Annexure I
Technical note on steps to be taken for implementation of remote sensing programme for monitoring vehicle emissions

1. Choice of remote sensing equipment

Selection of remote sensing devices: The schematic of a cross-road setup of units of the remote sensing device for both cross-road and top-down remote sensing systems explain the different approaches (Figure 1)[4]. The setup consists of a light source with the reflecting strip/mirror and the light detector, the speed and acceleration detectors, the plate number recorder, and a weather sensor. The data processing system consists of telemetry equipment, display equipment, data server, video data server, backup server, router, network printer, mobile workstation, firewall, etc.

Figure 1: Approaches to remote sensing measurements

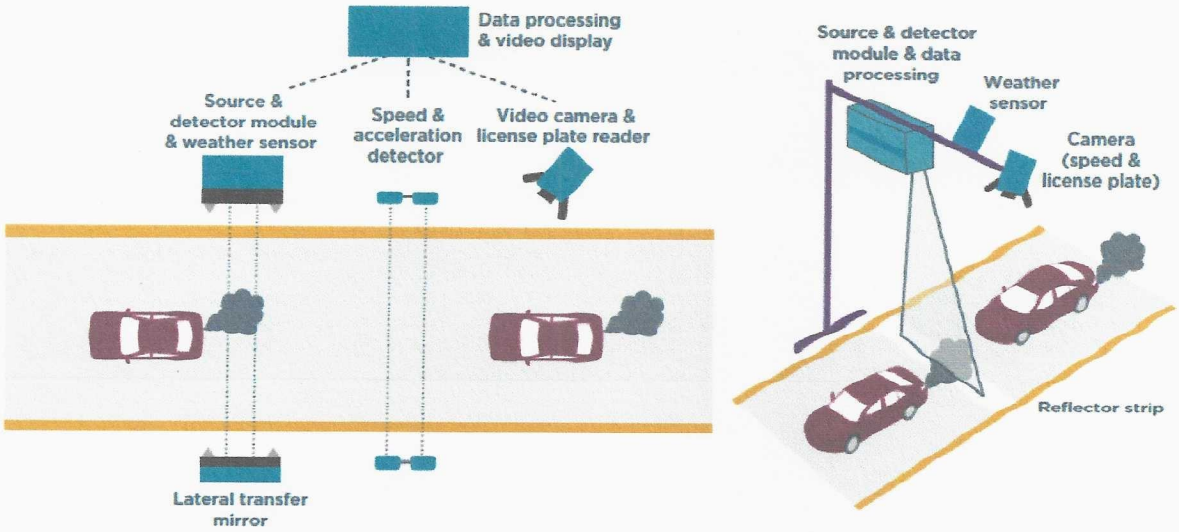

Figure 1: Remote sensing setup

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[4] https://theicct.org/publications/worldwide-use-remote-sensing-measure-motor-vehicle-emissions

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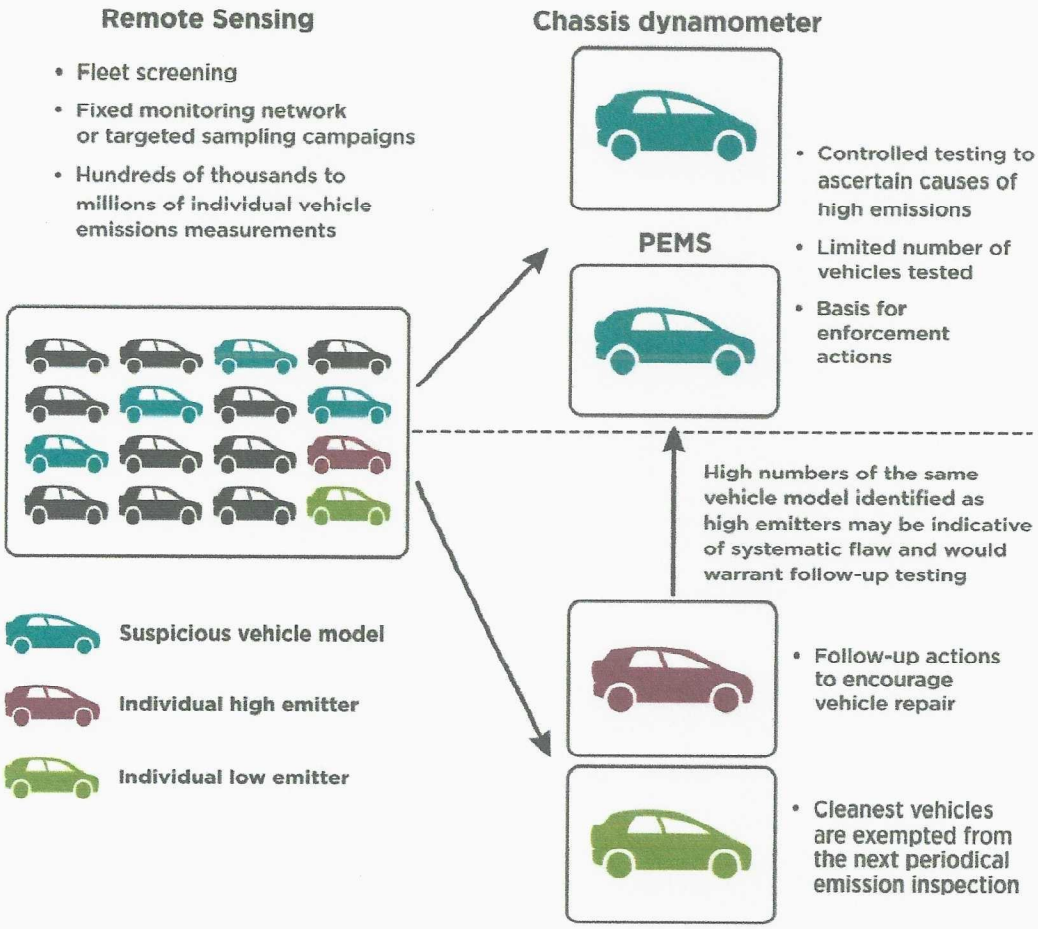

Figure 1: Possible applications of vehicle remote sensing in an enhanced vehicle emissions control program.

2. Pollutants to be measured

The system should be capable of measuring NO, NO_2, HC, CO, CO_2, and opacity at a minimum. Measurement of N_2O, NH_3, SO_2, and CH_4 is desired, but not necessary.

A complete remote sensing record for an individual vehicle should contain the following information:

- the concentration measurement of each emission above the concentration in ambient air;
- the vehicle's speed and acceleration;
- the measurement conditions: road grade, ambient temperature and pressure, and relative humidity;
- the vehicle's technical information, including brand, model, category, model year, body type and size, fuel type, engine size, emission standard, type-approval CO_2 value where available, and empty vehicle mass.

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3. Key manufacturers of remote sensing equipment and expected cost of equipment

At least half a dozen manufacturers of remote sensing equipment exist globally as shown in Table below.[5] Chinese companies are also manufacturing this equipment.

