

*Regional Workshop:
Fuel Quality and Alternative Fuels*

**Improving Fuel Quality
in CHINA**

**Pollution Control Department
State Environmental Protection
Administration of CHINA (SEPA)**

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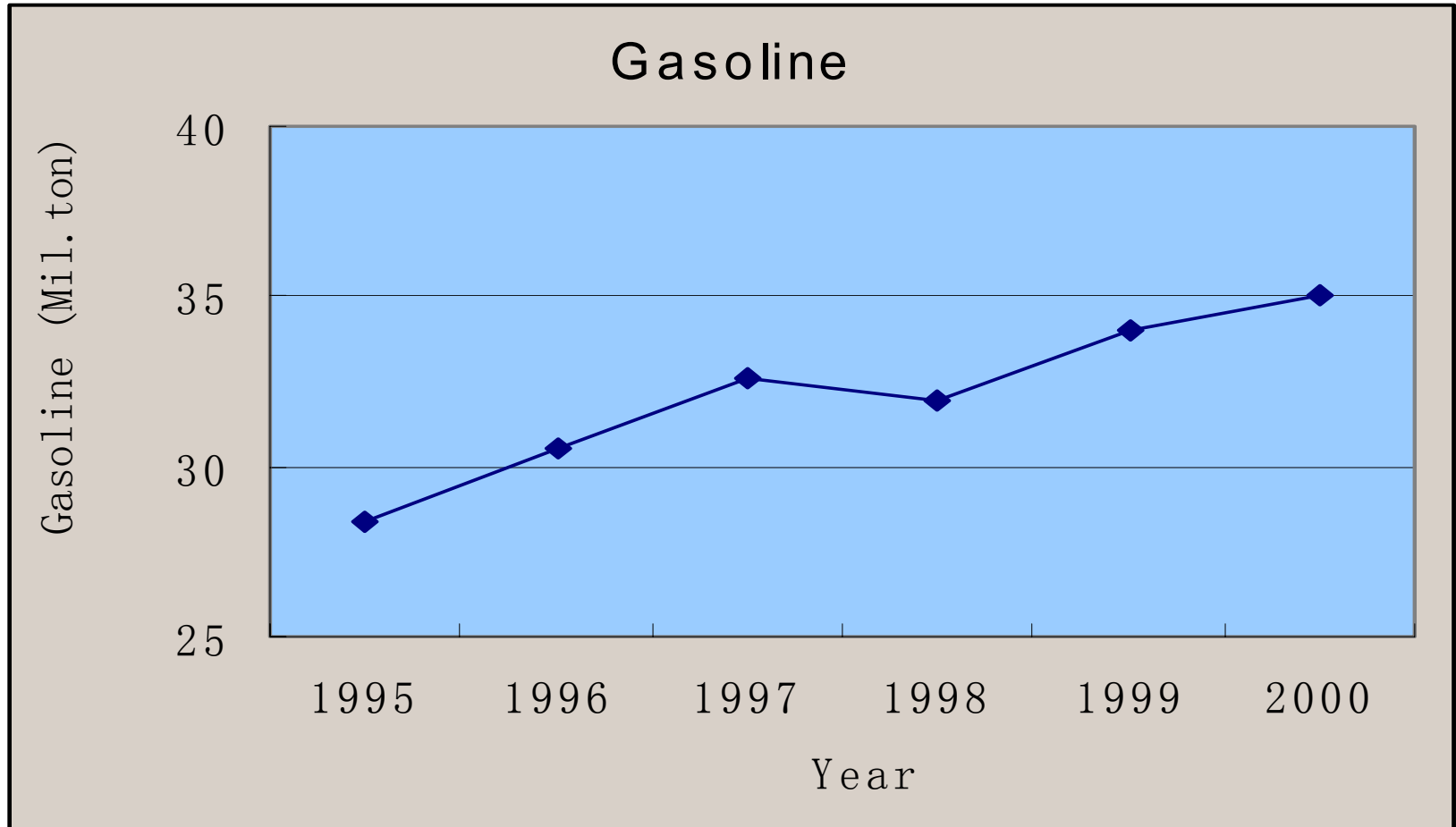
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General Information of China

- The third largest country
 - Area: 9.6 Million km²
- The largest population in the world
 - 1,295 million (2000)
- Total 669 cities, 400 million of population in urban area.

