

AUTO FUEL  
POLICY



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## **PREFACE**

Air quality has increasingly been an issue of social concern in the backdrop of rising industrial and vehicular pollution. While pollution may result from many sources, the Auto Fuel Policy seeks to control vehicular pollution arising from the dramatic rise in vehicular traffic in the country.

The Government had constituted an Expert Committee under the Chairmanship of Dr. R.A. Mashelkar, Director General, Council of Scientific and Industrial Research to obtain a holistic view on the issue of automobile technologies, corresponding fuel quality, its impact on the environment, the social cost and security of fuel supply. The Expert Committee has made its recommendations to the Government. These recommendations have been debated. As such, I am happy to present the Auto Fuel Policy for the country.

The policy provides a clear-cut road-map for changes in vehicular technology and corresponding fuel quality for the whole country. Measures are also proposed to reduce emissions from in-use vehicles. In developing the Policy, social cost has been optimized.

I do hope that the better ambient air quality will reflect through improvement in public health and the proposed measures will lead to better environment for future generations.

  
(RAM NAIK)



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## I. BACKGROUND

1. The Government of India had constituted a Committee of Experts on 13.09.2001 under the chairmanship of Dr. R.A.Mashelkar, Director General, Council of Scientific & Industrial Research (CSIR) to recommend an Auto Fuel Policy for the country including major cities; to devise a road map for its implementation; to recommend suitable auto fuels and their specifications considering the availability and logistics of fuel supplies, the processing economics of auto fuels, and the possibilities of multi-fuel use in different categories of vehicles; to recommend attributes of automobile technologies, fiscal measures for ensuring minimization of social cost of meeting a given level of environmental quality and institutional mechanisms for certification of vehicles and fuels, as also the monitoring and enforcement measures.
2. Although substantial work has been done over the past five to six years to improve the auto fuel quality, India has not had a comprehensive Auto Fuel Policy based on holistic considerations per se. In the backdrop of increasing environmental concerns, oil industry, auto industry and the people at large need to know about the policy and the plans of the Government on this subject. The Auto Fuel Policy addresses these concerns.

## II. AVAILABILITY, DEMAND, SECURITY OF SUPPLY AND QUALITY OF AUTO FUELS

3. Government's *India Hydrocarbon Vision – 2025* document projects that the present gap between the domestic demand and availability of oil and gas from indigenous sources is expected to increase. With country's increasing dependence on imports due to stagnation of indigenous production of oil and gas, supply security considerations assume significance in policy formulation.
4. National fuel policy of any country should be always directed towards ensuring sufficient, reliable and economic fuel supplies to support social and economic development. One of the key strategies for meeting this objective should be to diversify the sources and avoid dependence on any single source of supply of fuels. The strategy followed for meeting country's demand by processing imported crude oil in the refineries, has, apart from generation of employment and savings in the country's import bill, has made diversification of supply sources possible and has helped in minimization of price risks associated with oil market volatilities and reduction in infrastructure costs for importing fuel requirements.
5. Presently, the country is marginally surplus in domestically produced petroleum products except LPG, indigenous availability of which almost matches the country's requirement for cooking purposes. Incremental demand of LPG would be met from imports. The feasibility of dispensing CNG as an alternative auto fuel in the country would depend not so much upon the overall gas availability, but on the feasibility of laying the gas pipelines connecting the consuming cities with the few gas supply sources.
6. The presently available storage and inland transportation infrastructure in the country for sourcing liquid fuels, set up over the years, is adequate. Lower storage capacities and non-availability of well dispersed import facilities are the gap areas in the case of LPG.
7. At the present level of development of the oil industry in the country, auto fuel security concerns can be better met by conventional fuels as the facilities for import, production, storage and distribution are diversified and distributed throughout the country. Security of supply of gaseous auto fuels will, however, remain an area of concern.
8. Therefore, the Auto Fuel Policy, while meeting the environmental concerns, needs to simultaneously address the supply security and strategic concerns taking into account the domestic and regional product demand-supply balance and other related factors mentioned above. Further, with a view to reduce the costs to the economy and the ultimate consumer, the suggested measures need to be such that the existing production, storage and transportation infrastructure is optimally utilized. It is also imperative that the consumers are protected against supply disruptions and price risks.
9. The quality of auto fuels in the metro cities in India is comparable or marginally inferior to the quality obtained in the developed countries. Auto fuel quality in the country is superior to the quality in most of the developing countries, including China.
10. Oil companies have implemented major programmes for up gradation of petrol and diesel quality in the past few years. Investment of about Rs.10,000 crore was made for petrol and diesel quality improvement to meet the year 2000 standards.



### III. VEHICULAR EMISSION TECHNOLOGIES AND NORMS

11. Most of the car manufacturers in India have foreign collaborations for new technologies. This is, however, not true for heavy vehicles, buses, trucks, and a smaller number of tractor-trailers. The population of two-wheelers and three-wheelers in India using two-stroke engines is very high. In contrast to passenger cars, the technological innovations and developments for two-wheelers and three-wheelers have to be done with indigenous efforts since readymade technologies, for the class of such vehicles used in India, are not available from abroad.
12. Vehicular technologies in India have seen improvements in recent years; vehicles with old technologies constitute a large number, though the vehicle age in major cities is reducing.
13. The existing scenario for vehicular emission norms is as under:
  - In India, the European model for emission norms has been adopted for passenger cars, light commercial vehicles, buses and heavy duty trucks. In the case of 2 and 3 wheelers, Indian norms, which are more stringent than the European Union, are being followed.
  - Vehicular emission norms/standards are applicable only for new vehicles before they come on road, while PUC checks are the only means of emissions testing for new or old/ in-use vehicles.
  - Idle emission norms (PUC checks) for on-road vehicles came into force from 1991 and are in the process of being revised.
  - Vehicular emission norms for new vehicles were notified for the first time in India in 1991 for both at the manufacturing stage as well as for in-use vehicles. The emission norms were revised in 1996. India 2000 (Euro I equivalent, Bharat Stage I) vehicle emission norms were introduced for new vehicles from April 2000. Bharat Stage II (Euro II equivalent) emission norms for new cars were introduced in Delhi from the year 2000 and extended to the other 3 metro cities in the year 2001. The emission norms for CNG and LPG vehicles were notified in the year 2000 and 2001, respectively.
14. The future emission norms need to take into account the technical, financial and institutional considerations, time required to upgrade technology and fuel quality as also the absorptive capacity.

