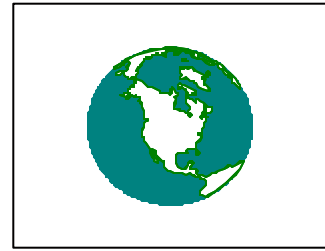


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CAR LINES

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Best Wishes To All For A Safe and Happy Holidays and A Healthy New Year

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1. European Summer Smog Levels Exceeded Critical Threshold On Two Days In Three

Concentrations of potentially harmful ground-level ozone pollution, the main component of summer smog, exceeded a critical threshold somewhere in Europe on two out of every three days this spring and summer, according to preliminary information compiled by the European Environment Agency. The report was submitted to EU environment ministers for their meeting on 29 October.

Ozone can cause serious health problems in humans and damage to ecosystems, agricultural crops and materials. It forms when certain air pollutants emitted by industry and transport react with sunlight. Smog levels tend to be highest during warm, sunny weather, and are generally higher in southern Europe than in the north.

A European Union directive on air pollution by ozone requires governments to inform the public whenever monitoring stations detect ozone concentrations above a critical threshold, set at 180 micrograms of ozone per cubic meter of air averaged over one hour.

A preliminary evaluation of the April-August 2001 period conducted for the European Commission shows that the public information threshold was exceeded in 11 of the 15 EU Member States and in five out of 10 other European countries that supplied data at the EEA's request. An exceedance occurred in at least one of these 25 countries on 101 of the 153 days covered.

Reflecting more frequent warm and sunny weather in summer 2001, ozone concentrations were slightly higher this year than last. An in-depth analysis of data since 1994, however, shows a mixed trend of falling peak levels but rising average concentrations.

These findings suggest, on the one hand, that reductions since 1990 in emissions of the pollutants that lead to ozone formation – principally, oxides of nitrogen (NO_x), volatile organic compounds (VOCs) and carbon monoxide – are feeding through into lower peak concentrations and so reducing the European population's short-term exposure to ozone.

On the other hand, the increasing average concentrations of ozone, for which no unambiguous explanation exists, are increasing the public's long-term exposure to the pollutant.

The average maximum ozone concentration during exceedances of the public information threshold this year was 200 µg/m³. Exceedances lasted on average between 1.2 hours in April and 3.0 hours in June and August.

Italy recorded the highest number of days with exceedances, 80, followed by France (58) and Spain (48). Of those countries reporting exceedances, Poland had the fewest exceedance days, with two. However, these numbers do not necessarily give a fair comparison because of wide variations in the extent of different countries' ozone monitoring networks. Belgium and France both had the highest proportion of stations reporting exceedances - 73%.

The countries that recorded no exceedances of the public information threshold this year were Bulgaria, Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Norway and Sweden. For Ireland and Finland, 2001 marks the fourth consecutive year without exceedances.

Governments are also required under the EU directive to issue public warnings if ozone concentrations exceed 360 $\mu\text{g}/\text{m}^3$, averaged over one hour. During the summer period this level was reached, but not exceeded, at one monitoring station in Spain. However, the warning threshold was exceeded in March during an ozone "episode" near the southern French port of Marseilles.

Agreement was reached among the EU institutions this week, pending final approval by the European Parliament, on a new ozone directive that will include, among other things, the introduction of an "alert" threshold at 240 $\mu\text{g}/\text{m}^3$. When ozone concentrations exceed this threshold, governments will have to set in train action plans aimed at achieving an immediate reduction of ozone pollution where feasible.

Of the exceedances of the public information threshold recorded this year, around five per cent also exceeded the future alert threshold.

2. EU Adopts Plans To Boost Biofuels

The European Commission has unveiled plans for fostering biofuel production in Europe in a bid to ensure they account for two percent of all fuels by 2005 and reaching 5.75 percent of all fuels sold by 2010. Biofuels are combustible fuels that can be used pure or blended with conventional fuels and are obtained by processing plant oils, sugar beet, cereals and organic waste materials.

The Commission said it had adopted an action plan that aimed at a target of 20 percent inclusion of biofuels by 2020. European Union Transport Commissioner Loyola de Palacio said the plans would reduce the transport market's dependence on oil-based fuels.

"This coherent action plan for an alternative fuel strategy for transport will tackle this over dependence, which is a significant source of environmental and supply concerns for the European Union," she said in a statement.

EU Tax Commissioner Frits Blkestein said a second proposal adopted by the

Commission that offers member states the choice of reducing tax rates on pure or blended biofuels used as heating or motor fuel would act as "an important incentive for economic operators to turn towards products which promote sustainable development".

The Commission says biofuels cost an extra 300 euros per 1000 liters, based on current oil price levels of 30 euros a barrel and the tax incentives are an attempt to bridge this gap. The promotion of biofuel production will also impact the EU's farming sector, Farm Commissioner Franz Fischler said. He said it could "offer new sources of income" and "become a concrete demonstration of a sustainable, multifunctional agriculture."

The biofuels currently used in the EU include biodiesel that is made from plant oils such as soybean, sunflower and rapeseed, while fermented sugar beets and cereals are used to make bio-ethanol.

3. German Parliament Ups Subsidies For Green Energy

Germany's parliament has agreed to increase subsidies next year for four kinds of renewable energy, overruling Economics Minister Werner Mueller who had wanted to cut financial support for the sector. The parliamentary budget committee decided to raise subsidies for solar, thermal, biogas and geothermal energy to 400 million marks from 300 million in 2001. Mueller, who is politically independent, had proposed to cut this budget by 100 million marks.

The minister had also wanted to cut the government's research budget into renewable energy by 65 million marks to 235 million marks from 300 million but the committee decided to cut the budget by less to 274 million marks. Even there it might end up being higher than the 274 million figure because another six million marks could still become available from the science ministry.

4. Clean Diesel Spreading In Europe

Belgium has become the latest European country moving to ultra low sulphur diesel (50 PPM). It expects to complete the shift before the end of this month, with Luxembourg expected to follow a few days later. Germany, one of Europe's biggest diesel markets, moved over to ULSD on November 1, joining the UK, Netherlands, Sweden, Finland and Denmark, well ahead of a mandatory European Union shift to ULSD (and ultra low sulphur petrol) in 2005.

The European market for diesel and petrol, centered around the Rotterdam hub, is being transformed, with increasing volumes of ULSD and ULSP being traded on both barge and cargo markets.

Governments rushing to make the environmentally friendly switch have raised taxes on higher sulphur fuels by an amount intended to cover the additional costs of manufacturing them.

In order to make ULSD cheaper, Belgium and Luxembourg are raising excise duties on regular 350-ppm diesel, although for petrol the tax shift will only apply to the high octane 98 RON, rather than the popular 95 RON, or premium unleaded, grade. The Belgian government has raised the tax on 350-ppm diesel by 60 centimes to 12.30 Belgian francs per liter, as from November 9, while the 50-ppm tax stays on 11.70. As a result, it's expected that by around November 25, terminals and depots supplying petrol stations in Belgium will have completely switched (to ULSD)."

Luxembourg was also due to agree to a duty hike on regular diesel; the switch to ULSD in Luxembourg would likely take effect from early December.

In Germany, the switch to clean fuels had been signaled by an additional three pfennigs per liter tax on higher sulphur diesel and petrol.