Table 1: Main remote sensing technologies and manufacturers.

Type	Position	Provider / Inventor	Equipment name	Measurement	Measures
Open path	Cross-road	University of Denver	FEAT	Arc lamp light beam with mirror reflector	CO, HC, CO_2, NO, NO_2, NH_3, SO_2, opacity
	Cross-road	Opus	RSD 4600 and older	Arc lamp light beam with mirror reflector	CO, HC, CO_2, NO, opacity
			RSD 5000		CO, HC, CO_2, NO, NO_2, NH_3, opacity
	Cross-road	Environmental Technology Consultants	R-series S650	Arc lamp light beam with mirror reflector	CO, CO_2, HC, NO, NO_2
	Cross-road; Overhead	Dopler Eco Technologies	DPL7000 Series	Laser light beam with mirror reflector	CO, CO_2, HC, NO, opacity
	Overhead	HEAT LLC	EDAR	Laser curtain with strip reflector	CO, total and speciated HC, CO_2, NO, NO_2, opacity
	Overhead	Anhui Baolong		Arc lamp light beam with mirror reflector	CO, CO_2, HC, NO, opacity
Extractive	Overhead sampling	University of California, Berkeley		Exhaust plume sample	CH_4, NO, NO_2, NH_3, BC, PM, PN, PN size,
	Overhead sampling	CARB	Portable Emissions Acquisition System (PEAQS)	Exhaust plume sample	Black carbon and NO_x
	Overhead sampling in Shed	University of Denver	OHMS	Exhaust plume sample	CO, CO_2, HC, NO, NO_2, N_2O, PM, PN, Black Carbon
	Roadside sampling	Czech Technical University		Exhaust plume sample	CO, CO_2, NO_x, PM, PN
	Roadside sampling	University of Münster		Exhaust plume sample	NO_x, CO_2, PN
	Plume chaser	University of Heidelberg	ICAD	Exhaust plume sample	NO, NO_2, CO_2
	Plume chaser	University of Birmingham	SNIFFER	Exhaust plume sample	NO, NO_2, CO_2
	Plume chaser	CARB	Mobile Measurement Platform (MMP)	Exhaust plume sample	CO, CO_2, HC, NO_x, PM, PN, Black Carbon

4. Site selection

Vehicle emissions are dependent on driving conditions (speed, acceleration, gradient of the road, time since the engine was started, traffic, etc.). Therefore, the selection of sites for remote sensing should take into account variability of driving conditions, while ensuring that measurement of emissions can take place accurately[6]. Key considerations for site selection include:

- Single lane roads to prevent interference from nontarget vehicle exhaust plumes

[5] Ibid

[6] https://theicct.org/publications/true-london-dec2018

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- Steady traffic flow to provide sufficient sampling rates and to avoid sampling disruptions during periods of congestion
- Slight upward slope or locations where vehicles are under acceleration in order to provide engine load
- Sufficient distance from residential areas to limit measurements of cold engines
- Adequate space to set up instrumentation and ensure operator safety without disrupting traffic flows

5. Number of remote sensing set ups required

Vehicle emissions are currently being monitored in Hong Kong with the help of 14 sets of equipment, which are rotated around between 158 sites[7]. Each city in Jing-Jin-Ji area of China is required to install at least 10 stationary and 2 mobile sets of remote sensing equipment[8]. The NCT may therefore require between 12-15 setups to adequately cover the entire area. At least five setups should be procured initially, with the rest added after gaining experience with the initial setups for one year. A detailed sampling plan should be developed to include a number of sites around the NCT that meet the site selection criteria.

6. Data management

All data from the remote sensing measurements should be stored in centralized database owned by Delhi Transport Department. A version of the emissions data without the license plate and vehicle owner details, but identifying the make, model, and year of vehicle should be released to the public so that researchers may be analyze the data for trends in vehicle emissions, and/or identify systemic problems with vehicles of certain make or type.

7. Identification of individual high emitters

As suggested in ICAT report, the first phase of the program should focus on identifying the gross polluters, with a particular emphasis on heavy-duty vehicles. This can be done by setting a single pollutant-specific cut point per fuel-type, technology group, and Bharat emission norms. The threshold should be lowered every two to three years to go after other high emitters. All vehicles identified as high emitters should be sent a letter warning the vehicle owner to immediately repair their vehicle, and/or pass a confirmatory test at I/M facility. The confirmatory test should be a loaded

[7] https://www.ncbi.nlm.nih.gov/pubmed/29482019
[8] 2017 Jing-jin-ji Air Pollution Prevention and Control Plan

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mode test to ascertain that repairs have been carried out, and that the vehicles are no longer gross polluters. In absence of a test certificate obtained within 30 days, the insurance and/or registration of vehicles should be cancelled. Delhi traffic police would be responsible for enforcement of this provision in NCT. Delhi government may also double the ECC for vehicles found as gross polluters.

According to the Chinese remote sensing standard, a vehicle is considered as a non-compliant if it exceeds the limits for the same pollutant in two or more consecutive remote sensing tests in 6 months. Adopting a similar approach, insurance certificate for a vehicle which is found to fail twice in remote sensing measurements should be voided with immediate consequence, and a fiscal penalty be assessed.

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Annexure H

Subhas Datta
Chartered Accountant
Environmental Activist

Resi: 25/1, Guitendal Lane, Howrah-711 101
55/2, Panchanantala Road, Howrah-711 101
Office: S. R. Dutt Associates
17, Sagar Dutta Lane, Calcutta-700 073

Contact: (033) 2638 3526, 9830752752 (M)
Email: subhasdatta@rediffmail.com

09.09.2024

To
The Chief Secretary,
Govt. of West Bengal
Nabanna, 325, Sarat Chatterjee Road,
Shibpur, Howrah - 711102

Sir,

I beg to draw your kind attention to the following points in the matter of measuring and mitigating the major source of air-pollution in the State of West Bengal through the operation of Remote Sensing Device (RSD):-

1. That the Hon'ble High Court, Calcutta had directed on 17th June 2010 in WP 4183 (w) of 2005, the deploy four RSD in Calcutta, Howrah, North & South 24 Parganas. But still last March 2024 only one such machine had been in operation. From April 2024 two more RSDs have been put into use making the tally three now. Several related directions have been passed by the High Court, Calcutta in another petition WP 6377 (w) of 2007 for abatement of pollution arising out of auto-emissions. Both the petitions had been filed by me.
2. That the undersigned had further moved a petition before the National Green Tribunal, vide OA no. 33 of 2014/EZB wherein inter alia, the following relief was sought:-

   "To further direct the respondents to procure and deploy three more Remote Sensing Devices (RSD) for checking/measuring the emissions from individual vehicles on roads."
3. That the Source Apportionment Study, conducted by CSIR-NEERI in December 2019 has indicated that the problem of air-pollution primarily with particulates (PM 10 and PM 2.5)" is contributed by motor vehicles emissions. It is also reported that night-time pollution is more than the day-time during winter stretch from October to March. The major contributors to the night-time pollution are the goods carrying vehicles that enter the city after dusk.