#### IV. POLICY OBJECTIVES

15. The Auto Fuel Policy aims to comprehensively and holistically address the issues of vehicular emissions, vehicular technologies, and auto fuel quality in a cost-efficient manner while ensuring the security of fuel supply. The policy objectives are:
- (i) Ensure sustainable, safe, affordable and uninterrupted supplies of auto fuels of right quality to support social and economic development. One of the key factors for meeting this policy objective is to diversify the sources and reduce dependence on any single source of supply.
  - (ii) Over the years, infrastructure for the import of crude and crude products, their processing and production, and storage and transportation has been created in the country. Considerable investment has been made in developing this infrastructure and the logistics for the distribution of petroleum products in the country. The Auto Fuel Policy is committed to an optimal utilization of such an infrastructure.
  - (iii) Assess the future trends in emissions and air quality requirements from the view point of public health, and establishment of a consistent framework within which different policy options to reduce emissions can be assessed. It is, therefore, required that environmental objectives for air quality be determined, emission reduction targets be established, input data on costs and benefits be collected and cost effective measures to reduce emissions be identified. Appropriate institutional arrangements to be put in place to where such activities can be handled effectively.
  - (iv) Adopt such vehicular emission standards that they together with other measures, will be able to make a decisive impact on air quality, without placing an undue burden on the people.
  - (v) Vehicular emission standards and auto fuel quality should offer choice to the citizens and equally a choice to automobile manufactures in matters of technology selection. Principles of widening the choice and promoting competition amongst automobile technologies, within the limits that are imposed by the availability of auto fuels and security of their supplies.
  - (vi) As elsewhere in the world, the Government should decide only the vehicular emission standards and the corresponding fuel specifications without specifying vehicle technology and the type of fuel.
  - (vii) The requirement of investments to reach vehicular technology and fuel quality of *Euro III* equivalent levels throughout the country is estimated in the range of Rs.50,000 – Rs. 60,000 crore. Therefore, to achieve the air quality targets by gradually improving emission standards and a phased up gradation of fuel quality and vehicular technology, taking note of the financial, technical and institutional considerations as also the absorptive capacity is required.
  - (viii) Administered fuel prices, carrying subsidies and cross-subsidies, lead to distortions in fuel usage pattern. Determination of fuel prices on the principles of import parity and putting in place a medium term fiscal regime as early as possible are necessary for the sustainability of fuel usage pattern.
  - (ix) In order to remain relevant, the Auto Fuel Policy must undergo periodic revisions, preferably at an interval of five years. This will allow adjustments in the Policy that may become necessary on account of the technological and other changes that are inevitable in the country and the world. It would also afford an opportunity to different stakeholders to express their views in the light of the changes that take place with time.



## V. MEASURES TO REALIZE THE POLICY OBJECTIVES

Measures to realise the policy objectives of the Auto Fuel Policy alongwith a road map for their implementation are:

### Vehicular Emission Norms

16. The suggested road map for reduction in vehicular emission norms for new vehicles would be as given in the table below.

### Auto fuels

17. The twin objectives of providing assured supply of auto fuels at minimal costs and meeting the environmental concerns would be achieved by broadly following the below mentioned policy:

(a) Liquid fuels would be the main auto fuels throughout the country and their quality/specifications would be progressively upgraded in line with vehicular emission norms;

(b) The use of CNG/LPG would be encouraged in the cities affected by high vehicular pollution to enable the vehicle owners to have the choice of fuel and technology combination to meet the higher emission norms in such cities. Safety of CNG/LPG fuelled vehicles is of paramount importance. There will be a continuance of the present practice of having fixed fuel tanks in CNG and LPG vehicles in line with the practices around the world.

(c) To accelerate the development of other alternative fuel vehicles including battery powered vehicles, hydrogen and fuel cell vehicles, a comprehensive programme of policy support, R&D support and other measures for zero emission vehicles would be drawn up.

### Road Map for New Vehicles

Coverage	Passenger Cars, light commercial vehicles & heavy duty diesel vehicles	2 / 3 wheelers
Entire country	Bharat Stage II - 1.4.2005 Euro III equivalent - 1.4.2010	Bharat Stage II - 1.4.2005 Bharat Stage III* - Preferably from 1.4.2008 but not later than 1.4.2010
11 major cities (Delhi / NCR, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur & Agra)	Bharat Stage II - 1.4.2003 Euro III equivalent - 1.4.2005 Euro IV equivalent* - 1.4.2010	

\* These schedules would be reviewed in the year 2006, when Euro II equivalent vehicular emission norms (Bharat Stage II norms) would have been implemented in the entire country and Euro III equivalent vehicular emission norms implemented in 11 major cities.

Vehicular emission norms are detailed in table 1 to 4. Specifications of petrol & diesel to meet Bharat Stage II, Euro III and Euro IV equivalent vehicular emission norms are indicated in table 5 to 10. Specifications for CNG & LPG are shown in table 11 & 12.

It may be seen that the cities facing serious pollution levels have been brought under a separate road map for quicker adoption of emission norms.



(d) Technologies for producing ethanol / bio fuels from different renewable energy sources and vehicles to utilize these bio fuels would be encouraged by providing R&D and other support.

18. At the present stage of development of the infrastructure of petroleum imports, production, transportation and distribution, maintenance of assured supplies of gaseous fuels may be difficult in situations of disruption resulting from any unforeseen natural or other factors, external or internal. Therefore, in order to protect the consumer from supply disruptions and price risks, it is considered inadvisable that city public transport systems use, or be designed for, only gaseous or other non-conventional fuels.

#### **Reduction of pollution from in-use vehicles**

19. The existing PUC system would be replaced and upgraded to a more reliable computerized system which would ensure better compliance, help identify polluting vehicles and transfer data to a centralized location for further analysis and interpretation.

20. Inspection and maintenance (I&M) system would be introduced in the eleven (11) major cities, namely, Delhi, Mumbai, Chennai, Kolkata, Hyderabad, Bangalore, Ahmedabad, Pune, Surat, Kanpur and Agra on an urgent basis. The same I&M system would be extended throughout the country. It would be examined whether OBDD system may be accepted for new vehicles in lieu of I&M system.