5. Lithuanian Mazeikiu Approves Pollution Measures

Lithuanian oil concern Mazeikiu Nafta has announced that it is starting a series of pollution control measures to reduce emissions to meet European Union standards. The company said in a statement it was earmarking 104 million litas (\$26 million) for air pollution projects through 2003 and has completed two projects already.

The company said it had already installed a floating pontoon cover aimed at reducing evaporation losses and replaced a sulfur reduction catalyst in the refinery to bring sulfur emissions levels to a minimum.

"Mazeikiu Nafta plans additional measures to reduce air pollution as we increase the volumes of crude oil refined by the company and improve diesel fuel and gasoline quality in compliance with new EU requirements," it added.

EU-aspirant Lithuania seeks to complete negotiations with the 15-member bloc next year and to join the union in 2004.

6. EU Parliament Tightens Near Zero Sulfur in Fuel Requirements; Council Adjusts Common Position

The European Parliament meeting in Brussels on Wednesday, November 29th voted in the first reading on amendments that would introduce tougher provisions than those proposed by the European Commission for introducing sub 10-ppm sulfur fuels.

The key amendments adopted include:

- Member states are required to make <10 ppm gasoline and diesel fuels available for on and off road applications from 2005.

- The ban on the sale in member states of sulfur containing fuels (>10 PPM) is brought forward from 2011 to 2008 for both on and off road applications.
- The review clause inserted in the original Commission proposal to confirm the ban on the sale of > 10-ppm diesel fuel is removed.
- The current derogation allowing high sulfur fuels < 50 ppm until 2007 is eliminated as of 2005.

The Council of Environment Ministers then met on 19 December and agreed to ban sulphur in petrol completely from January 1, 2009 and to require all member states to introduce sulphur-free petrol and diesel from January 1, 2005.

It is also planned to make sulphur-free diesel mandatory across the EU from 2009, but this is to be decided after a review by the European Commission, which is to be completed by December 2005 at the latest.

The Council position, however, only applies to on road fuels.

The oil industry said earlier this year that the cost of upgrading refineries would be over 10 billion euros over 15 years.

But the EU argues consumers will profit from the move, which will allow modern cars to burn less fuel as well as help reduce greenhouse gases thought to cause global warming.

"This will significantly reduce emissions of carbon dioxide - the most important greenhouse gas. In addition, these fuels will...improve the air quality for people throughout the European Union," European Environment Commissioner Margot Wallstrom said in a statement.

The Commission has said the cleaner fuel would speed up the introduction of new fuel-efficient technologies and allow car makers to go further in a voluntary commitment they made in 1999 to reduce carbon dioxide emissions from new cars.

7. UK Greenhouse Gas Emissions, Acid Rain Down

Britain's emissions of greenhouse gases have fallen by 14 percent since 1990, according to the latest government report. British lakes and rivers are also on the road to recovery from acid rain poisoning, following successful curbs to air pollution from cars and heavy industry.

The report by the National Atmospheric Emissions Inventory (NAEI) attributed the drop in greenhouse gas emissions to several factors including the introduction of catalytic converters on cars, a move towards low sulphur and lead-free petrol and a switch to gas from coal and oil in power generation.

Environment Minister Michael Meacher said the downward trend was welcome,

but warned of complacency. "Even though these figures are encouraging, we must not be complacent. There are still significant problems where we need to do more, for example, to further reduce greenhouse gases and harmful pollutants such as ammonia and particulate matter," he said in a statement.

The government has a target to cut greenhouse gases by 23 percent by 2010 on 1990 levels. This is almost double the target of 12.5 percent to which the UK is committed under the Kyoto Protocol and there are signs emissions are rising as generators return to using coal-fired power stations in the face of rising natural gas prices.

The Department of Environment Food and Rural Affairs (DEFRA) said substantial curbs on sulphur dioxide emissions across the UK and Europe had cut acid rain by half over the last 12 years. "Damaged freshwater lakes and streams are showing signs of recovery," it said.

But DEFRA warned of a new threat: "Nitrogen oxides and ammonia are the main air pollutants that must be tackled to stop future damage."

DEFRA's warning is based on a study commissioned in 1998 from the National Expert Group on Transboundary Air Pollution (NEG-TAP) to look at changes to air quality over the last 12 years, and just recently published.

The bulk of Britain's ammonia emissions come from farm animal manure, causing over-enrichment of land and waterways, said the report. Certain species rampage unchecked through this ultra-fertile environment, smothering the slower growing plants beneath them and choking streams and rivers. Nitrogen oxides enter the atmosphere from car exhausts and industry, creating health-damaging ozone and contributing to acid rain.

"High levels of ozone, often associated with episodes of poor air quality, have declined by 30 percent since 1986," said DEFRA. "But, at the same time, average levels of ozone look set to rise in the future, largely as a result of increasing air pollution in the rest of the world," it added, warning of damage to crops and forestry.

8. Conciliation Reached On Ozone Directive

The conciliation negotiations between the European Parliament and the Council resulted in an agreement, on November 22nd, for a new directive on air-quality standards with respect of ground-level ozone. According to that agreement, the maximum number of days, on which ozone levels may be allowed to exceed the World Health Organization's recommended guide value of 120 micrograms/m³, has been set at 25, with 2010 as the final date for implementation.

There is however a loophole, derogation being allowed where that is "not achievable through proportionate measures."

The compromise text represents a relaxation from the Parliament's original aim of no more than 20 days, and making limit values binding with no exception.

The Parliament had also called for the inclusion of a definite date (2020) for attainment of the long-term aim of eliminating all exceedances of the guide value recommended by the WHO. The Council first rejected this demand, but as a result of the compromise that deadline has now been included, although still with the same loophole.

The agreement reached includes "information" and "alert" thresholds requiring responses from local authorities when levels rise.

The so-called information threshold requires local authorities to provide up to date information on ozone concentration to the public any time concentrations exceed 180 micrograms/m³ in an hour.

The alert threshold requires local authorities to inform the public and, if appropriate, take short term measures to control, reduce or suspend certain activities that contribute to higher emission levels any time smog levels exceed 240 micrograms/m³ in an hour.

9. Swedish Cities Expand Requirements For Environmental Zones To Include NOx

Sweden's major cities have required older heavy-duty vehicles to be fitted with aftertreatment controls to reduce both hydrocarbons and particulate matter for several years. As of January 1, 2002, the requirements will be modified to require the addition of NOx controls.

The basic requirement for entering the **Environmental Zone** is that all Heavy Duty Vehicles equipped with a diesel engine must not be more than 8 years old. The age of the vehicle is calculated from the first date of registration.

All the regulations are applicable from January 1, 2002 until further notice. Application for exemption from this regulation should be submitted to each of the Municipalities where the vehicle is to be used. From December 31, 2001 all previous regulations will no longer be valid.

a. Approved Exhaust Emission Aftertreatment Device

Aftertreatment devices, such as catalytic converters, particle filters and equipment for reduction of NO_x may not, when installed on a vehicle, conflict with the type approval of the vehicle/engine, EU-directives or other ordinances (laws). The manufacturer of the equipment shall, by a separate statement, verify that the installation of the equipment and the equipment itself fulfils relevant EU-directives or, that concerned authority grants an exemption.

Furthermore, the aftertreatment device should be tested and approved in accordance with the Guidelines issued by the Municipalities. Verification of the proper installation and that the device has been tested and approved is carried out by the Swedish Motor Vehicle Inspection Company (Svensk Bilprovning) in the form of a written statement.