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4. That the Principal Bench of National Green Tribunal, New Delhi in its order dated 07.10.2015 in the matter of application no. 21/2014, Vardhaman Kaushik Vs Union of India & Ors. has inter alia directed:-

> *"The Central Pollution Control Board (CPCB) and the DPCC are hereby directed to purchase and/or arrange proper mechanism and instruments for checking emissions of moving overloaded heavy vehicles, as measuring the emissions of standing vehicles, particularly transportation vehicles, would never depict correct data which are basic cause for raisinfg particular matter and carbon content in the air."*

5. That six cities in the State of West Bengal namely Asansol, Raniganj, Durgapur, Kolkata, Howrah, Haldia and Barrackpore have consistently failed to meet the National Ambient Air Quality Standards (NAAQS) for over FIVE years have got the distinction of being termed as Non-Attainment Cities (NAC) and being listed amongst most polluted cities in India. Vehicle population has gone up exponentially in the State of the West Bengal and it's a matter of growing concern that there is no effective mechanism in place to monitor vehicular pollution. Cities like Siliguri, Malda, Suri, Beharampur, Krishnanagar, Hooghly and Kharagpur are not far behind and deteriorating Air Quality will soon get it infamous tag of NAC.

6. That in the recent order of 26.07.2024 the Hon. Supreme Court of India in WP (s) (Civic) 13029/1985 has directed MoRTH to use remote sensing in the NCR to monitor vehicular pollution, which were directed 14 years ago by the Hon. High Court of Calcutta in WP 4183 (w) of 2005, order dated 17.06.2010 but the State Authorities have failed to comply with the directions of the High Court.

7. That at present after the lapse of 14 years the Transport Department is using only 3 RSD and the news published by The Telegraph online, dated 08.12.2023 had reported that "The state pollution control board handed the two devices to the transport department and pledged, in an MoU, 18 more over the next few months." More than 9 months have elapsed, now it is the call of the day that such 18 machines should be procured and deployed without any further delay.

8. Other than six non-attainment cities/towns, our State deserves the deployment of RSD in the place where air-quality is deteriorating very fast. Moreover, in order to check the night time pollution arising from goods carrying vehicles, entering into city areas, the RSD mechanism should be installed at major entry points (Toll Point) like Bidyasagar Setu, Nibedita Setu, Dankuni Toll Plaza and Dhulagarh Toll Collection points.

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In the aforesaid position, I earnestly request you to kindly initiate steps to deploy, at least two dozens of RSD devices within the State of West Bengal without any further delay.

Regards & best wishes,

Thanking you,

Yours Faithfully,

Subhas Datta

(Subhas Datta)

C.c. 1. Principal Secretary,
Environment Department,
Govt. of West Bengal,
5th Floor, Pranisampad Bhavan,
Block LB-II, Salt Lake, Sec – III,
Bidhannagar, Calcutta – 700106

2. Secretary,
Transport Department,
Govt. of West Bengal,
Paribahan Bhavan,
12, R.N. Mukherjee Road,
Calcutta – 700001

3. The Member Secretary,
West Bengal Pollution Control Board,
Paribesh Bhawan, 10A Block LA, Sec-III,
Salt Lake, Bidhannagar, Kolkata - 700106

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EW116073808IN IVR:69871160738O8
SP HOWRAH BPC (711101)
Counter No:4,09/09/2024,13:05
To:THE MEMBER SE.WB POLLUTION CON
PIN:700106, Bidhan Nagar IB Market SO
From:SUBHAS DATTA ,HOWRAH
Wt:30gms
Amt:41.30,Tax:6.30,Amt.Paid:41.00(Cash)
(Track on www.indiapost.gov.in)
(Dial 18002666868) (Wear Masks, Stay Safe)

EW116073811IN IVR:69871160738ll
SP HOWRAH BPC (711101)
Counter No:4,09/09/2024,13:05
To:THE SECRETARY,TRANSPORT DEPT.G
PIN:700001, KOLKATA GPO
From:SUBHAS DATTA ,HOWRAH
Wt:20gms
Amt:41.30,Tax:6.30,Amt.Paid:41.00(Cash)
(Track on www.indiapost.gov.in)
(Dial 18002666868) (Wear Masks, Stay Safe)

EW116073825IN IVR:69871160738Z5
SP HOWRAH BPC (711101)
Counter No:4,09/09/2024,13:05
To:PRINCIPAL SEC.ENVIRONMENT DEPT
PIN:700106, Bidhan Nagar IB Market SO
From:SUBHAS DATTA ,HOWRAH
Wt:20gms
Amt:41.30,Tax:6.30,Amt.Paid:41.00(Cash)
(Track on www.indiapost.gov.in)
(Dial 18002666868) (Wear Masks, Stay Safe)

EW116073839IN IVR:69871160738Z9
SP HOWRAH BPC (711101)
Counter No:4,09/09/2024,13:05
To:THE CHIEF SEC,GOVT.OF WB NABAN
PIN:711102, Sibpur SO
From:SUBHAS DATTA ,HOWRAH
Wt:20gms
Amt:17.70,Tax:2.70,Amt.Paid:18.00(Cash)
(Track on www.indiapost.gov.in)
(Dial 18002666868) (Wear Masks, Stay Safe)

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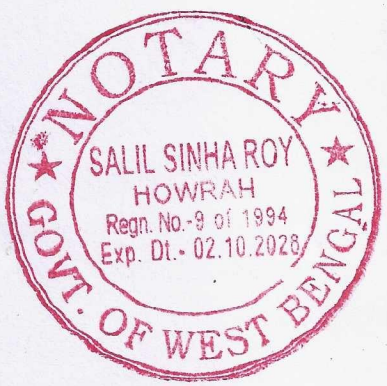
Annexure I

AIS-170

AUTOMOTIVE INDUSTRY STANDARD

Remote Sensing Devices for on-road Emissions Monitoring – Product Specifications and Programme Guidelines



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ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER
CENTRAL MOTOR VEHICLE RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY
MINISTRY OF ROAD TRANSPORT and HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT and HIGHWAYS)
GOVERNMENT OF INDIA

March 2021

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INTRODUCTION

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the erstwhile Ministry of Surface Transport (MoST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India (ARAI), Pune, being the secretariat of the AIS Committee, will publish this standard.

The matter of control of in-use vehicle emissions by was deliberated in the 60th Meeting of Standing Committee on Implementation of Emission Legislation (SCOE) held on 22nd August, 2019 and subsequently an AIS panel under the Chairmanship of Director-ICAT was constituted with focus to finalise technical guidance on remote sensing equipment, remote sensing data reporting which specifies design, construction, networking and data sharing of motor vehicle and recommend polluter thresholds for different vehicle and different fuel types. In the 61st Meeting of Standing Committee on Implementation of Emission Legislation (SCOE) held on 13th February, 2020, it was directed to consider polluter thresholds based on prevalent emission norms and in the absence of authentic data for these thresholds, the Committee had agreed to consider the first year as monitoring phase to arrive at threshold values.