21. Performance checking of catalytic converters and conversion kits already installed in vehicles would be made mandatory.

22. Promoting public bus transport would be viewed as a top priority area to improve urban road traffic and for controlling air

pollution from automobiles.

23. The annual vehicle insurance would be linked with Inspection and Certification, by making the availability of valid pollution check certificates a necessary condition for allowing settling of insurance claims.

24. The tighter emission norms would reduce emissions only from new vehicles. To bring emission improvements in old vehicles, they would be retrofitted with new engines or the emission control devices. Schemes combined with incentives would be developed for the replacement of old polluting vehicles.

25. Appropriate systems would be put in place to check emission warranty for new vehicles. Random checking of CNG/LPG kits or any other emission control devices or retrofit engines for their emission performance would also be undertaken.

26. In other countries, emission charges are a key instrument for controlling pollution. Such economic instruments would be considered for implementation in India also. To start with, in the metropolitan cities of Delhi, Mumbai, Kolkata, Chennai etc., State Governments may consider levying higher motor vehicle tax on old vehicles.

27. Road maps suggested for reducing pollution from in use vehicles have been shown in boxes 4 to 6. As the road map for reducing pollution from in-use vehicles is to be implemented mainly by the State Governments under the aegis of the Union Ministry of Road Transport and Highways (MORTH), the MORTH has been authorised to make adjustments in the schedules for implementing the road map for in-use vehicles.

#### **Vehicle technology**

28. The Ministry of Heavy Industry & Public



Enterprises, Government of India have already formulated an "Auto Policy" to establish a globally competitive automotive industry in India and to double its contribution to the economy by 2010. Coordinated implementation of this policy and Auto Fuel Policy would help in achieving the desired environmental benefits.

29. Declaration of fuel economy standards by automobile manufactures would be made mandatory, who would publish the fuel economy standards (km/litre or km/kg) for each model in the documents that are supplied with each vehicle.

#### **Quality of fuels and standard of kits**

30. To ensure benefits from the introduction of improved vehicular emission norms and supply of better quality fuels and alternative fuels, quality aspects are crucial. Therefore, supply of liquid fuels of the right quality for conventional fuel vehicles and the use of standard kits of the right quality in alternative fuel vehicles need to be ensured. The following measures will be undertaken:

- (a) Complete the process of correcting the fuel price distortions by removal of subsidies and cross subsidies as early as possible.
- (b) Extend the tank lorry locking system for movement of products to all major cities in the entire country.
- (c) Encourage setting up of consumer pumps by the transport companies operating city public transport.
- (d) Depending on the results of the pilot projects for the use of special markers to detect and prevent adulteration in petrol and diesel, take up the use of markers on commercial basis.
- (e) Set up mechanism for independent inspection and rigorous checks by

agencies other than the oil companies, e.g. joint teams of Anti-Adulteration Cell, States Civil Supplies Departments, and State Pollution Control Boards, in the highly polluted cities.

- (f) Make oil companies responsible and accountable for the quality of fuels dispensed from their retail outlets.
- (g) Set up the testing facilities and enforcement machinery for checking the quality of conversion kits fitted in the on-road vehicles simultaneously with the introduction of alternative fuels in any city.
- (h) Ensure that any conversion of vehicles to CNG and LPG mode is reported to the registering authority for endorsing the change in the vehicle registration certificate after inspection of the converted vehicle for fitness.
- (i) Set up mechanism for regular inspection of agencies authorized to carry out conversion of vehicles to alternative fuel vehicles by the joint teams of the State Transport Departments and Pollution Control Boards and to ensure that the authorized agencies carry their work only by the trained personnel.
- (j) Put restrictions on dispensing of alternative fuels to the vehicles converted and/or retrofitted to alternate fuel mode if such vehicles do not carry requisite endorsement in the vehicle registration certificate.
- (k) Provide for heavy penalty including impounding of vehicles that are found converted illegally or which do not have requisite endorsement in the vehicle registration certificate.
- (l) Provide for penalties against vehicles including impounding of vehicles, in

which the emission control devices fitted by Original Equipment Manufacturers (OEMs) are found to be removed or tampered with.

### **Air quality data and research & development**

31. Data on air quality is a crucial input for taking policy and investment decisions. Currently, air quality data is insufficient, requiring a major expansion and augmentation of the existing network of air quality monitoring and supervision. To ensure that such data is collected scientifically, provision of funding support for strengthening of the network and the supervision / monitoring of data collection would be undertaken.
32. Surveys and studies on the sources of pollution and their apportionment to different sources are a pre-requisite to a proper understanding of what causes pollution and in what proportion. Such studies would be immediately initiated in the polluted cities and the National Capital Territory. National level research institutes, having the necessary manpower, experience, and equipment would be utilized for undertaking such studies.
33. Actions for containing air pollution in cities that suffer from pollution from auto exhaust would be undertaken as a part of a comprehensive scheme for reducing air pollution from different sources. Several steps would help in determining the actions:
  - (a) Identification of critical pollutants in the city and the sources of pollution
  - (b) Analysis and assessment of pollution loads from different sources and contribution of auto exhausts thereto

- (c) Contribution of different categories of vehicles, inter-city and intra-city, to the pollution loads of critical pollutants
- (d) Cost benefit analysis of alternative solutions, based on different combinations of fuel - vehicle technology options, for achieving the intended objectives.

### **Health effects of air pollution**

34. A database linking air pollution and emission related diseases and ambient pollution levels would be created for planning of interceptive action. The state governments would be requested to collect and analyze this information and disseminate the same to the concerned authorities at regular intervals.
35. The regulatory authorities, R&D institutions dealing with environmental health and medical community would need to play an active role in the prevention and control of air pollution and adverse health impacts.
36. Research and development needs would be directed towards well designed multi-centric epidemiological studies, based on reliable objective parameters for exposures (outdoor, indoor, occupational) and health outcomes. Studies would be undertaken in the four metropolitan cities and other polluted cities to find out the attributability of environmental pollutants and disease outcomes, health and environmental economics of air pollution, and vehicular emission. A core group of experts from ICMR, CPCB, CSIR and MoE&F would be set up by the MOE&F, whose responsibility would be to steer the research studies.