Vehicles more than 8 years equipped with approved aftertreatment device in the form of a catalytic converter and a particle filter fulfilling the requirements for “Level B”, and equipment for reduction of NO_x “Level C”, may apply for a permission to enter the Zone.

Requirements for reduction of emissions (valid from January 1, 2002):

Emissions	Level B	Level C
Particulates	-80 %	-
Hydrocarbons	-80 %	-
Oxides of Nitrogen	No increase	-35 %
Noise	No increase	

Level B = Aftertreatment device: Particle filter and catalytic converter

Level C = Equipment for reduction of NO_x

b. Basic Requirements

From January 1, 2002, Heavy Duty Vehicles (trucks and buses) powered by a diesel engine and with a gross vehicle weight of more than 3.5 metric tons, and registered for the first time more than 8 years ago are not allowed to enter the Zone.

i. Identification of Vehicles

To enter the Zone the age of the vehicle must be verified. The age of the vehicle may be identified with a **sticker** confirmed and provided by the Municipality (may later on also be provided by the Swedish Road Administration). The sticker should be easily readable and attached to the windscreen. The following information is found on the sticker:

- Expiry of the admittance to enter the Zone
- Year for first registration of the vehicle regardless country (applicable only for labels provided by the Swedish Road Administration)
- The registration number of the vehicle

ii. *Fee for the sticker in case of vehicles not more than 8 years old*

The sticker is provided free of charge (for this group of vehicles) after application to the Municipality where the vehicle is to be used.

From the Basic Requirements exemptions may be accepted in accordance with the following:

c. Exemptions

Application for a label/permission shall be asked for from the Municipality where the vehicle is to be used.

iii. *Vehicles with Extra Low Emissions*

Vehicles with the potential to be certified according to Euro IV or better, before the date when the requirements are put into force, may after special application be granted exemptions from the regulation applicable in the Zone. The application must in every single case be supported by a technical report showing test results, test methods, test cycles etc. The tests must be carried out at a laboratory appointed as the "Technical Service". When exemptions are granted no fee is applicable.

Example: The vehicle is put on the market 2002 but the vehicle has the potential to be certified according to Euro IV. If an application for exemption is made during 2002, the first year of registration will be considered as 2005, when the regulation will be mandatory. In reality the vehicle owner will gain 3 years of usage in the Zone.

iv. *Vehicles Equipped with Approved Aftertreatment Device*

Vehicles Registered 1992 or earlier.

Vehicles registered for the first time 1992 or earlier may enter the Zone for 4 more years if the vehicle is equipped with approved aftertreatment device, fulfilling "Level B" according to the (left) table below

When the vehicle, in addition, is fitted with approved equipment for reduction of NO_x, fulfilling "Level C" the vehicle may enter the Zone for 2 more years according to the (right) table below

Model year/ Year of registration	Level B
1989	2001
1990	2002
1991	2003
1992	2004

Model year/ Year of registration	Level B+C
1989	2003
1990	2004
1991	2005
1992	2006

Vehicles Registered 1993 or later.

Vehicles with the first year of registration 1993 or later and older than 8 years, may enter the Zone for 4 or 6 more years, if the vehicle is equipped with approved aftertreatment device, fulfilling “Level B” and in addition is fitted with approved equipment for reduction of NO_x, fulfilling “Level C” according to the tables below.

Alternative 1:

If the vehicle is equipped **only** with an aftertreatment device meeting level B, the vehicle may enter the Zone for 4 more years. The maximum permissible time in the zone cannot later on be prolonged by the introduction of NO_x reduction equipment (see left table below)

Model year/ Year of registration	Level B
1993	2005
2002	2014

Model year/ Year of registration	Level B+C
1993	2007
2002	2016

Alternative 2:

If the vehicle **simultaneously** is equipped with an aftertreatment device meeting level B and in addition equipment for reduction of NO_x meeting level C the vehicle may enter the Zone for 6 more years (see right table above)

v. *Vehicles with “Special Body” and Approved Aftertreatment Device*

Vehicles with special body older than 8 years, may enter the Zone for 7 more years, if the vehicle is equipped with approved aftertreatment device, fulfilling “Level B” according to the (left) table below

When such a vehicle, in addition, is fitted with approved equipment for reduction of NO_x, fulfilling “Level C” the vehicle may enter the Zone for 2 more years according to the (right) table below

Model year/ Year of registration	Level B
- 1987	2002
1988	2003
1989	2004
etc.	

Model year/ B+C Year of registration	Level
- 1987	2004
1988	2005
1989	2006
etc.	

vi. *Change of Engine*

The engine exchanged not later than December 31, 1998

An older vehicle in which a new engine is fitted not later than December 31, 1998 may enter the Zone for a maximum of 6 years from the date of the manufacture of the engine, provided that the fitted engine is approved and certified meeting at least the requirements for environmental class 3, model year 1993 (the mandatory requirements at that time). Please observe that it is only the manufacturer of the engine that can verify the year of manufacture of the engine. If the vehicle in addition is equipped with approved aftertreatment device, the vehicle may enter the Zone for 4 or 6 more years according to the tables below.

Year of manufacture Level B of the engine	
1993	2003
1994	2004
1995	2005
1996	2006
1997	2007

Year of manufacture Level B+C of the engine	
1993	2005
1994	2006
1995	2007
1996	2008
1997	2009

The engine exchanged not later than December 31, 2001

If a vehicle is fitted with a new environmental classified engine meeting **at least MK 2-96 and** the vehicle also fulfills the **EU-Directive 92/97/EEC** (noise, 80 dB (A) requirement), the vehicle may enter the Zone for a maximum of 8 years calculated from the year of manufacture of the engine. If the vehicle, in addition, is equipped with approved aftertreatment device, the vehicle may enter the Zone for additional years in accordance with paragraph 2 above.

The engine exchanged after January 1, 2002

Vehicles fitted with new certified (approved) engine may enter the Zone for a maximum of 6 years calculated from the date of manufacture of the engine provided:

The new engine could be related (approved) to the most severe Swedish or European environmental class at the time of exchanging the engine **and** The vehicle fulfills the EU-directive 92/97/EEC (noise, 80 dB (A) requirement)

If the vehicle in addition is equipped with approved aftertreatment device, the vehicle may enter the Zone for additional years in accordance with the paragraph above.

10. Bulgaria Surprises EU, Says Wants To Join in 2004

Bulgaria surprised the European Union by saying it planned to wrap up accession negotiations in 2003 and to join the bloc in the first wave of eastern enlargement. The European Commission had said it does not expect Bulgaria and Romania to qualify in time for the next round of EU enlargement, likely to take place in 2004 and to include up to 10 other candidate countries.

"Bulgaria aims to close negotiations by 2003 and to take part in the European Parliament elections in 2004," Bulgarian Foreign Minister Solomon Passy announced after regular accession talks in Brussels. "2003 is not a political statement or wishful thinking but a realistic formula," said Passy, who serves in the government of Prime Minister Simeon Saxe-Coburg, Bulgaria's former king.

Bulgaria, which along with Romania is the poorest of the 12 applicant countries negotiating membership, had previously said it hoped to join the EU in 2006. Passy did not say why the target date had changed, but said he had taken heart from recent comments by French Foreign Minister Hubert Vedrine suggesting that Bulgaria and Romania should not be excluded from the next wave of enlargement.