This standard is technology neutral and does not restrict any arrangement for implementation based on the recommendations for implementing of remote sensing of emissions of in-use vehicles for on-road monitoring as per the directions of the Hon'ble Supreme Court and the EPCA Report No 99 dated 26th July, 2019. The EPCA report refers to the New Delhi Real World Emission Study (NDRWES) using Remote Sensing Technology, from which considerable reference has been drawn.
Reference has also been drawn from the following documents while preparing this standard:

- Commonwealth of Virginia State Air Pollution Control Board – 9VAC5 Chapter 91 - Regulation for the Control of Motor Vehicle Emissions in the Northern Virginia Area.
- EPA: Guidance on Use of Remote Sensing for Evaluation of I/M Program Performance
- ICCT Paper - Remote Sensing of Motor Vehicle Exhaust Emissions
- ICCT Paper - Remote-Sensing Regulation for Measuring Exhaust Pollutants from in-use Diesel Vehicles in China

The AISC panel responsible for formulation of this standard is given in Annex H.
The Automotive Industry Standards Committee (AISC) responsible for approval of this standard is given in Annex I.

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Remote Sensing Devices for on-road Emissions Monitoring – Product Specifications and Programme Guidelines

1.0 SCOPE

The standard lays down the minimum technical and performance requirements for remote sensing equipment and programme guideline.

2.0 REFERENCES

2.1 New Delhi Real World Emission Study (NDRWES) using Remote Sensing Technology

2.2 DOC.NO.: MoRTH/CMVR/TAP-115/116, Issue No. 4 Part 8 – Document on Test Method, Testing Equipment and Related Procedures for Testing, Type Approval and Conformity of Production (CoP) of Vehicles for Emission as per CMV Rules 115, 116 and 126

2.3 Finalized Draft AIS-137 (Part 8) – Technical Specifications and Related Test Procedure for Type Approval and Conformity of Production (COP) of PUC Equipment (Gas Analyser and Smoke Meter) As per CMV Rules 115, 116

2.4 ISO/IEC VIM:1993: International Vocabulary of Basic and General Terms in Metrology

2.5 ISO/IEC Guide 99: International vocabulary of metrology – Basic and general concepts and associated term (VIM)

3.0 DEFINITIONS

For the purpose of this standard, the following definitions shall apply:

3.1 **"Calibration gas"** means stable gas mixture of known concentration used for periodic calibration of the instruments and for various performance tests.

3.2 **"Manufacturer"** means the RSD manufacturer or equipment supplier.

3.3 **"Remote Sensing Device (RSD)"** means a device that measures exhaust emissions by absorption spectroscopy without interference with the vehicle or its driver.

Note: This standard does not restrict any device/ instruments or principle of their operation as long as they meet the technical and performance requirements of this standard.

3.4 **"Monitoring phase"** means the time duration for arriving at threshold limits for different vehicle, different emission norms and different fuel types with a focus on vehicles of category M and N.

3.5 **"Adjustment (of a measuring system)"** means a set of operations carried out on a measuring system so that it provides prescribed indications corresponding to given values of a quantity to be measured

3.6 **"User adjustment (of a measuring Instrument)"** means Adjustment employing only the means at the disposal of the user.

3.7 **"Manual adjustment facility"** means a facility allowing the adjustment of the instrument by the user.

3.8 **"Semi-automatic adjustment facility"** means a facility allowing the user to initiate an adjustment of the instrument without having the possibility of influencing its magnitude whether the adjustment is automatically required or not.

Note: For those Instruments that require the values of the calibration gas to be entered manually, the facility is considered to be semi-automatic.

3.9 **"Automatic adjustment facility"** means a facility performing the adjustment of the instrument as programmed without the intervention of the user, to initiate the adjustment or its magnitude.

3.10 **"Checking facility"** means a facility that is incorporated in the instrument and that enables significant faults to be detected and acted upon.

Note: "Acted upon" means any adequate response by the Instrument (luminous or acoustic signal, by blocking of process, etc.)

3.11 **"Automatic checking facility"** means a checking facility operating without the intervention of the user.

3.12 **"Zero adjustment of a measuring system"** means adjustment of a measuring system so that it provides a null indication corresponding to a zero value of a quantity to be measured.

3.13 **"Calibration gas adjustment facility"** means a facility to adjust the instrument to the value of a calibration gas.

3.14 **"Internal adjustment facility"** means a facility to adjust the instrument to a designated value without the use of an external calibration gas.

3.15 **"Warm-up time"** means the elapsed time between the instant power is applied to an instrument and the instant at which the instrument is capable of complying with the metrological requirements.

3.16 **"Resolution"** means the smallest change in quantity being measured that causes a perceptible change in the corresponding indication.

3.17 **"Error (of indication)"** means the indication of a measuring instrument minus a true value of the corresponding input quantity.

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3.18 **"Intrinsic error"** means the Error of a measuring instrument, determined under reference conditions.

3.19 **"Absolute error of measurement"** is the result of a measurement minus the conventional true value of the measurand.

3.20 **"Relative error"** means the absolute error of measurement divided by the conventional true value of the measurand.

3.21 **"Fault"** means the difference between the error of indication and the intrinsic error of the instrument.

3.22 **"Significant fault"** means a fault, the magnitude of which is greater than the magnitude of the maximum permissible error on initial verification.

Note: The following faults are considered not to be significant.

a) Fault arising from simultaneous and mutually independent causes in the instrument itself or in its checking facilities

b) Faults implying the impossibility to perform any measurement

c) Transitory faults being momentary variations in the indication, which cannot be interpreted, recorded or transmitted as a measurement result and

d) Faults giving rise to variations in the measurement results that are so large as to be noticed by all users of the instruments.

3.23 **"Reference condition"** is the operating condition prescribed for evaluating the performance of a measuring instrument or measuring system or for comparison of measurement results,

3.24 **"Stability"** of a measuring instrument means the property of the instrument, whereby its metrological properties remain constant in time.

3.25 **"Step response time"** means the duration between the instant when an input quantity value of a measuring instrument or measuring system is subjected to an abrupt change between two specified constant quantity values and the instant when a corresponding indication settles within specified limits around its final steady value.

3.26 **"Testing Agency"** means an agency notified under the Rule 126 of The Central Motor Vehicle Rules, 1989.

4.0 REQUIREMENTS

The instruments shall have a permanent and easily readable label or labels giving the following information:

a) Manufacturer's trade mark/corporate name

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b) Year of manufacture

c) Model number

d) Nominal mains voltage, frequency and power required

e) Site code

f) RSD unit ID

g) System number

The RSD shall meet the requirements specified in the following Annexes of this standard.

These requirements specified in the standard shall be verified by a Testing Agency before implementation is commissioned.