## **VI. ROAD MAPS FOR EMISSION NORMS FOR NEW VEHICLES/IN-USE VEHICLES AND FUEL QUALITY**

### **Road map for emission norms for new vehicles and fuel quality**

37. The road map for vehicular emission norms for new vehicles and auto fuel quality laid out in the attached boxes 1 to 3 would be implemented.
38. Relaxation to the North-East refineries processing Assam crude oil in regard to fuel specifications would be provided.

### **Road map for in-use vehicles**

39. The road map, laid out in the attached Boxes

4 to 6 for reducing pollution from the in-use vehicles would be implemented. In addition to the measures in the road map, State Governments / Union Territories can take such special city specific measures as may be necessary to deal with any local problem. These measures should take into account the availability of auto fuels and the security of their supplies to guard against disruption in transport system and hardship to people.

**Road Map for Vehicular Emission Norms for New Vehicles  
(except 2 & 3 Wheelers)**

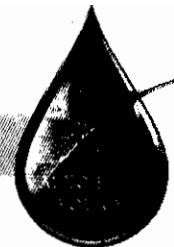
***Entire Country***

- ***Bharat Stage II*** emission norms  
From 1 April, 2005
- ***Euro III*** equivalent emission norms  
From 1 April, 2010

***For Cities of Delhi / NCR, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur and Agra***

- ***Bharat Stage II*** emission norms
  - ***Delhi, Mumbai, Kolkata & Chennai***  
Already introduced in the year 2000 & 2001
  - ***Bangalore, Hyderabad Ahmedabad, Pune, Surat, Kanpur and Agra***  
From 1 April, 2003
- ***Euro III*** equivalent emission norms for all private vehicles, city public service vehicles and city commercial vehicles.  
From 1 April, 2005
- ***Euro IV*** equivalent emission norms for all private vehicles, city public service vehicles and city commercial vehicles  
From 1 April, 2010

The schedules for introduction of Euro-III equivalent emission norms in the entire country from 01.04.2010 together with Euro-IV equivalent emission norms in the 11 major cities of Delhi, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur & Agra would be reviewed in the year 2006, after the implementation of Bharat Stage II emission norms in the entire country w.e.f. 01.04.2005 and Euro-III equivalent emission norms in these eleven major cities from the same date.



**Box 2**

**Road Map for Vehicular Emission Norms for New Vehicles  
New 2 & 3 Wheelers**

**Emission Norms for 2 / 3 Wheelers to be the same in the Entire Country**

- ***Bharat Stage II norms***  
From 1 April, 2005
- ***Bharat Stage III norms***  
Preferably from 1 April, 2008 but not later than 1 April, 2010 in any case.

**Box 3**

**Details of Vehicular Emission Norms and Auto Fuel Quality**

**Details of Vehicular Emission Norms**

*Bharat Stage II, Euro III & Euro IV* equivalent emissions norms for all categories of new vehicles (excluding 2 / 3 wheelers) are given in **Table 1 to 3**. The *Bharat Stage II* and *Bharat Stage III* emission norms for 2 / 3 wheelers for the year 2005 & 2008 are given in **Table 4**.

**Details of Auto Fuel Quality**

To meet the recommended vehicular emission norms, quality of auto fuels to be supplied are detailed in **Table 5 to 12**.

**Road Map for reducing Pollution from In-use Vehicles*****For the Entire Country*****New PUC checking system for all categories of vehicles**

- to be put in place by 1 April, 2005

**Inspection & Maintenance (I&M) System for all categories of vehicles**

- to be put in place by 1 April, 2010

**Performance checking system of catalytic converters and conversion kits installed in vehicles**

- to be put in place by 1 April, 2007

**Augmentation of city public transport system**

- finalisation of plans by the State Governments/  
local authorities. : Not later than 1 April, 2005

Wherever any State Government seeks adjustments in the schedules for implementing any item in this road map, the Union Ministry of Road Transport and Highways could fix the revised schedules thereof.



## Road Map for reducing Pollution from In-use Vehicles

### *For the National Capital Territory of Delhi (NCT)*

#### **New PUC Checking System for all categories of vehicles**

- to be put in place by 1 October, 2004

#### **Inspection & Maintenance (I&M) System for all categories of vehicles**

- to be put in place by 1 April, 2005

#### **Performance checking system of catalytic converters and conversion kits installed in vehicles**

- to be put in place by 1 October, 2004

#### **Augmentation of city public transport system**

- should be undertaken by the State Government after reviewing the start up schedules and estimated impact of metro rail system.

#### ***Emission norms for city public service vehicles***

- For city buses, taxis & 3 wheelers, emission norms have already been set under the directions of the Supreme Court.

#### ***Emission norms for all inter-state buses from / to Delhi***

All inter-state buses originating or culminating in Delhi should conform to the following norms :

- Minimum India 2000 (*Bharat Stage I*) emission norms : Not later than 1 April, 2007
- Minimum *Bharat Stage II* emission norms : Not later than 1 April, 2011

#### ***Emission norms for inter-state trucks loading / unloading goods from / at Delhi***

All inter-state trucks originating or culminating in Delhi should conform to the following norms :

- Minimum India 2000 (*Bharat Stage I*) emission norms : Not later than 1 April, 2007
- Minimum *Bharat Stage II* emission norms. : Not later than 1 April, 2011

Wherever any State Government seeks adjustments in the schedules for implementing any item in this road map, the Union Ministry of Road Transport and Highways could fix the revised schedules thereof.



## Road Map for reducing Pollution from In-use Vehicles

***For the Cities of Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur & Agra***

### **New PUC checking system for all categories of vehicles**

- to be put in place by 1 April, 2004

### **Inspection & Maintenance (I&M) system for all categories of vehicles**

- to be put in place by 1 April, 2006

### **Performance checking system of catalytic converters and conversion kits installed in vehicles**

- to be put in place by 1 April, 2005

### **Augmentation of city public transport system**

- finalisation of plans by the State Governments/local authorities : Not later than 1 April, 2004

### ***Emission norms for city public service vehicles***

#### ***City Buses and Taxis***

All city buses and taxis should conform to the following norms :

- **From 1 April, 2004**
  - Registered after 1 April, 1996 : Applicable emission norms on the date of registration
  - Registered before 1 April, 1996 : Minimum 1996 emission norms
- **From 1 April, 2008**
  - Registered after introduction of *Bharat Stage II* norms : Applicable emission norms on the date of registration
  - Registered before introduction of *Bharat Stage II* norms : Minimum India 2000 (*Bharat Stage I*) emission norms

#### ***3 Wheelers (Autos/Tempos)***

All 3 wheelers (Autos/Tempos) should conform to the following norms :

- **From 1 April, 2004**
  - Registered after 1 April, 2000 : Applicable emission norms on the date of registration
  - Registered before 1 April, 2000 : Minimum 1996 emission norms
- **From 1 April, 2008**
  - Registered after 1 April, 2000 : Applicable emission norms on the date of registration
  - Registered before 1 April, 2000 : Minimum India 2000 (*Bharat Stage I*) emission norms



Box 6 (contd.)