Passy denied that the others would have to wait for his country. "I don't think there will be any delay for enlargement," he said. "We believe firmly in the principle of catch-up and the evaluation of each country according to its merits," he said.

The Commission says any candidate is free to move ahead more quickly if it is able.

Ten candidates - Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta - hope to wrap up accession talks by the end of 2002 and to join in time for the 2004 European Parliament elections.

Bulgaria has so far closed negotiations in 13 "chapters" or policy areas out of a total of 31, fewer than any candidate except Romania which has just nine. Frontrunners Hungary and Cyprus have closed 23 apiece and Poland 19. In the just completed negotiating session, Slovakia closed negotiations in the difficult area of environmental protection, bringing its tally to 21. Slovak Foreign Minister Eduard Kukan said the EU had granted his country long grace periods for bringing its environmental standards into line with the strict rules of the Western bloc.

"Our environment was neglected for a very long time under the old (communist) regime," Kukan told reporters, adding that Slovakia would need some three

billion dollars to upgrade its environment to EU standards.

NORTH AMERICA

11. US EPA Releases Non Road Staff Paper

In 1998, EPA adopted more stringent emissions standards for nonroad diesel engines. In that rulemaking, EPA indicated that in 2001 it would review the upcoming Tier 3 portion of those standards (and the Tier 2 emission standards for engines under 50 horsepower) to assess whether or not the new standards were technologically feasible.

The emission standards for Tier 3, in grams per horsepower-hour (g/hp-hr), are shown in the Table below.

Nonroad Tier 3 Emission Standards (g/hp-hr)

Engine Power	Model Year	NMHC+ NOx	Carbon Monoxide (CO)	PM *
50#hp<100	2008	3.5	3.7	0.30
100#hp<175	2007	3.0	3.7	0.22
175#hp<300	2006	3.0	2.6	0.15
300#hp<600	2006	3.0	2.6	0.15
600#hp<750	2006	3.0	2.6	0.15

- Tier 2 standards carry over into Tier 3

When it set the Tier 3 emission standards in 1998, available information indicated to EPA that the cooled exhaust gas recirculation (EGR) technology developed for highway diesel engines would be the primary means of compliance with these standards. In conducting its technology review, EPA has surveyed the recent engineering and scientific literature on advances in diesel emissions control. It has also reviewed information provided by engine manufacturers in support of its 2004 highway standards program, showing the considerable progress they have made in the design of robust EGR systems for use in highway engines. In addition, EPA gathered information from engine manufacturers on their design plans for Tier 3 and their testing and development experience with control technologies they are likely to employ. This information shows that cooled EGR is but one of several technologies available to diesel engine manufacturers to meet the Tier 3 emission standards. This widening of technology options comes from the progress of technology development since 1998. In addition, as EPA acknowledged in the 1998 final rule, EPA envisioned a Tier 3 program more closely aligned with future highway standards, in particular, achieving comparable control of particulate matter (PM) for nonroad engines. Based on the information it has gathered to date, EPA reaffirmed that the Tier 3 standards in

Title 40 of the Code of Federal Regulations (CFR), Part 89, are feasible in the timeframe established in the rule. Based on the information to date, EPA also reaffirmed that the Tier 2 standards for engines under 50 horsepower are likewise feasible. This preliminary assessment is reinforced by certification test data from Tier 1 engines in this power range showing that many of these engines are already meeting the Tier 2 standards.

The 1998 rule did not establish a new Tier 3 program for PM emissions reductions because of critical unresolved issues connected with the appropriate test procedure for characterizing transient operating conditions. Instead, the Agency made a commitment in that rule to establish an effective program for controlling PM emissions beyond the limited control achieved under the Tier 2 standards, and to consider adopting measures to better ensure emissions control in-use. These actions were, at least in part, planned to occur in the context of this technology review. Since the 1998 final rule, growing evidence that diesel engine exhaust emissions can cause serious health problems has reinforced the belief that further action is warranted. EPA has recently issued regulations that will dramatically reduce emissions from *highway* diesel vehicles. As a result, *nonroad* diesel engines, already a major source of harmful particulate matter and ozone-forming compounds, will become a dominant mobile source of these emissions in the future.

The Agency has already taken some steps toward dealing with nonroad diesel PM and in-use emissions concerns (such as developing a transient test cycle to better characterize in-use PM emissions). However, it believes a separate rulemaking is the best approach because it is increasingly clear that the most effective means of further reducing emissions of PM (and oxides of nitrogen (NO_x), if warranted) is through a “systems” approach that regulates nonroad diesel engines and fuel in a single coordinated program, similar to the approach recently taken to controlling highway vehicle emissions. This approach would continue the pattern followed successfully in the past, in which nonroad emissions reduction programs are modeled after highway programs, with some additional lead-time provided for adaptation of highway technologies to nonroad diesel applications. EPA plans to initiate such a rulemaking with a proposal next year.

Additional details from the staff paper are summarized in Appendix A.

12. EPA Issues Report On Boutique Fuels

EPA has prepared its report on the state and local “boutique” fuel programs called for by the President’s National Energy Policy report. The Agency’s report identifies several regulatory changes that can be made in the near term that could help to moderate gasoline price spikes during future transition periods when fuel producers switch from winter to summer grade cleaner-burning gasoline. During the transition period in both 2000 and 2001, gasoline prices

rose sharply, particularly in the Midwest.

In conducting its study of boutique fuels, EPA analyzed the air quality benefits of clean fuels programs and assessed the impact of these fuels on the production and distribution system. EPA's report identifies two major issues related to boutique fuels. The first is the need for greater flexibility in the process by which fuel marketers make the transition from winter to summer grade reformulated gasoline (RFG). The second is the growing number of state and local boutique fuels programs and the challenges that this growth may present to the gasoline distribution system.

The Agency's report to the President specifically outlines the actions that EPA will take in the near-term to provide for a more orderly transition from winter-to-summer grade RFG every spring. In summary, EPA will:

- Propose new regulations to ensure that terminals are able to transition from winter to summer grade fuels more gradually. This approach could help to avoid the temporary fuel shortages that, in the past, have been associated with localized spikes in gasoline prices.
- Allow fuel producers more flexibility in meeting fuel specifications than they currently have for their initial transition to summer fuel.
- Allow certain fuels types to be reclassified as RFG, thus making it easier to address localized issues that arise when there is an unexpected disruption in the distribution system.
- Propose to simplify certain RFG accounting and reporting requirements.

The second issue identified by the Agency is the growing number of state and local governments that have adopted their own fuel programs that are different from the federal RFG program. Despite the number of state and local fuel programs, EPA has found that the current gasoline production and distribution system is able to provide adequate quantities of boutique fuels, as long as there are no disruptions in the supply chain. If there is a disruption, such as a pipeline break or refinery fire, it can be difficult to provide gasoline supplies because of constraints created by these boutique fuel requirements. In addition, fuel providers are concerned that recently enacted state laws that ban the use of MTBE in future years may proliferate the number of boutique fuels and present new challenges to this country's fuel production and distribution system.

EPA staff has prepared a White Paper that explores a number of possible approaches that could reduce the total number of fuels in the longer term. This White Paper lays the groundwork for needed future study into these and other possible approaches.