4.1 Technical specifications of RSD and allied equipments: **Annex A.**

4.2 Program Guidelines: **Annex B.**

4.3 Communication Protocol: **Annex C.**

4.4 Guidelines for Monitoring Phase: **Annex D.**

4.5 Indicative Reporting format: **Annex E.**

4.6 Thresholds: **Annex F.**

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Annex A

(See 4.1)

Technical Specifications of RSD and allied equipments

A.1 The requirements for the RSD can be broadly classified in the following segments.

- Emission analyser
- Weather sensor
- Data storage and networking equipment
- Communication Protocol – Real time evaluation
- Allied equipment / services etc.

A.2 The RSD must be able to measure the following pollutants:

Table 1 : Mandatory Parameters

Parameter	Range	Min. Resolution	Max. Absolute intrinsic error*	Max. Relative intrinsic error*
HC	0-12000 ppm vol	±10 ppm vol	±12 ppm vol	±5%
CO#	0-13% vol	0.01% vol	±0.06 vol	±5%
Opacity#	0-100%	0.1%	±2%	±5%

Table 2 : Optional Parameters

Parameter	Range	Min. Resolution	Max. Absolute intrinsic error*	Max. Relative intrinsic error*
NO	0-6000 ppm	± 10 ppm vol	± 10 ppm vol	±5%
NH_3	0-4000 ppm	± 8 ppm vol	± 8 ppm vol	±5%
CO_2	0-999000 ppm	± 50 ppm vol	± 50 ppm vol	±5%
SO_2	0-6000 ppm	± 12 ppm vol	± 15 ppm vol	±5%
CH_4	0-6000 ppm	± 15 ppm vol	± 15 ppm vol	±5%
NO_2	0-6000 ppm	± 15 ppm vol	± 15 ppm vol	±5%

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*whichever is greater (taken to the reading)

#Values shall be rounded to two decimal places.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2: 1960, as amended from time to time.

(Parameters may be included as per specific requirements)

A.3 Requirements for ambient weather and site condition testing:

The system should be able to provide stability during measuring the following parameters and should have a step response time such that it does not hinder the functioning or the accuracy of the RSD as established in A.2 above.

Parameter	Range	Error
Temperature	-5°C to 52°C	±0.5°
Relative humidity	5-95%	±3%
Wind speed	0 –25 m/s	±10%
Pressure	70-102.4 kPa	±5%
Slope angle	-15° to +15°	±0.1°
Speed	0 - 120 km/ h	± 1%
Acceleration	35 km/h s	± 1%

Automatic compensation of the pollutant parameters listed above, and their corresponding correction with the environmental factors should be taken care of in the RSD software.

A.4 The RSD must be GPS/ IRNSS enabled – to identify the location of the device and communication with the authorized servers for data exchange (real time data transfer).

A.5 The vehicle sampling rate of the device shall be greater than 1Hz.

A.6 There must be a system to capture the image of the registration number of the vehicle at a rate of 99% or greater of the vehicles passing through the RSD measurement location.

The system must be equipped with,

1. Optical Character Recognition (OCR) to identify the registration numbers of the vehicles automatically or any other suitable technology to identify the registration numbers.

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2. FASTag reader for mapping registration numbers and linking in the central database.

A.7 Following parameter shall also be linked to the vehicle records and superimposed on every image:

- Site (where the RSD is installed) code
- Test date and time
- RSD System / unit number
- Record number
- GPS/ IRNSS location
- Emission readings
- Emission stage and threshold limits
- Vehicle registration number (characters e.g. HR XX XXXX)
- Vehicle FASTag ID

The equipment system shall create a new record each time for a vehicle and each record shall be assigned a unique sequence number.

A.8 The RSD setup should have an independent power supply/ source with a voltage stabilizer and a power backup of minimum of one hour for stationary units and four hours for mobile units, of uninterrupted operation, in case the primary source fails.

It should be compatible with 230V, 50Hz single phase AC supply.

(Mains voltage variation: –15 % to + 10 % of the nominal voltage, ±2 % of the nominal frequency.)

See IEC 61000-3-3 / IEC 61000-3-11/ IEC 61000-4-11/ IEC 61000-4-29

If a battery is used to power the instrument, the limits of power supplied shall be within the instrument manufacturer's specifications. In case the battery power drops outside the limits, there should be an indication on the instrument and it should not be possible to make any measurement with the instrument. If a portable generator is used, its requirements shall comply with the specifications for the mains voltage.

It shall include all the cables, proper light illumination, for operation during the sampling period.

The RSD must be able to capture the values irrespective of all categories of vehicles irrespective of placement of the vehicle exhaust pipe i.e. front and rear, sides- either / both left or right, without any adjustment in the device fixture/ frame.

A.9 The system should be complete with the following:

- Data server
- Photo/ Video data server
- Backup server
- Router
- Network printer
- Mobile workstation
- Software support services such as firewall, data integrity evaluation (ex. discarding measurements with inadequate signal strengths, measurements with too much uncertainty) etc.
- Link with Central database (e.g. VAHAN / authorized server)
- Warning issuing system for heavy polluters (through on-road display, SMS, email etc.)
- Data storage for at least **5,00,000** records at any point of time
- Should be practically portable

A.10 Calibration Checks

A.10.1 The system should be calibrated automatically or at a frequency recommended by the manufacturer so as to ensure accuracy of the parameters of the vehicle emission data.

Wherever calibration gases are used, initial calibration shall be done with reference gas shall have an accuracy of ±1% and subsequent calibration(s) with reference gas shall have an accuracy of ±2%.

A.10.2 Manufacturer's calibration certificate shall be provided with RSD;

A.10.3 Adjustment facilities

A.10.3.1 The Instrument shall have an adjustment facility that provides operations for zero-setting, gas calibration (if applicable), and internal adjustment.

A.10.3.2 The facility shall be automatic for zero-setting and internal adjustment.

A.10.3.3 Instrument shall be controlled by an automatic self-checking facility that shall operate in such a way that before a measurement can be indicated or printed, all internal adjustments, calibration gas adjustments, and all other checking facility parameters shall be confirmed for proper values or status (i.e. within limits)

A.11 Ingress Protection (IP)

A.11.1 The device must be able to work in dusty environment that are typically encountered by the vehicles where these would be installed. IP rating (IS/IEC 60529: 2001) is used for specifying the environmental protection characteristics of the device.

The device shall be tested for dust and water ingress as per following requirement:

IP rating	Dust	Water	
	6	3	5
	Dust tight	For internal parts, for example, display, controller	For exterior parts for example, sensors, camera

A.12 Robustness of equipment :

The equipment should be stable under vibrations from operating conditions.

A.13 The RSD system should be tamper proof and should able to detect any unauthorised access to the device.