## Road Map for reducing Pollution from In-use Vehicles

*For the Cities of Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur & Agra*

### ***Emission norms for inter-state buses from / to the identified cities***

All inter-state buses originating or culminating in the identified cities should conform to the following norms :

- From 1 April, 2006
  - Registered before 1 April, 2000 : Minimum 1996 emission norms
- From 1 April, 2008
  - Registered after 1 April, 2000 : Minimum India 2000 (*Bharat Stage D*) emission norms
- From 1 April, 2011
  - Registered after 1 April, 2005 : Minimum *Bharat Stage II* emission norms

Wherever any State Government seeks adjustments in the schedules for implementing any item in this road map, the Union Ministry of Road Transport and Highways could fix the revised schedules thereof.

**Table 1**

**Bharat Stage II emission norms**

<b>(a) Motor cars with seating capacity of and upto 6 persons (including driver) and GVW not exceeding 2500 kg.</b>						
<b>Vehicles with</b>		<b>Standards (TA - COP), g/km</b>				
		<b>CO</b>	<b>(HC + NO<sub>x</sub>)</b>		<b>PM</b>	
<b>Petrol engine</b>		2.2	0.5		-	
<b>Diesel engine</b>		1.0	0.7		0.08	
<b>(b) Four wheeler passenger vehicles with GVW equal to or less than 3500 kg and designed to carry more than 6 persons (including driver) or maximum mass of which exceeds 2500 kg.</b>						
<b>Limit values (TA-COP), g/km</b>						
<b>Class</b>	<b>Ref. Mass (rw), kg</b>	<b>Mass of CO</b>		<b>Mass (HC + NO<sub>x</sub>)</b>		<b>Mass of PM</b>
		<b>Petrol</b>	<b>Diesel</b>	<b>Petrol</b>	<b>Diesel</b>	<b>Diesel</b>
<b>I</b>	<b>rw&lt;1250</b>	2.2	1.0	0.5	0.7	0.08
<b>II</b>	<b>1250&lt;rw&lt;1700</b>	4.0	1.25	0.6	1.0	0.12
<b>III</b>	<b>1700&lt;rw</b>	5.0	1.5	0.7	1.2	0.17
<b>(c) For light commercial vehicles</b>						
<b>Limit values (TA-COP), g/km</b>						
<b>Class</b>	<b>Ref. Mass (rw), kg</b>	<b>Mass of CO</b>		<b>Mass (HC + NO<sub>x</sub>)</b>		<b>Mass of PM</b>
		<b>Petrol</b>	<b>Diesel</b>	<b>Petrol</b>	<b>Diesel</b>	<b>Diesel</b>
<b>I</b>	<b>rw&lt;1250</b>	2.2	1.0	0.5	0.7	0.08
<b>II</b>	<b>1250&lt;rw&lt;1700</b>	4.0	1.25	0.6	1.0	0.12
<b>III</b>	<b>1700&lt;rw</b>	5.0	1.5	0.7	1.2	0.17
<b>(d) For heavy duty vehicles</b>						
<b>Limit values (TA-COP), g/kWh</b>						
<b>CO</b>	<b>HC</b>	<b>NO<sub>x</sub></b>		<b>PM</b>		
4.0	1.1	7.0		0.15		

## Euro III equivalent emission norms

		Reference mass (rw, kg)	Limit values									
			Mass of carbon monoxide (CO)		Mass of hydrocarbons (HC)		Mass of oxides of nitrogen (NO <sub>x</sub> )		Combined mass of hydrocarbons and oxides of nitrogen (HC + NO <sub>x</sub> )		Mass of particulates (PM) <sup>1</sup>	
Category	Class	L <sub>1</sub> (g/km)	L <sub>2</sub> (g/km)		L <sub>3</sub> (g/km)		L <sub>2</sub> + L <sub>3</sub> (g/km)		L <sub>4</sub> (g/km)			
			Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel
M <sup>2</sup>	—	2.3	0.64	0.20	0.15	0.50	-	0.56	0.05	0.05		
	I	2.3	0.64	0.20	0.15	0.50	-	0.56	0.05	0.05		
	II	4.17	0.80	0.25	0.18	0.65	-	0.72	0.07	0.07		
N <sup>3</sup>	III	5.22	0.95	0.29	0.21	0.78	-	0.86	0.10	0.10		

<sup>1</sup>For compression ignition engines

<sup>2</sup>Except vehicles designed to carry more than 6 number occupants and the mass of which exceeds 2500 kg.

<sup>3</sup>And those category M vehicles which are specified in (2) above

(contd.)



**Euro III equivalent emission norms (contd.)**

<b>(b) Heavy duty vehicles for diesel engines</b>				
Diesel engines over the ESC / ELR Test Cycles				
Gaseous and PM emissions (g/kwh)				
CO	HC	NO <sub>x</sub>	PM	Smoke(m-1)
2.1	0.66	5.0	0.10 <sup>1</sup>	0.80
<sup>1</sup> A particulate matter limit of 0.13 g/kwh applies for small engines having a swept volume of less than 0.75 dm <sup>3</sup> per cylinder and a rated speed greater than 3000 min <sup>-1</sup> .				

<b>(c) Diesel and gas engines over the ETC test cycles</b>				
Gaseous and PM Emissions (g/kwh)				
CO	NMHC	CH <sub>4</sub>	NO <sub>x</sub>	PM
5.45	0.78	1.6	5.0	0.16 <sup>1</sup>
<sup>1</sup> A particulate matter limit of 0.21 g/kwh applies for small engines having a swept volume of less than 0.75 dm <sup>3</sup> per cylinder and a rated speed greater than 3000 min <sup>-1</sup> .				