13. Report Cites Dangerous Air On US - Mexico Border

Pollution from assembly plants on the U.S.-Mexico border, coupled with desert dust, has millions of people on both sides of the Rio Grande breathing particles linked to heart and lung disease, a study soon to be released by U.S. and Mexican environmental agencies shows. The foul air hanging over the bone-dry landscape is an unwanted by-product of Mexico joining the North American Free Trade Agreement (NAFTA) with the United States and Canada, which brought 84 assembly plants to the area since the mid-1990s.

"Today, air pollution presents significant environmental risk in some border communities," according to the air quality report by Mexico's Environment Ministry and the U.S. Environmental Protection Agency (EPA).

"Many border residents are frequently exposed to elevated concentrations of carbon monoxide, sulfur dioxide, ozone and particulate matter," the report said.

The findings raise alarms about potential harm to the ecosystem and human health in the 2,000-mile (3,200 kms) border area - home to more than 4.8 million Mexicans and 5.8 million U.S. citizens. The border population is expected to more than double in the next 20 years.

The study found that virtually every major community from Ciudad Juarez and its U.S. neighbor El Paso, Texas to the Pacific Ocean, has toxins that exceeded air quality standards in at least one of six categories of contaminants: particulate matter - soot mixed with gaseous vapors - sulfur dioxide, carbon monoxide, nitrogen dioxide, lead and ozone. Only San Diego County, Calif., escaped the worst-air list. That state has some of the strictest emissions laws in the United States.

The study is a U.S.-Mexican effort to monitor spiraling pollution fueled by a rising population, industry and traffic since Mexico joined NAFTA in 1994.

Conducted from 1996-2000, the air quality study blames the region's pollution on dust from unpaved streets and industry, vehicle exhaust, power plants and outdated methods of brick making - all exacerbated by the desert topography and climate that encircles most of the border.

In 1997, the Mexican government stopped using lead as an additive in gasoline, and since October 1999 Ciudad Juarez has joined El Paso in distributing oxygenated gasoline in winter. That effort reduces the carbon monoxide levels during the cold months, when weather patterns keep pollutants close to the ground for much of the day.

14. BP Introduces Low Sulfur Gasoline in Washington State

BP Plc, the British oil giant, introduced a lower-sulfur gasoline in Washington State designed to fight air pollution. BP said the newly formulated fuel is expected to reduce vehicles' nitrogen oxide emissions by about 4 percent.

"This is the equivalent of removing 2,100 cars off (interstate highway) I-5 every day," the company said in a news release.

The premium-grade gasoline will initially be sold at 145 ARCO stations in Washington. BP acquired ARCO last year. As BP refineries convert their operations to produce additional lower-sulfur fuel, the company expects to have lower-sulfur gasoline available in all grades.

Current production is focused on serving major cities with air pollution concerns around the United States

The U.S. Environmental Protection Agency has established federal limits aimed at reducing gasoline sulfur levels by 90 percent by 2006, but BP said its new lower-sulfur premium, with a sulfur content of 30 parts per million (ppm), meets the limits four years earlier.

15. US Carbon Dioxide Emissions Up 3.1 Percent in 2000

Carbon dioxide emissions spewed by the United States and its territories jumped 3.1 percent last year, one of the biggest annual increases in a decade, according to a newly released Department of Energy report. Carbon dioxide emissions, which accounts for more than 80 percent to total U.S. greenhouse gas emissions, reached 1,583 million metric tons of carbon equivalent, according to the Energy Department's analytical arm.

The report came out just before officials from more than 160 countries met in Morocco to try to finalize a global warming agreement to cut greenhouse gases that are blamed for trapping heat in the atmosphere. The Bush administration has said the United States, the world's biggest producer of greenhouse gases, will not take part in the accord, because it would hurt U.S. companies and the American economy.

The 3.1 percent growth last year in U.S. carbon dioxide emissions was the second highest annual increase during the 1990-2000 period, and was well above the average annual 1.6 percent growth rate for the period, said the department's Energy Information Administration. Only the 3.4 percent increase in emissions during 1996 was higher.

"The high growth in carbon dioxide emissions can be attributed to a return to more normal weather, decreased hydroelectric power generation that was replaced by fossil-fuel power generation, and strong economic growth," EIA said.

Carbon dioxide emissions from electric power plants were up 4.7 percent last year to 642 million metric tons, almost double the 1990-2000 average annual increase of 2.4 percent.

"Contributing to the relatively large increase in 2000 was a 4.2 percent increase in (fuel oil) use for electricity generation, as well as an 11 percent reduction in electricity generation from renewable fuels, including a 14 percent drop in hydroelectric generation," EIA said.

Total U.S. greenhouse gas emissions increased by 2.5 percent last year to 1,906 million metric tons, well above the 1.3 annual growth rate of the last decade, the agency said.

16. US Isolated As World Moves On Climate Treaty

The first global multilateral talks since the September 11 attacks ended in success with most of the world declaring it would push ahead with a major anti-pollution pact, but the United States will not be joining the party. Eight months after President George W. Bush shocked many U.S. allies by pulling out of the Kyoto global warming treaty, the rest of the world finalized the legal work that should let them bring it into force without the planet's biggest polluter.

Bush's critics abroad saw that as evidence Washington, already planning a strategic missile shield, was turning its back on the concerns of the rest of the world.

The Kyoto pact aims to reduce gas emissions from factories and exhaust pipes that many scientists say are gathering in the atmosphere trapping heat - the so-called greenhouse effect. U.N. scientists predict the result could be an increase in average temperatures by up to six degrees Celsius over the next 100 years, leading to rising sea levels, and an increase in major floods and droughts.

The Marrakesh agreement sealed the legal text to govern how the treaty works and, crucially, is meant to give enough legal certainty for waverers like Russia and Japan to ratify it. It commits the world's industrialized countries to cut their greenhouse gas emissions, particularly carbon dioxide, by an average of five percent of 1990 levels by 2012.

As Russia and Japan indicated that the Marrakesh deal should make their ratification possible, Kyoto could come into force without the United States by late 2002.

The United States insists it will not return to Kyoto. U.S. Under-Secretary of State for Global Affairs Paula Dobriansky said her country was looking for a global solution to climate change, one that would be a "tapestry" of national and regional measures, rather than the single worldwide system provided by Kyoto.

17. War On Terrorism Brings Focus To Oil Alternatives

Even as oil prices tumble, a new outbreak of violence involving Islamic extremists is renewing concerns that the United States is too dependent on Middle East for its energy needs. World oil prices have slumped 40 percent since mid-September, with U.S. benchmark West Texas Intermediate crude touching a new low of \$17.15 per barrel since June 1999. Still, a gnawing unease over instability in the Middle East has revived long-dormant debate over whether America should embrace new energy sources and conservation programs.

The plan to reduce foreign-oil dependence has three main aspects: First, aggressive conservation measures; second, the development of alternative energy sources like wind, solar, bio-fuels and hydrogen; third, drilling of new domestic oil wells, notably in Alaska. But while the Bush administration has made moves in these three areas, critics fault the leadership in Washington for stressing new drilling too much and for failing to grasp that seriously embracing conservation and alternative energy could cut U.S. oil consumption by a third within 15 years.

In the period immediately after the oil shocks of the 1970s, the country began to initiate much tighter controls on energy use. But in the past four years, U.S. reliance on foreign supply has rocketed, rising by 11 percentage points to 60 percent of the 20 million barrels of oil it now guzzles a day after nearly a decade of robust economic growth.