A.14 Disturbances

A.14.1 Significant faults (as defined in 3.22) shall not occur or shall be detected and acted upon by means of checking facilities for the following disturbances:

a) Mechanical shock and vibrations

b) Short time power reductions

c) Bursts from the mains (transients)

d) Electrostatic discharges

e) Radiated radio frequency electromagnetic fields

f) Mains frequency magnetic fields

Repeatability (as per A.16) shall be ensured after the completion of each test.

A.14.1.1 Mechanical shock and Vibrations Test

For mechanical shock testing, the tested Instrument shall be placed in its normal position of use on a rigid surface. It shall be tilted on one bottom edge and then allowed to fall freely onto the test surface. The following conditions shall be applied:

Height of fall: 25 mm

Number of falls: 1 on each bottom edge.

See IEC 60068-2-31

Vibration test should be conducted as per IS 9000 Part VIII 1981. Analyser may be subjected to vibration in normal mounting axis for 5 to 9 Hz ± 3 mm displacement and 9 to 150 Hz ±1 g acceleration amplitude, preferably with electrical power 'ON' condition. This test should be repeated for other two axes also. However, during the test the instrument shall be mounted in its normal position only.

A.14.1.2 Short Time Power Reductions Test

A test generator suitable for reducing the amplitude of the A.C. mains voltage is used. It shall be adjusted before being connected to the Instruments. The mains voltage interruptions and reductions shall be repeated 10 times with an interval of at least 10 s between successive disturbances. 100 % reductions shall be effectuated for duration of 10 ms 50 % reductions shall be effectuated for duration of 20 ms.

See IEC 61000-4-5

A.14.1.3 Burst from the mains (transients)

The test consists of exposure of the Instruments to bursts of voltage spikes of 1 kV and having a double exponential waveform. Each spike shall have a rise time of 5 ns and half amplitude duration of 50 ns. The burst length shall be 15 ms, the burst period (repetition time interval) shall be 300 ms. Repetition frequency of the impulses and peak values of the output voltage on 50 Ω load: 5 kHz ± 1 kHz. The transient generator shall have an output impedance of 50 Ω and shall be adjusted before connecting the Instrument. At least 10 positive and 10 negative bursts randomly phased shall be applied. Insertion of blocking filters in the cables to the Instrument may be necessary to prevent the burst energy being dissipated in the mains.

See IEC 61000-4-4

A.14.1.4 Electrostatic discharges Test

A capacitor of 150 pF shall be charged by a suitable DC voltage source of 6 kV in contact mode and 8 kV in air mode. Then it shall be discharged through the Instrument by connecting one terminal to the Instrument's ground chassis and the other through a 330 Ω resistance to the Instrument's surfaces that are normally accessible to the user. At least 10 successive discharges shall be applied with a time interval between discharges of at least 10 s. An Instrument not equipped with a grounding terminal shall be placed on a grounded plane surface that projects beyond the Instrument by at least 0.1 m on all sides. The associated grounded connection to the capacitor shall be as short as possible.

See IEC 61000-4-2

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In the contact discharge mode, to be carried out on conductive surfaces, the electrode shall be in contact with the Instrument and the discharge shall be actuated by the discharge switch of the generator.

In the air discharge mode, on insulating surfaces, the electrode is approached to the Instrument and the discharge occurs by spark.

A.14.1.5 Radiated, radio frequency, electromagnetic fields test

Instruments shall be exposed to electromagnetic field strength as follows:

Frequency range: 26 MHz to 1000 MHz

Field strength: 10 V/m

Modulation: 80 % AM, 1 kHz sine wave

The specified field strength shall be established prior to the actual testing (without the Instruments in the field). When the test is carried out in a shielded enclosure to comply with international laws prohibiting interference to radio communications care needs to be taken to handle reflections from walls. Anechoic shielding may be necessary.

See IEC 61000-4-3

Note: The attention is drawn to the fact that IEC 61000-4-3 refers to the frequency range from 80 MHz to 1000 MHz The lower frequencies are covered by IEC 61000-4-6.

A.14.1.6 Mains Frequency Magnetic Fields Test

The Instrument tested shall be exposed in all directions to a magnetic field of 30 A/m at mains frequency.

See IEC 61000-4-8

A.15 Stability with time or drift

When used in accordance with the manufacturer's operating instructions, the measurements made by the instruments, under stable environmental conditions and after adjustment using a calibration gas or the internal adjustment facility shall remain within the maximum permissible errors on initial verification for at least 4 hours without the need for calibration gas or internal re-adjustments by the user.

If the Instruments are equipped with a means for drift compensation, such as automatic zero or automatic internal adjustment, then the action of such adjustments control shall not produce an indication / display that can be confused with a measurement of an external gas. It should not be possible to pass the gas sample and measure the same while the automatic adjustments are in process.

A.16 Repeatability

For 20 consecutive measurements, using the same calibration gas mixture, carried out by the same person with the same Instrument within relatively short time interval – as defined by the manufacturer, the experimental standard deviation of the 20 results shall not be greater than one third of the modulus of the "maximum permissible error on initial verification" taken from Table 1/2 for the relevant gas.

A.17 Dry Heat Test

This test consists of exposure of the Instruments to a temperature of 45° C under "free air" conditions for 2 hours (the time duration specified begins after the Instruments have reached temperature stability). During the heating up or cooling down of the instrument, the rate of change in temperature shall not exceed 1° C/min.

Repeatability (as per A.16) shall be ensured after the completion of test.

A.18 Damp Heat, Steady State Test

This test consists of exposure of the Instruments to a constant temperature of 30° C and a constant relative humidity of 85 % for two days. The exposure shall be such that water does not condense on the Instruments. The temperature is deemed to be steady when the difference between the extreme temperatures does not exceed 5° C, and the rate of change does not exceed 5° C/h.

Repeatability (as per A.16) shall be ensured after the completion of test.

A.19 Power Supply Variation Test

The A.C. power supply test consists of exposure of the Instruments to extreme values of the nominal power supply voltage and nominal frequency for a period long enough to perform the required measurement under following variation conditions.

Voltage: Nominal Voltage (230V), +10% ~ -15%

Frequency: Nominal Frequency (50 Hz), ± 1 Hz.

The AC power supply test will be repeated with frequency of 50 Hz ± 2 Hz also and the results of the test will be noted. These tests results will be provided in the manual for the information of the user.

Repeatability (as per A.16) shall be ensured after the completion of test.

See IEC 61000-3-3 / IEC 61000-3-11/ IEC 61000-4-11/ IEC 61000-4-29

A.20 Warm-up time

A.20.1 After the warm-up time, the Instruments shall meet the metrological requirements as stated in this document. Instruments shall have the means to prevent measurement and an indication of measured gas volume fractions

during the warm-up time. Instruments shall have a warm-up time not exceeding 10 min.

A.20.2 At reference conditions and at 5° C, the warm-up time test shall consist of the following steps:

a) Stabilize the instrument at each temperature

b) Let the instrument warm up

c) Immediately after either the manufacturer's prescribed warm-up period has elapsed or an automatic warm-up lockout has been de-activated, perform a volume fraction measurement (with any necessary internal adjustment being performed prior to this measurement)

d) At time intervals of 2 min, 5 min and 15 min after warm-up, perform a measurement with the same calibration gas as above.