## Euro IV equivalent emission norms

Reference mass (rw, kg)		Limit values									
		Mass of carbon mono-oxide (CO)		Mass of hydrocarbons (HC)		Mass of oxides of nitrogen (NO <sub>x</sub> )		Combined mass of hydrocarbons and oxides of nitrogen (HC + NO <sub>x</sub> )		Mass of particulates (PM) <sup>1</sup>	
Category	Class	L1 (g/km)		L2 (g/km)		L3 (g/km)		L2 + L3 (g/km)		L4 (g/km)	
		M <sup>2</sup>	—	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel	Petrol	Diesel
N <sup>3</sup>	I	1.0	0.50	0.10	-	0.08	0.25	-	0.30	0.025	
	II	1.81	0.63	0.13	-	0.10	0.33	-	0.39	0.040	
	II	2.27	0.74	0.16	-	0.11	0.39	-	0.46	0.06	

<sup>1</sup>For compression ignition engines<sup>2</sup>Except vehicles designed to carry more than 6 number occupants and the mass of which exceeds 2500 kg.<sup>3</sup>And those category M vehicles which are specified in (2) above

(contd.)

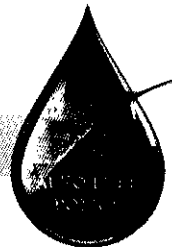


Table 3 (contd.)

**Euro IV equivalent emission norms (contd.)**

<b>(b) For heavy duty vehicles for diesel engines</b>				
<i>(i) Diesel engines over the ESC / ELR Test Cycles</i>				
<b>Gaseous and PM emissions (g/kwh)</b>				<b>Smoke (m-1)</b>
<b>CO</b>	<b>HC</b>	<b>NO<sub>x</sub></b>	<b>PM</b>	
1.5	0.46	3.5	0.02 <sup>1</sup>	0.50
<i>(ii) Diesel and gas engines over the ETC Test Cycles</i>				
<b>Gaseous and PM Emissions (g/kwh)</b>				
<b>CO</b>	<b>NMHC</b>	<b>CH<sub>4</sub></b>	<b>NO<sub>x</sub></b>	<b>PM</b>
4.0	0.55	1.1	3.0	0.03 <sup>2</sup>
<sup>1</sup> A particulate matter limit of 0.13 g/kwh applies for small engines having a swept volume of less than 0.75 dm <sup>3</sup> per cylinder and a rated speed greater than 3000 min. <sup>2</sup> A particulate matter limit of 0.21 g/kwh applies for small engines having a swept volume of less than 0.75 dm <sup>3</sup> per cylinder and a rated speed greater than 3000 min <sup>-1</sup> .				



Table 4

**Emission norms and deterioration factors (DF)  
for 2 and 3 wheelers**

Vehicle	Pollutants, g/km	Year 2005		Preferably from year 2008	
		<i>Bharat Stage II</i>		<i>Bharat Stage III</i>	
		Norms	DF*	Norms	DF*
2 Wheelers	CO	1.50	1.2	1.0	1.2
	HC + NO <sub>x</sub>	1.50	1.2	1.0	1.2
3 Wheelers (Petrol)	CO	2.25	1.2	1.25	1.2
	HC + NO <sub>x</sub>	2.00	1.2	1.25	1.2
3 Wheelers (Diesel)	CO	1.00	1.1	0.50	1.1
	HC + NO <sub>x</sub>	0.85	1.0	0.50	1.0
	PM	0.10	1.2	0.05	1.2

\* Deterioration factors to account for deterioration of devices like catalytic converter.



Table 5

**Indian petrol specifications required to meet  
Bharat Stage II emission norms**

Sl no.	Characteristics	Unit	Requirements	
			Unleaded regular	Unleaded premium
1	Colour, visual		Orange	Red
2	Density @ 15 °C,	kg/m <sup>3</sup>	710-770	710-770
3	Distillation :			
	a) Recovery up to 70 °C (E 70)	% volume	10-45	10-45
	b) Recovery up to 100 °C (E 100)	% volume	40-70	40-70
	c) Recovery up to 180 °C (E 180), min	% volume	90	90
	d) Final Boiling Point (FBP), max <sup>o</sup>	C	215	215
	e) Residue, max.% volume		2	2
4	Research Octane Number (RON), min		88	93
5	Anti-Knock Index (AKI), min		84	88
6	Existent Gum, max	g/m <sup>3</sup>	40	40
7	Potential Gum, max	g/m <sup>3</sup>	50	50
8	Sulphur, total, max.	% mass	0.05	0.05
9	Lead content ( as Pb), max.	g/l	0.013	0.013
10	Reid Vapour Pressure (RVP), max.	kPa	35-60	35-60
11	Vapour Lock Index (VLI= 10RVP+7E70)			
	a) Summer, max		750	750
	b) Other months, max		950	950
12	Benzene Content, max	% volume		
	a) For the Metros		3.0	3.0
	b) For the rest		5.0	5.0
13	Copper strip corrosion for 3 hrs @ 50 °C, max.	rating	Not more than No. 1	Not more than No. 1
14	Water tolerance of Gasoline-alcohol blends, temp. for phase separation			
	a) Summer, max	°C	10	10
	b) Winter, max	°C	0	0
15	Engine intake system cleanliness	MFA used	To report	To report

**Note :**

- Indian standard specification for petrol namely IS 2796 : 2000 shall be applicable for test methods and all other provisions / details
- Benzene content in petrol shall be reduced from the existing limit of 3 per cent max. for the 4 metros (Delhi, Mumbai, Kolkata & Chennai) and 5 per cent max. in the rest of the country independent of implementation of *Bharat Stage II* vehicular emission norms. The Benzene content shall be reduced progressively to 1 per cent max. in the mega cities (NCT/NCR, Greater Mumbai, Kolkata, Chennai, Bangalore, Hyderabad & Ahmedabad) by April 2005. For the rest of the country, the maximum limit of Benzene content shall be 3 per cent from April 2005.
- These standards specifications have been finalised by the Expert Committee after discussions with the automobile and oil industry.