The biggest concern when it comes to foreign oil, say energy and national security experts, has been focused in recent weeks on Saudi Arabia. That country presides over one-fourth of world oil reserves and supplies the United States with nearly 20 percent of its petroleum imports. Another 8 percent of the oil the United States consumes comes from countries like Iraq and Kuwait, bringing U.S. reliance on the region to nearly 30 percent of current needs.

Despite the political concerns, the global economic slowdown helped push down U.S. oil futures prices to near two-year lows this week - hardly a catalyst for Americans to give up oil-intensive lifestyles epitomized by the popularity of gas-guzzling sport utility vehicles. If the possibility of a supply disruption from the Middle East is remote, it is nonetheless most likely to occur, if it ever does, in connection with Iraq. That country, run by Saddam Hussein, exports some 600,000 barrels daily to the United States - or about 6 percent of current U.S. needs.

Critics say that for it's long term policy, the Bush administration has focused mainly on increasing domestic energy drilling and opening up Alaska's Arctic National Wildlife Refuge. But it has not gone far enough to wean the United States off its oil habit.

Major oil firms like Royal Dutch/Shell and BP are starting to develop alternative energy and being careful to create environmentally friendly public images. Shell has pledged to spend between \$500 million and \$1 billion in the next five years to develop new energy businesses, concentrating primarily on solar and wind energy. BP is also making a push toward solar energy, and is now the world's No. 3 photovoltaic maker after two Japanese firms, Sharp Corp. and Kyocera Corp.

The world's No. 1 oil firm, Exxon Mobil Corp., which remains opposed to the 1997 Kyoto protocol that mandates cuts in emissions of carbon gases, is focusing on energy efficiency. The huge oil company is meanwhile skipping on developing renewable energy sources, such as biomass, wind and solar.

Jitters over foreign supply have also spurred moves to increase the nation's Strategic Petroleum Reserve (SPR), created by Congress in the mid-1970s after the Arab oil embargo. The SPR currently holds about 545 million barrels of crude at several sites in Texas and Louisiana ready to provide a 54-day supply in the event of a sudden cutoff in foreign oil imports. The U.S. government now plans fill the reserve to its capacity of 700 million barrels over three years.

18. US Energy Demand To Rise By One-Third by 2020

U.S. energy demand is expected to increase by one-third over the next two decades, as businesses and consumers use more oil and electricity to fuel a growing American economy, according to a government report released this week. Growth in commercial buildings and personal travel, combined with slower increases in fuel efficiency for cars and trucks, is expected to account for the large increase in energy demand by 2020. The Energy Department's statistical arm, the Energy Information Administration, issued its annual report with demand and supply forecasts stretching out to 2020.

Total U.S. demand for all types of energy is projected to jump from 99 quadrillion British thermal units (Btu) in 2000 to 131 quadrillion Btu in 2020. The latter is higher than what the EIA projected for 2020 in its annual report last year.

Domestic crude oil production is projected to decline slightly by 2020 to 5.6 million barrels per day (bpd). As a result, foreign imports are expected to account for 62 percent of U.S. oil supplies by 2020, up from 53 percent in 2000, the EIA said. However, that rise is lower than the 64 percent-share for oil imports by 2020 that EIA forecast in its report last year.

The difference is due to higher expected domestic production from new oil fields in Alaska's National Petroleum Reserve. The National Petroleum Reserve, covering 23 million acres in northwestern Alaska, has been owned by the federal government since the 1920s for military fuel. In 1999, the Interior Department leased some tracts in the reserve to energy companies, which have reported at

least two discoveries. Another lease sale in the reserve is planned for June.

The EIA report also projected world oil demand would increase from the current 76 million bpd to 118.9 million bpd by 2020, due to higher demand in the United States and developing countries in the Pacific Rim, and Central and South America. OPEC oil production is expected to reach 57.5 million bpd in two decades, up from the cartel's 30 million bpd this year. Other highlights of the EIA forecast were:

- Coal remains the primary fuel for U.S. electricity generation, although its share is projected to decline from 52 percent in 2000 to 46 percent by 2020.
- Natural gas demand will increase by 50 percent by 2020, largely due to its popularity as a fuel for U.S. electricity generation.
- Carbon dioxide emissions from U.S. fuel consumption will reach 2,088 million tons by 2020, 54 percent higher than the 1,352 tons in 1990.
- Nuclear generating capacity will decline because of the high cost to maintain aging U.S. nuclear power plants.

U.S. ENERGY FORECASTS (includes EIA's new 2020 forecast and previous one)

	2000 (actual)	2020 (pvs f'cast)	2020 (new f'cast)
DEMAND -----			
World crude (mln bpd)	76.0	117.4	118.9
US nat gas (trillion cu ft)	22.8	32.8	33.8
US coal (mln tons)	1,081	1,297	1,365
US electricity	N.A.	N.A.	N.A.
PRODUCTION -----			
US crude oil (mln bpd)	5.8	5.1	5.6
US nat gas (trillion cu ft)	19.1	29.1	28.5
US coal (mln tons)	1,084	1,331	1,397
US electricity	N.A.	N.A.	N.A.
PRICES -----			
World crude oil (\$/barrel)	27.72	22.92	24.68
US nat gas (\$/mcf wellhead)	3.60	3.20	3.26
US coal (\$/ton mine mouth)	16.45	12.99	12.79
US electricity (cts/Kwh)	6.9	6.1	6.5

(All data from EIA's Annual Energy Outlook 2002 report).

19. EPA Gives Refiner Relief From Low-sulfur Requirement

The Environmental Protection Agency will give a small oil refiner in Pennsylvania

more time to meet stricter government requirements for producing low-sulfur gasoline.

This marks only the third time the agency has provided such regulatory relief.

United Refining Co, based in Warren, Pennsylvania, won the temporary relief by demonstrating it would incur extreme hardships in complying with the new clean-fuel rule at its 65,000 barrel-per-day refining plant.

EPA has established federal limits aimed at reducing gasoline sulfur levels beginning in 2004 and cutting them by 90 percent by 2006.

A refiner applying for hardship relief must demonstrate that it has made its best effort to comply with the requirements of the new regulation.

United Refining is a subsidiary of Red Apple Group Inc. Most of the gasoline produced by United is distributed to its 350 KwikFill gas stations in New York, Pennsylvania and Ohio.

EPA previously granted two similar hardship approvals last May to the National Cooperative Refinery Association and the Wyoming Refining Co.

20. Mexico City's Pollution Linked To Children's Lung Damage

Mexico City's polluted air damages the lungs of otherwise healthy children, who should probably be kept inside when pollution is at its peak, according to a newly released study. Chest X-rays of 241 children living in Mexico's capital showed more than half had an abnormal number of markings in their lung tissue that could be precursors of worse respiratory problems to come. Nearly two-thirds of the children, who were chosen because they enjoyed adequate diets and excellent health care, had excessive inflation of their lungs. Both conditions are associated with high levels of ozone and particulate matter in the air, according to a team of investigators led by Lilian Calderon-Garciduenas of the National Institute of Pediatrics in Mexico City and Lynn Ansley Fordham of the University of North Carolina in Chapel Hill.

By comparison, lung abnormalities were significantly less common among 19 children living in a small coastal town, they said in a report presented to a meeting of the Radiological Society of North America. The scientists said their expectation was that all the children would have normal chest X-rays.