Overview of Fuel Production and Quality



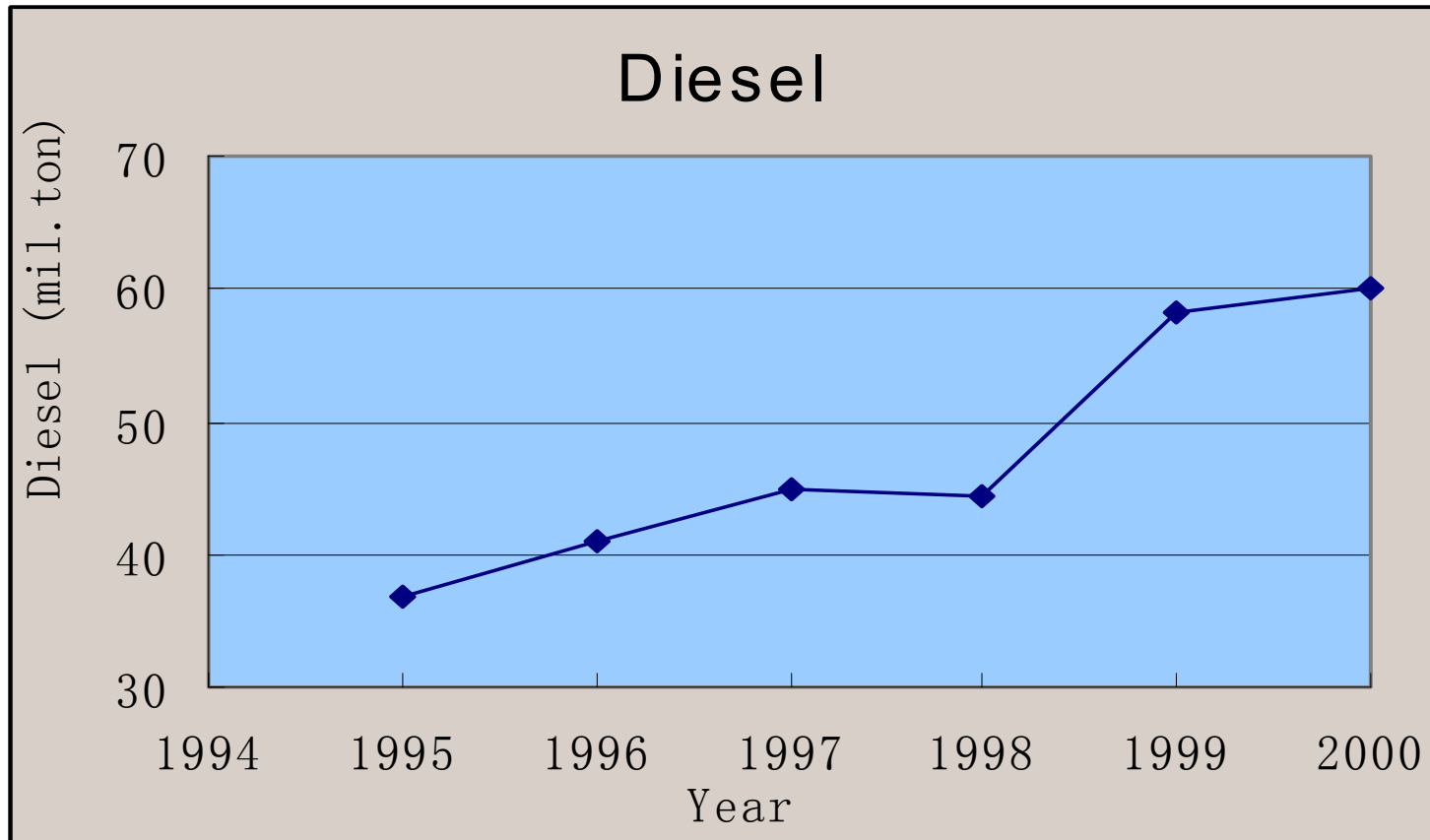
Overview of Fuel Production and Quality

Tab.1 Specifications for Gasoline

ITEM	LIMITS	
	GB 484-1993	GB 17930-1999 ¹⁾
Code of Standards		
Lead (g/L, max.)	0.35, (0.45)	0.005
Sulphur (% Mass, max.)	0.15	0.08
Manganese (g/L, max.)		0.018
Phosphorus (g/L, max.)		0.0013
RON, Min.	90, 93, 97	90
(RON+MON)/2, Min.	85, 89, 92	85
Aromatics HC (vol. %, max.)		40
Olefins (vol. %, max)		35
Benzene (vol.%, max)		2.5
Vapour pressure		
Winter (Sep. – Feb.), kPa max.	88	88
Summer (Mar. – Aug.), kPa max.	74	74
Oxygen (wt. %, max.)		2.7

Note: 1) Implemented from Jan. 1, 2000

Overview of Fuel Production and Quality



Overview of Fuel Production and Quality

Tab. 2 Specifications for Light Diesel in China

ITEM	LIMITS ¹⁾	
Code of Standard	GB 252-94	GB 252-2000 ²⁾
Cetane Number, min	45 (40)	45
Sulfur, %(m/m), max	0.2 (0.5, 1.0)	0.2
Flash point PM, °C, min	65 (45)	55 (45)
Ash, wt%, max	0.01 (0.02)	0.01 (0.02)
Acidity, mg/KOH/100ml, max	5 (10)	5 (10)
Oxidation stability, mg/100ml, max.	2.0	2.5
Density@20°C, kg/m ³	—	—
CCR 10%, wt %, max	0.3	0.3
Note: 1) Limits in () are for basic qualified diesel; 2) GB 252-2000 will be effect from Jan. 1, 2002.		