Table 6

**Indian petrol specifications required to meet Euro III equivalent emission norms**

Sl no.	Characteristics	Unit	Requirements	
			Unleaded regular	Unleaded premium
1	Colour, visual		Orange	Red
2	Density @ 15 °C,	kg/m <sup>3</sup>	720-775	720-775
3	Distillation :			
	a) Recovery up to 70 °C (E 70)	% volume.	10-45	10-45
	b) Recovery up to 100 °C (E 100)	% volume	40-70	40-70
	c) Recovery up to 150 °C (E 150)	% volume	75 min	75 min
	d) Final Boiling Point (FBP), max	°C	210	210
	e) Residue, max.	% volume	2	2
4	a) Research Octane Number (RON),min		91	95
	b) Motor Octane Number (MON), min		81	85
5	Gum content( solvent washed), max	mg/100ml	5	5
6	Oxidation stability, min	minutes	360	360
7	Sulphur, total, max.	mg/kg	150	150
8	Lead content ( as Pb), max.	g/l	0.005	0.005
9	Reid Vapour Pressure (RVP), max.	kPa	60	60
10	Vapour Lock Index (VLI)			
	a) Summer, max		750	750
	b) Other months, max		950	950
11	Benzene Content, max	% volume	1	1
12	Copper strip corrosion for 3 hrs @ 50 °C, max	rating	Class 1	Class 1
13	Olefin content, max	% volume	21	18
14	Aromatics content, max	% volume	42	42
15	Oxygen content, max	% mass	2.7	2.7
	Oxygenates Content :	% volume		
	a) Methanol, max	% volume	3	3
	b) Ethanol, max	% volume	5	5
	c) Iso-propyl alcohol, max	% volume	10	10
	d) Iso-butyl alcohol, max	% volume	10	10
	e) Tertiary-butyl alcohol, max	% volume	7	7
	f) Ethers containing 5 or more carbon atoms per molecule, max	% volume	15	15
	g) Other Oxygenates, max	% volume	8	8

**Note :**

1. Test methods and other provisions, details along with the requirements as given above shall be issued by Bureau of Indian Standards.
2. Petrol of 89 RON and 79 MON and having all other properties as the unleaded regular grade indicated above shall also be available for meeting requirements of the older vehicles which will be conforming to *pre-Euro III* equivalent vehicular emission norms.
3. Type test for Phosphorous content in petrol shall be introduced.
4. These standards specifications have been finalised by the Expert Committee after discussions with the automobile and oil industry.

## Indian diesel specifications required to meet *Bharat Stage II* emission norms

Sl no.	Characteristics	Unit	Requirements
1	Acidity, inorganic		Nil
2	Acidity, total, mg of KOH/g, max	mg of KOH/g	0.2
3	Ash, max	% mass	0.01
4	Carbon residue(Ramsbottom) on 10 % residue, max	% mass	0.3
5	Cetane number (CN), min OR Cetane index (CI), min		without additives 48* 46*
6	Pour point, max, as per OCC Directive		
	a) Winter (Nov-Feb), max	°C	3
	b) Summer, max	°C	15
7	Copper strip corrosion for 3 hrs @ 100 °C, max		Not worse than No. 1
8	Distillation :		
	a) at 350 °C, min recovery	% volume	85
	b) at 370 °C, min recovery	% volume	95
9	Flash point		
	a) Abel, min	°C	35
10	Kinematic viscosity @ 40 °C	cst	2.0-5.0
11	Sediment, max	% mass	0.05
12	Density @ 15 °C,	kg/m <sup>3</sup>	820-860(820-870*)
13	Total Sulphur, max.	% mass	0.05
14	Water content, max	% volume	0.05
15	Cold filter plugging point(CFPP)		
	a) Winter (Nov-Feb), max	°C	6
	b) Summer, max	°C	18
16	Total sediments, max	mg/100ml	1.6
17	Lubricity, corrected wear scar diameter (wsd 1,4) @ 60 °C, max	um, (micron)	460

\* For diesel processed from Assam crude, either CN of 45 min or CI of 43 min and density of 820-870 shall be applicable

**Note :**

1. Indian Standard specification for diesel fuels namely IS 1460 : 2000 shall be applicable for test methods and all other provisions / details
2. These standards specifications have been finalised by the Expert Committee after discussions with the automobile and oil industry.



Table 8

**Indian diesel specifications required  
to meet Euro III equivalent emission norms**

Sl no.	Characteristics	Unit	Requirements
1	Ash, max	% mass	0.01
2	Carbon residue (Ramsbottom) on 10 % residue, max	% mass	0.3 without additives
3	Cetane number(CN), min		51
4	Cetane Index(CI), min		46
5	Distillation :		
	95 % vol. recovery at °C, max	°C	360
6	Flash point :		
	a) Abel, min	°C	35
7	Kinematic viscosity @ 40 °C	cst	2.0-4.5
8	Density @ 15 °C,	kg/m <sup>3</sup>	820-845
9	Total sulphur, max.	mg/kg	350
10	Water content, max	mg/kg	200
11	Cold filter plugging point (CFPP)		
	a) Summer, max	°C	18
	b) Winter, max	°C	6
12	Total contaminations, max	mg/kg	24
13	Oxidation stability, max	g/m <sup>3</sup>	25
14	Polycyclic Aromatic Hydrocarbon (PAH), max	% mass	11
15	Lubricity, corrected wear scar diameter (wsd 1,4) @ 60 °C, max	µm (microns)	460
16	Copper strip corrosion for 3 hrs @ 50 °C, max	rating	class-1

*Note :*

1. These density and 95 per cent distillation recovery temperature limits shall be company pool average values. However, all samples shall meet the density @ 15 °C limit of 820-860 kg/m<sup>3</sup> and 95 per cent minimum distillation recovery at 370 °C.
2. For diesel processed from Assam crude, relaxation of CN & CI by 3 units and density shall be applicable as provided in the present BIS specification.
3. Test methods and other provisions / details along with the requirements as given above shall be issued by Bureau of Indian Standards.
4. These standards specifications have been finalised by the Expert Committee after discussions with the automobile and oil industry.