Twenty-five children with the most abnormal X-rays also underwent computerized tomography scans that showed 10 had mild thickening of the walls of bronchial air passages, eight had trapped air in their lungs, four had unusually prominent central airways, and one child had a lung nodule.

"These basically healthy children were very active, and many of them spent

hours playing soccer in the late afternoon - when pollutant levels are at their peak," Fordham said in statement. "Most parents might naturally think it a good thing for their children to exercise vigorously. But the fact is that they would most likely be safer staying indoors in the after-school hours when ozone levels are high."

21. Graham's Anti Regulatory Agenda Becoming Clearer

The Office of Information and Regulatory Affairs has been working with lobbyists on plans that could weaken environmental regulations under the veil of reducing federal paperwork requirements, according to press reports. An e-mail from Barbara Kahlow, deputy director of the House subcommittee overseeing federal regulations, listed 57 rules the business community wants to target, including rules governing pesticide use, coalmine ventilation, air and water quality, lead-paint disclosure and toxic-release reporting. Kahlow's e-mail said OIRA Administrator John D. Graham asked her to "convene key lobbyists to identify and rank" regulations to target.

"This was a secret campaign to circumvent the process," the lobbyist who leaked the e-mail said. "With Graham in that job, we figured we could get whatever we want."

22. US Drivers in SUV Gas-Guzzling Buying Spree

U.S. drivers are buying gasoline at a feverish clip despite the nation's recession, due largely to low pump prices and an autumn buying rush for gas-guzzling SUVs. Gasoline consumption for November averaged about 8.6 million barrels per day, up nearly 3 percent from last year, according to the American Petroleum Institute (API), despite a recession.

The robust gasoline demand comes amid a steep drop in retail pump prices to two-year lows of \$1.12 a gallon and amid a dramatic increase in sales of sport utility vehicles and pickup trucks - some of the least fuel-efficient automobiles on the market.

Bargain financing deals by big automakers have helped push sales of SUVs and light pickup trucks 13.7 percent higher than last year for the month of November, according to the U.S. Commerce Department. Meanwhile, half of the 20 best-selling automobiles so far this year have been trucks or SUVs, including the mammoth GMC Sierra and Dodge Ram pickup, according to data reported by automakers.

According to the Federal Highway Administration, the number of vehicles on the road grew by 5.2 million between 1999 and 2000.

In October, the U.S. Environmental Protection Agency said that Americans' love affair with gas-guzzling SUVs reduced the average fuel mileage of all 2001

model year vehicles to 20.4 miles per gallon, the lowest in two decades.

The trend could become a curse to the nation's energy infrastructure, which over the past two years struggled desperately to overcome regional fuel shortages due to refinery and pipeline outages.

The current Corporate Average Fuel Economy standards, first adopted by Congress in 1975 after the Arab oil embargo, require passenger cars to average 27.5 miles per gallon and light trucks to average 20.7 mpg.

At the time, light trucks were allowed to get lower mileage because mostly farmers and small businesses used them.

If auto manufacturers increased fuel economy by as little as three miles per gallon, consumers would save as much as \$25 billion a year in fuel costs, the EPA said.

That modest increase in fuel efficiency, the agency said, would also reduce 140 million tons of carbon dioxide emissions per year and cut the United States' reliance on foreign oil by 1 million barrels of oil each day - a boon as heightened tensions in the Mideast raise fears of a disruption in crude supply.

23. Senate Begins To Explore CAFE Hike

Members of the Senate Commerce, Science and Transportation Committee heard arguments for and against including a significant Corporate Average Fuel Economy standards hike in a comprehensive energy bill the Senate aims to pass next year.

CAFE standards haven't been updated since 1984 and are currently set at 27.5 miles per gallon for cars and 20.5 mpg for light trucks. Meantime, in October, the Environmental Protection Agency reported that the average fuel economy of new passenger vehicles reached a 20-year low, largely because of the widespread popularity of sport utility vehicles.

Proponents argue gradually increasing CAFE standards for all types of consumer vehicles to 40 mpg by 2012 would save 1.9 million barrels of oil per day by the time the higher standard is in place. Critics argue such a standard would force automakers to raise the price of their vehicles or cut their power and weight, sacrificing sales in one instance and safety in another.

The House passed a comprehensive energy bill (H.R. 4) in early August that included modest language requiring the Department of Transportation to develop programs aimed at cutting the nation's oil consumption. The bill also includes language opening the Arctic National Wildlife Refuge to oil exploration and drilling, and \$35 billion in energy tax breaks.

Senate Democrats consequently blocked GOP attempts to bring similar legislation to the Senate floor this year. However, Senate Majority Leader Tom Daschle (D-S.D.), who spearheaded the effort to punt the energy issue into next year, has promised to bring an energy bill to the floor in February.

That puts pressure on Sen. John Kerry (D-Mass.), chairman of the Commerce, Science and Transportation Subcommittee on Oceans, Atmosphere and Fisheries, and other Senate proponents of tougher CAFE standards to build support for slipping such a measure into the energy mix.

The last significant congressional hearing on CAFE standards took place Aug. 2, when Kerry hosted a joint hearing with Senate Energy and Natural Resources Committee Chairman Jeff Bingaman (D-N.M.) on a July 30 National Academy of Sciences report that said cars and light trucks could be made significantly more fuel-efficient in the next 10 to 15 years without compromising safety or hurting consumers. The NAS panel that wrote the report later changed some technical figures on the report, but stood by its key findings.

The last comprehensive energy bill floated by Senate Democrats, S. 597, aims to cap the growth of petroleum products used by cars and light trucks to no more than 5 percent between 2000 and 2008.

But other proposals would do more. Sens. Dianne Feinstein (D-Calif.), Olympia Snowe (R-Maine) and Susan Collins (R-Maine) introduced stand-alone legislation, S. 804, that would eliminate what they refer to as the "SUV loophole" by increasing the CAFE standard for all vehicles under 10,000 pounds (including SUVs -- which are classified as light trucks under current law even though most consumers use them as passenger vehicles) to 27.5 mpg, the current standard for passenger cars, by 2007.

During the joint hearing on the NAS report, Feinstein hinted she might change the legislation to give automakers a larger window -- 10 to 15 years -- to meet the tougher standard. Feinstein is still expected to try to include the language as part of the broader Senate energy package.

Even if CAFE proponents are unsuccessful at winning a significant CAFE increase in next year's energy bill, there are other bills that might be easier to attach. Sen. Orrin Hatch's (R-Utah) CLEAR Act (S. 760) appeals to several environmental groups because it aims to increase demand for electric, fuel cell, gas-electric hybrids or other highly fuel-efficient vehicles by offering tax credits to purchasers.

Some within the environmental movement are opposed to tax credits unless automakers are forbidden to include the mileage of vehicles eligible for credits when figuring the economy of their overall fleet, arguing the offset would allow automakers to sell even more gas-guzzlers.

The NAS report also made mention of a sliding CAFE scale based on vehicle weight, as well as a scheme allowing automakers to buy and sell CAFE credits, but neither idea has been discussed at any length.

24. New GM SUV, the Hummer H2, Super Gas Guzzler

General Motors Corp. brags that its new Hummer H2 sport utility vehicle can surmount the most challenging off-road courses and go just about anywhere. The Hummer H2, resembling the U.S. military's Humvee vehicles seen fighting in Afghanistan, will get around 13 miles per gallon when it goes on sale next summer, GM officials have announced. But similar to the Ford Excursion, a full size sport utility vehicle that some environmental groups dubbed the "Valdez" because of its gas-guzzling weight, the Hummer H2 is so heavy its falls outside U.S. regulations on fuel economy.