The difference between any of the measured values above shall not exceed the modulus maximum permissible error on initial verification.

Note: At reference conditions, the warm-up time test may be included with the drift test.

A.21 Warranty and Maintenance

A.21.1 Warranty Requirements: minimum 2 year from the date of operation.

A.21.2 Annual Maintenance with local support: minimum 2 year from the date of operation.

Note: The requirements shall be the part of tender document or any arrangement between the equipment supplier and the implementing authority.

Annex B

(See 4.2)

Programme Guidelines

B.1 OPERATION

Instrument parameters

At a minimum the following parameters shall also be recorded in all RSD programs for each RSD site in a stations log. The log shall be kept electronically and/or in a hardcopy format.

- A description of the RSD equipment including light source, make/ model of the instrument, and detector type
- The name of the operator (and the data capturing station/ van). If more than one operator or van are used, key and record which operator and/ or van was used for each measurement.
- Complete description of the calibration procedure
- Audit check results
- Calibration check results
- Any equipment changes
- Verification of speed and acceleration measurement devices.

B.2 PROCEDURE

B.2.1 A RSD generally includes the following sub-systems which are linked to a computer:

- A speed and acceleration measurement system
- A license plate capture system, and
- Emission analyser

B.2.2 After identifying the ideal location, the Emission analyser module is set up.

B.2.3 The speed and acceleration measurement system is set up at a distance prescribed by the manufacturer.

B.2.4 The primary camera shall where it may be able to capture the license plate of the passing vehicle as its exhaust is being measured.

B.2.5 The speed and acceleration measurement system may be set up in-line with the camera.

B.2.6 After a trial–run and warm up(s) of the speed and acceleration measurement system, the emission analyser is set up in such a way that it maximises the infrared/laser and/ or UV signals received by the detector.

B.2.7 The system is calibrated as per the guidelines of the manufacturer.

B.2.8 A calibration verification audit is done immediately to confirm the sensor's accuracy and the calibrations' validity.

B.2.9 Three consecutive measurements of the calibration/ audit gases of pre-known concentration within accuracy tolerances shall constitute a successful calibration.

B.2.10 If the audit fails, the calibration is corrected and the process is repeated until a successful calibration is achieved.

B.2.11 The audit must be done once at the pre specified frequency and should happen continuously with the time difference between two consecutive checks not exceeding pre-determined hours, when in operation.

B.2.12 As per the manufacturer's specifications, the frequency of calibration may be higher and if operating conditions warrant, further calibration(s) may be conducted.

B.2.13 After the setup is complete, the operator is required to perform periodic audits over the course of the working day cycle to verify and optimise the RSD's calibration and accuracy.

B.2.14 The emission results obtained during testing as prescribed above shall be electronically uploaded through online process to the designated government portal on a daily basis.

B.2.15 The software used should be registered and shall be secured from unauthorized access.

B.2.16 The manufacturer must develop a cloud based data management system (DMS) for the storage, processing, quality-review and analysis of the collected RSD data.

B.3 SYSTEM PHYSICAL VERIFICATION

B.3.1 The initial verification of the Instruments may include the following tests:

a) Check the power supply voltage and frequency at the location of use to determine compliance with the specifications on the measuring Instrument's label.

b) Check the activation of the warm-up lockout Instruments by attempting to make a measurement within 1 min of initial power-on of the Instruments.

B.3.2 Subsequent verification of an Instrument at the same location may include the following tests:

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For short-term subsequent verification, perform all tests included in the initial verification except for the power check and the warm-up check.

For long-term subsequent verification, perform all tests included in the initial verification.

When the Instruments have been moved to a new location, or have undergone repairs, perform all tests included in the initial verification.

B.4 PULL-OVER INSPECTIONS

B.4.1 Roadside pull-over inspections in-line with the provisions specified in CMVR, 1989 - Rule 116, may be carried out for the purpose of random sampling/ invalid data capturing/ high emitter identification etc.

B.4.2 The RSD manufacturer shall also supply PUC instrument complying with AIS-137 Part 8, as amended from time to time.

B.4.3 On-road PUC measurements will be taken and data shall be recorded and uploaded to parivahan portal/ VAHAN/ authorised server as per the requirements of AIS-137 Part 8, as amended from time to time.

B.5 VALID / IN-VALID DATA

B.5.1 Invalid data information/ report to be provided on daily or X hour in time.

(X is flexible)

B.5.2 Negative VSP limits will be treated as invalid

B.5.3 Exhaust plume of previous vehicle should not interfere with current measurements

B.5.4 Other parameters for valid/invalid flags:

- Record doesn't have a vehicle emissions and license plate record
- VSP out of range
-

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Annex C

(See 4.3)

Communication Protocol

C.1 The RSD equipment shall communicate with authorized server(s) on the real time bases.

C.2 The RSD must be GPS/ IRNSS enabled – to identify the location of the device and communication with the Authorized servers for data exchange (real time data transfer).

Note: It should be ensured that the accuracy of data transfer and sanctity of data at both the ends i.e. receiver and transmitter is maintained throughout.

C.3 The system should be capable of/ provide:

- Data server (Photo/ Video / information data etc)
- Backup server (control room)*
- Router
- Mobile workstation / computers etc
- Software support services such as firewall, data integrity evaluation (ex. discarding measurements with inadequate signal strengths, measurements with too much uncertainty) etc.
- Link with Central database (e.g. VAHAN / authorized server)
- Warning issuing system for heavy polluters (through on-road display, SMS, email etc.)
- Date storage for at least 5,00,000 records at any point of time
- To identify and exclude all samples that fail to meet desired predefined criterion of valid record (as defined in F.1)

* this room can be mutually agreed between RSD manufacturer and implementing authority

Note: These requirements are not limited and may vary depending on the specifications considered by the implementing authority.

C.4 The minimum information that has to be pushed to authorized server(s) shall include:

1. Date and time
2. RSD Unit No.

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3. Site location

4. Registration number of vehicle

5. FASTag number

6. Observed results, including valid or invalid data.

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Annex D

(See 4.4)

Guidelines for Monitoring Phase

D.1 A monitoring phase shall be established to capture vehicular emissions and define accurate polluter thresholds.

D.2 The thresholds must be decided categorically while differentiating from the following parameters:

- Category of vehicle
- Emission norms (Bharat Stage) and/or year of manufacture of vehicle
- Fuel type

D.3 Relevant pollutants are to be captured as per A.2.

D.4 The percentage of data rejection by RSD is to be captured to monitor efficacy.

D.5 High emitters shall be pulled aside and on-road PUC test to be carried out.

D.6 Data shall be uploaded a centralised server (in conjunction with NIC).

D.7 RSD database shall be linked with VAHAN for information as required in Annex E.