Table 9

## Indian petrol specifications required to meet *Euro IV* equivalent emission norms

Sl no.	Characteristics	Unit	Requirements	
			Unleaded regular	Unleaded premium
1	Colour, visual		Orange	Red
2	Density @ 15 °C,	kg/m <sup>3</sup>	720-775	720-775
3	Distillation :			
	a) Recovery up to 70 °C (E 70)	% volume	10-45	10-45
	b) Recovery up to 100 °C (E 100)	% volume	40-70	40-70
	c) Recovery up to 150 °C (E 150)	% volume	75 min	75 min
	d) Final Boiling Point (FBP), max	°C	210	210
	e) Residue, max.	% volume	2	2
4	a) Research Octane Number (RON) min		91	95
	b) Motor Octane Number (MON), min	min	81	85
5	Gum content( solvent washed), max	mg/100ml	5	5
6	Oxidation Stability, min	minutes	360	360
7	Sulphur, total, max.	mg/kg	50	50
8	Lead content ( as Pb), max.	g/l	0.005	0.005
9	Reid Vapour Pressure (RVP), max.	kPa	60	60
10	Vapour Lock Index (VLI)			
	a) Summer, max		750	750
	b) Other months, max		950	950
11	Benzene Content, max	% volume	1	1
12	Copper strip corrosion for 3 hrs @ 50 °C, max	rating	Class 1	Class 1
13	Olefin content, max	% volume	21	18
14	Aromatics content, max	% volume	35	35
15	Oxygen content, max	% mass	2.7	2.7
	Oxygenates Content :	% volume		
	a) Methanol, max	% volume	3	3
	b) Ethanol, max	% volume	5	5
	c) Iso-propyl alchol, max	% volume	10	10
	d) Iso-butyl alchol, max	% volume	10	10
	e) Tertiary-butyl alchol, max	% volume	7	7
	f) Ethers containing 5 or more carbon atoms per molecule, max	% volume	15	15
	g) Other oxygenates, max	% volume	8	8

**Note:**

1. Test methods and other provisions details along with the requirements as given above shall be issued by Bureau of Indian Standards.
2. Petrol of 89 RON and 79 MON and having all other properties as the unleaded regular grade indicated above shall also be available for meeting requirements of the older vehicles which will be conforming to *pre-Euro III* equivalent vehicular emission norms.
3. Type test for Phosphorous content in petrol shall be introduced.
4. These standards specifications have been finalised by the Expert Committee after discussions with the automobile and oil industry.



Table 10

**Indian diesel specifications required to meet  
Euro IV equivalent emission norms**

Sl no.	Characteristics	Unit	Requirements
1	Ash, max	% mass	0.01
2	Carbon Residue (Ramsbottom) on 10 % residue, max	% mass	0.3 without additives
3	Cetane number(CN), min		51
4	Cetane Index(CI), min		46
5	Distillation : 95 % vol. recovery at °C, max	°C	360
6	Flash point : a) Abel, min	°C	35
7	Kinematic Viscosity @ 40 °C	cst	2.0-4.5
8	Density @ 15 °C,	kg/m <sup>3</sup>	820-845
9	Total Sulphur, max.	mg/kg	50
10	Water content, max	mg/kg	200
11	Cold filter Plugging point (CFPP) a) Summer, max b) Winter, max	°C °C	18 6
12	Total contaminations, max	mg/kg	24
13	Oxidation stability, max	g/m <sup>3</sup>	25
14	Polycyclic Aromatic Hydrocarbon (PAH), max	% mass	11
15	Lubricity, corrected wear scar diameter (wsd 1,4) @ 60 °C, max	µm (microns)	460
16	Copper strip corrosion for 3 hrs @ 50 °C, max	rating	class-1

*Note :*

1. These density and 95 per cent distillation recovery temperature limits shall be company pool average values. However, all samples shall meet the density @ 15°C limit of 820-860 kg/m<sup>3</sup> and 95 per cent minimum distillation recovery at 370°C.
2. For diesel processed from Assam crude, relaxation of CN & CI by 3 units and density shall be applicable as provided in the present BIS specification.
3. Test methods and other provisions / details along with the requirements as given above shall be issued by Bureau of Indian Standards.
4. These standards specifications have been finalised by the Expert Committee after discussions with the automobile and oil industry.

Table 11

## Proposed specifications for CNG as auto-fuel in India

Constituent	Value	Tolerance
Wobbe Number	1350	+/- 20
Water, lbs/million ft <sup>3</sup>	0.5	Maximum
Hydrogen Sulphide, grains/100 ft <sup>3</sup>	0.1	Maximum
Other Soluble Sulphide, grains/100 ft <sup>3</sup>	0.1	Maximum
Carbon Dioxide, vol. %	3.0	Maximum
Oxygen, vol. %	1.0	Maximum
<b>Hydrocarbons (% of Total Organic Carbon Present)</b>		
Methane	80	Minimum
Ethane	10	Maximum
C <sub>3</sub> and Higher HC	5.0	Maximum
C <sub>4</sub> and Higher HC	1.0	Maximum
Total Unsaturated HC	1.0	Maximum
<b>Other Species (mole %)</b>		
Hydrogen	0.1	Maximum
Carbon Monoxide	0.1	Maximum
<b>Other Requirements</b>		
Free from liquids over the entire range of temperatures and pressures encountered in the engine and fuel system.		
Free from solid particulate matter.		



Table 12

## BIS specifications for automotive LPG (IS 14861-2000)

S. No.	Characteristics	Requirement
i)	Vapour pressure (gauge) @ 40°C, kPa Min. Max.	520* 1050
ii)	C <sub>5</sub> Hydrocarbons and heavier, mol-%, Max.	2.0
iii)	Dienes (as 1,3 Butadiene), mol-%, Max.	0.5
iv)	Total volatile sulphur (after stanching) ppm, Max.	150
v)	Copper strip corrosion @ 40°C for 1 hour, Max.	Class 1
vi)	Hydrogen sulphide	Pass the test
vii)	Evaporation residue, mg/kg, Max.	100
viii)	Free water content	Nil**
ix)	Motor octane number (MON), Min.	88
x)	Odour	Unpleasant and Distinctive down to 20% Lower Explosive Limit (LEL)***

\* In winter, the gauge vapour pressure requirement shall be minimum 700 kPa at 40°C. Winter period shall be from 1<sup>st</sup> November to 15<sup>th</sup> February.  
\*\* The water content shall be determined at the Refinery/First Dispatching Location.  
\*\*\* Product shall contain 20 ppm, min. ethyl mercaptan at the first dispatching location to ensure the detection of leakage by odour.