Motor Vehicle Increase Rapidly

- Automobile
 - **China: about 15 million, annual increase 11-13%;**
 - **In metropolitan cities: annual increase 15-20%.**
- Motorcycle
 - **The biggest annual output in the world recent years;**
 - **Total population is 50 million more, annual increase by 30-35%.**
- Other motor vehicles
 - **Agricultural vehicles, tractors and engineering machinery etc.**

Motor Vehicle Pollution in Urban Area

- **Motor vehicle emission contribute nearly 50% of NOx emissions in metropolitan cities, 1/3 of statistical city's ambient NOx concentration exceeded NAAQS;**
- **CO concentration higher than national standard in traffic areas;**
- **Potential photochemical pollution in big cities;**
- **Vehicle emission is becoming a main source of air pollution in urban areas.**

Control Measures on Motor Vehicle Pollution

Tab. 3 Strict emission standards for new vehicle

Time Category	Before 2000	2000	2001	2002	2003	2004	2005
PC	ECE 1503	EURO I	←	←	←	EURO II	←
LDV&LDT	ECE 1503	←	EURO I	←	←	←	EURO II
HDDV	None	←	EURO I	←	←	EURO II	←
Motorcycle	ECE R 40	←	EURO I	←	←	←	EURO II

Policy on Improving Fuel Quality

- <Law of the People's Republic of China on the Prevention and Control of Air Pollution> (<Air Law>)
 - In 1995, the amended <Air Law> regulated “Phasing out leaded gasoline used on vehicle”;
 - In 2000, the new revised <Air Law>:
 - Production of premium fuel, and reducing the hazardous materials in the fuel shall be encouraged and supported.

Policy on Improving Fuel Quality

- The <Technical Policy on Prevention and Control of Motor Vehicle Pollution> sets the relevant policies on fuels.
 - The develop of presumed unleaded gasoline and low sulfur diesel shall be promoted;
 - The quality of fuels must meet the national standards;
 - The standard of fuel quality should be improved properly while the vehicle emission standard to be stringent.

Improving of Gasoline Quality

- Phasing out leaded gasoline
 - The urban 8 districts in Beijing was the first area to ban using leaded gasoline in China, which started from July 1st. of 1997.
 - Following that , many big cities, such as Shanghai, Guangzhou, Tianjin, etc. started this work one by one.

Improving of Gasoline Quality

- In September of 1998, the State Council release a circular, two steps will be taken to phase out leaded gasoline in the whole country.
 - **First step, major cities from July 1st of 1999;**
 - **Second step, national wide, one year later; but from Jan. 1, 2000 all refinery plants in China have to produce unleaded gasoline.**
- By now, more than 99% of gasoline in the whole country is qualified on the lead content.
- About 95% is up grade to 90 (RON) or above.

Improving of Gasoline Quality

- Phasing out the use of lead in gasoline created the good condition to implement new emission standard and adopt the techniques of EFI+3-way catalytic converter. Improve the components in gasoline, reduce the toxic emission
- <Hazardous Materials Control Standard for Motor Vehicle Gasoline> issued by SEPA in June of 1999;

Improving of Gasoline Quality

- Limits of lead, benzene, sulfur, olefin, aromatic, manganese, etc. 9 hazardous materials;
- The effective detergent added in the gasoline also required;
- The standard take effect since Jan. 1, 2000;
- Requirement for olefin is implemented first in 3 big cities (Beijing, Shanghai, Guangzhou), whole country will be effected in the year 2003.

Improving of Gasoline Quality

Tab. 4 Hazardous materials control limit for gasoline

Item	Limit
Benzene (vol.%, max)	2.5
Olefins (vol. %, max)	35
Aromatics HC (vol. %, max.)	40
Manganese (g/L, max.)	0.018
Iron, Copper	Non-detectable
Lead (g/L, max.)	0.013
Sulphur (% Mass, max.)	0.08
Phosphorus (g/L, max.)	0.0013

Improving of Gasoline Quality

- **The Gasoline quality need to be improved**
 - High olefin (40~50%), interferes the normal work of EFI & catalytic convertor;
 - High sulfur, deteriorate the efficiency and durability;
 - Other fuel quality problem (Octane number, metal additives, impurity, etc.)

Improving of Diesel Quality

- **Light Diesel**

- 1/3 of light diesel used on automobile in China
- The left used on agricultural vehicle, tractor, ship marine, railway train, mining, construction machinery, power generation or other civil machinery etc.
- The implement of new standard (GB 252-2000) will improve light diesel quality especially on cetane number, sulfur content and oxidation stability etc., but for automobile it is still poor.

Improving of Diesel Quality

- **Diesel problem for automobile**

- By now, no specific light diesel is for automobile use, the diesel is all same quality to use on automobile and other machinery.
- High sulfur (1000—2000ppm) , cause the high emission of particulate, also lower the efficiency and durability of the emission control devices.
- Low cetane number (40-45), and other quality problem.

Improving of Diesel Quality

- **High quality diesel for automobile to be produced**

Tab. 5 Proposed Automobile Diesel Specifications

ITEM	LIMITS
Cetane Number, min	49
Sulfur, %(m/m), max	0.05
Oxidation stability, total insoluble matter, mg/100ml, max.	2.5
Density@20°C, kg/m ³	816.5~856.6