D.8 The information recorded shall not be stored, and no copy of the data shall be retained unless specified in the confidentiality agreement shall be made between the RSD manufacturer and the implementing authority.

D.9 Nodal agency as authorised by the competent authority shall collate data and propose threshold limits.

D.10 Necessary changes in the standard may be made based on the experience gained during the monitoring phase.

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Annex E

(See 4.5)

Monitoring Format

Format for recording RSD results and identifying High Emitters					
1	Date & Time		2	Site Code	
3	System No.		4	Record No.	
5	RSD Unit ID		6	Operator Code	
7	Location with GPS/ IRNSS coordinates		8	Road Grade	
9	**Ambient Conditions:**				
9.1	Temperature		9.2	Relative Humidity	
9.3	Wind Speed & Direction		9.4	Pressure	
10	**Emission Readings:**				

Pollutant	Ambient Value	Measured Value	Adjusted Value
Pollutant 1			
Pollutant 2			
...			
And so on...			

11	**Vehicle Details:**				
11.1	Vehicle Speed		11.2	Vehicle Acceleration	
11.3	FASTag ID		11.4	Registration No.	

Link with National Register (e.g. VAHAN / authorized server)

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11.4.1	Vehicle Category/ Class		11.4.2	Vehicle type	
11.4.3	Fuel Type		11.4.4	Emission norms	
11.4.5	Maker's name		11.4.6	Model name	
11.4.7	Engine displacement (cc)		11.4.8	Month-Year of Mfg.	
11.4.9	Unladen weight		11.4.10	Owner's Name	

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Specifications for the entries to be done in the Reporting Format			
Sr. No.	**Field**	**Format**	**Character Properties**
1.	Date & time	Date: DD-MM-YYYY Time: HHMM hours (24 hrs format)	Numeric Numeric
2.	Site Code	16 characters	Alpha-numeric
3.	System No.	16 characters	Numeric
4.	Record No.	16 characters	Numeric
5.	RSD Unit ID	16 characters	Alpha-numeric
6.	Operator Code	24 characters	Alpha-numeric
7.	GPS/ IRNSS coordinates	XX°YY'ZZ.Z" A1, XX°YY'ZZ.Z" A2	XYZ – Numeric A1&A2 – Alphabetical
8.	Road Grade	XXX.X°	Numeric
9.1	Temperature	XX.X°C	Numeric
9.2	Relative humidity	XX%	Numeric
9.3	Wind speed and direction	Speed: XX km/h Direction: YY	Numeric Alphabetical
9.4	Pressure	XXX.X kPa	Numeric
10	Pollutant	4 characters	Alpha-numeric
	Ambient value	8 characters	Numeric
	Measured value	8 characters	Numeric
	Adjusted value	8 characters	Numeric
11.1	Vehicle speed	XX.X km/h	Numeric
11.2	Vehicle acceleration	XX.X km/h -s	Numeric
11.3	FASTag ID	16 characters	Numeric
11.4	Registration No.	16 characters	Alpha-numeric
11.4.1	Vehicle category/ class	30 characters	Alphabetical
11.4.2	Vehicle type	3 characters	Alphabetical
11.4.3	Fuel	14 characters	Alphabetical
11.4.4	Emission norms	14 characters	Alpha-numeric
11.4.5	Maker's name	50 characters	Alphabetical
11.4.6	Model name	50 characters	Alpha-numeric
11.4.7	Cubic capacity	XXXX cc	Numeric
11.4.8	Month-Year of Mfg.	MM-YYYY	Numeric
11.4.9	Unladen weight	XXXXX kg	Numeric
11.4.10	Owner name	32 characters	Alphabetical

Note: Any character space which is unutilised shall be indicated an an asterisk ''*

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Annex F

(See 4.6)

Thresholds

F.1	**POLLUTER THRESHOLDS**					
F.1.1	[Limits to be finalised after the completion of Monitoring Phase]					
	Vehicle class*/ Type	Fuel type	Emission Stage	Pollutant 1 limits (ppm)	Pollutant 2 limits (ppm)	And so on....
			BS XX			
	***Note** – The above limits are subject to be reviewed and recommended from time to time.*					

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Annex G

Reporting Format

RESEREVED

(To be finalised after the completion of monitoring phase)

ANNEX H

(See Introduction)

COMPOSITION OF AISC PANEL*

Name	Organisation
Convener	
Mr. Dinesh Tyagi	Director International Centre for Automotive Technology (ICAT), Manesar
Members	**Representing**
Ms. Vijayanta Ahuja	International Centre for Automotive Technology (ICAT), Manesar
Mr. Deepak Agarwal	International Centre for Automotive Technology (ICAT), Manesar
Mr. Shakti N. Khanna	International Centre for Automotive Technology (ICAT), Manesar
Mr. Parag G. Mengaji	The Automotive Research Association of India (ARAI), Pune
Mr. Kamalesh Patil	The Automotive Research Association of India (ARAI), Pune
Mr. Manoj Kumar	State Transport Department, Haryana
Mr. Sukhbir Singh	State Transport Department, Haryana
Mr. Karunesh Kumar	National Informatics Centre (NIC)
Mr. Sanchit Seth	OPUS Group
Mr. Niranjan Vescio	OPUS Group
Ms. Rucy Phansalkar	NTT DATA Business Solutions India Pvt. Ltd.
Mr. Ravindra Inamdar	Horiba
Mr. Rajiv Sharma	Horiba
Mr. Nituj Bhatnagar	AVL
Mr. Andreas Pein	AVL
Mr. Akshat Mathur	AVL
Mrs. Yolla Hager	Hager Environmental & Atmospheric Technologies (H.E.A.T)

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ANNEX I

(See Introduction)

COMMITTEE COMPOSITION*

Automotive Industry Standards Committee

Chairperson	
Dr Reji Mathai	Director The Automotive Research Association of India, Pune
Members	**Representing**
Representative from	Ministry of Road Transport and Highways (Dept. of Road Transport and Highways), New Delhi
Representative from	Ministry of Road Transport and Highways (Dept. of Road Transport and Highways), New Delhi
Shri S. M. Ahuja	Office of the Development Commissioner, MSME, Ministry of Micro, Small and Medium Enterprises, New Delhi
Shri Shrikant R. Marathe	Former Chairman, AISC
Shri R. R. Singh	Bureau of Indian Standards, New Delhi
Director	Central Institute of Road Transport, Pune
Director	International Centre for Automotive Technology, Manesar
Director	Global Automotive Research Centre
Director	Indian Institute of Petroleum, Dehra Dun
Director	Vehicles Research and Development Establishment, Ahmednagar
Director	Indian Rubber Manufacturers Research Association
Representatives from	Society of Indian Automobile Manufacturers
Shri R. P. Vasudevan	Tractor Manufacturers Association, New Delhi
Shri Uday Harite	Automotive Components Manufacturers Association of India, New Delhi
Member Secretary	
Shri Vikram Tandon	The Automotive Research Association of India, Pune

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