The five-passenger Hummer H2, which will have an optional third-row seat for a sixth passenger next to a spare tire, has a combined weight and payload capacity of 8,600 pounds, just 100 pounds above the cut-off point. The Ford Excursion also weighs and holds 8,600 pounds for the two-wheel-drive version.

"We're not technically part of the CAFE equation," said Hummer division General Manager Michael DiGiovanni.

Adding to the vehicle's weight is steel and thick aluminum skid pads running under the vehicle and rocker protectors along the side to protect the H2 from boulders and tree trunks along the roughest trails. The H2 also has a steel reinforced chassis to withstand extreme twisting pressures.

Befitting its larger-than-life image, the new Hummer H2 stands 6-1/2 feet (198 cms) tall, without a roof rack, and is 6-3/4 feet (206 cms) wide. It captures the Humvee's slab-sided look, with a near-vertical windshield that sacrifices aerodynamics for style.

Although sales of the Excursion have been much fewer than expected, GM's large Chevrolet Suburban SUV is enjoying a record year, and GM expects Hummer H2 to also be a hit.

GM could sell as many as 40,000 Hummer H2s a year, and expects Hummer to become a very profitable division for the automaker.

GM acquired the rights to the Hummer brand name from AM General in 1999 after research showed that the rugged Hummer H1 and the military's Humvee captured widespread acclaim among younger buyers.

With a price tag of about \$50,000, DiGiovanni believes the H2 will appeal to buyers aged about 38 to 45, who are successful risk-takers with an average

income of about \$180,000.

25. Ford Strikes Fuel Cell Deal With Ballard

Ford Motor Co. reached a \$43.8 million deal to buy fuel cell engines and support services from Canada-based Ballard Power Systems Inc.

Ford, which has a 20 percent stake in Ballard, has said it aims to introduce a commercial fuel cell vehicle by 2004. The contract brings Ford's total fuel cell orders to \$65.7 million in three months.

Ballard has supplied fuel cells to Honda, Nissan and Volkswagen, among other automakers.

26. Toyota to Begin Selling Zero Emission RAV4-EV To California Retail Customers

Toyota Motor Sales, U.S.A., has announced that it will begin offering the RAV4-EV (electric vehicle) to retail customers in California beginning in February 2002. The Toyota RAV4-EV is a zero emission, state-of-the-art electric version of Toyota's popular RAV4 sport utility vehicle (SUV). The announcement was made at the 2001 Electric Transportation Industry Conference and Exposition.

In 1997, Toyota began making the RAV4-EV available nationally through a special fleet lease program to major corporations and utilities. Today, RAV4-EV is one of the best-selling electric vehicles in the country with more than 900 in service nationwide, including 700 on the road in California.

Beginning in 2003, the California Air Resources Board (CARB) Zero Emissions Vehicle Mandate (ZEV) will take effect, requiring 10 percent of all new vehicles sold in California to meet low emissions standards, with two percent qualified as zero emission vehicles. As part of Toyota's overall compliance effort, and in order to meet the zero emissions mandate, Toyota will begin offering RAV4-EVs to retail customers in February 2002.

A maintenance-free, permanent magnet motor powers the RAV4-EV, producing 50kW of power (equivalent to a 67-horsepower gasoline engine). It has a top speed of 78 mph and a range between 80 and 100 miles per charge.

The RAV4-EV will have a manufacturers suggested retail price (MSRP) of \$42,000, but a \$9,000 incentive from CARB and a \$3,000 IRS credit will bring the price down to \$30,000, which includes an in-home charging device. There will also be three special introductory lease options, which also include the use of the charger.

When RAV4-EV goes on sale in February, Toyota will have a participating dealer in every major metro market in California. Like the Prius gas/electric hybrid

vehicle, customers will have the ability to communicate and order the RAV4-EV on-line and take actual delivery through a participating dealer.

27. Denver Attains Clean Air

Denver, the mile-high city that tried to clean up its air for nearly three decades, has finally succeeded thanks to vehicle emissions testing and the use of alternative fuels, the Colorado governor's office has announced. The U.S. Environmental Protection Agency has granted the state's request to designate the seven county Denver metropolitan area as being "in attainment" of the National Ambient Air Quality Standard for carbon monoxide.

"It was not that long ago that carbon monoxide levels in Denver were among the highest in the nation. To reverse that trend and clean up the air despite our growing economy is quite remarkable," Gov. Bill Owens said in a statement.

In the early 1970s Denver violated the federal health-based standard for carbon monoxide more than 130 days a year. But a variety of strategies were used such as testing vehicle exhausts, mandatory use of alternative fuels in the winter and curbs on residential wood burning to reduce carbon monoxide levels.

An area is in compliance if it goes two years without a violation. Since 1996 there has only been one recorded day out of compliance and that was on November 30, 1999.

28. Scientists See Threat of Abrupt World Climate Change

Global climate change, often seen as a process stretching over thousands of years, could in fact occur abruptly and unexpectedly - quickly pushing up temperatures by as much as 10 degrees Celsius (18 degrees Fahrenheit) and wreaking havoc on human society, scientists warned in a new National Academy of Sciences report..

"Climate change is not always smooth. Sometimes it is abrupt," said Richard Alley, a climate expert at Pennsylvania State University and lead author of the report on the threat of rapid climactic shifts.

"If you have a very large, abrupt change, a lot of people and a lot of ecosystems are going to notice," he said. "The bigger and faster it is, the harder it will be to deal with."

The new National Academy of Sciences report warns that gradual global warming coupled with other human impacts on the environment could "trip the switch" for sudden climate change. At the American Geophysical Union meeting on Wednesday, Alley and other environmental scientists said the geological evidence indicated that such rapid climate shifts had occurred frequently in the past - moving temperatures drastically in the space of just a few decades.

"This can happen in less than a human generation, and then it will persist for thousands of years," said David Battisti, an atmospheric scientist at the University of Washington.

The most immediate dangers posed by abrupt climate change range are devastating droughts and floods that could seriously affect both water supply and agriculture across vast stretches of the planet.

Longer-term impacts could include changes in the basic systems that determine regional global temperatures.

Scientists believe that the Gulf Stream, a current of warm Atlantic water which now keeps much of Northern Europe temperate, could theoretically reverse direction if enough cool fresh water runs into the north Atlantic from melting ice, a change that would quickly impact European weather.

Researchers briefing the AGU meeting said it was clear that the world's oceans play a major role in queuing up rapid climate changes, but that thus far the mechanics of such changes were poorly understood.

"It's like being blindfolded and walking toward the edge of a cliff," said Wallace Broecker, a professor of environmental sciences at Columbia University. "We don't understand (the factors) so we don't really know what to look for."

Using ice cores drilled from glaciers and other ice sheets, the researchers have developed a model showing world temperatures spiking and dipping with unsettling frequency over the past 110,000 years.

While some of the changes have been slow and steady, such as the end of the last Ice Age some 12,000 years ago, others have been swift and unexpected, such as the rapid warming of the North Atlantic from 1920 to 1930 and the Dust Bowl drought of the 1930s.

The most drastic temperature changes - believed to be as much as 10 degrees Celsius (18 degrees Fahrenheit) over the space of just a few years - exceed any recorded in human history, they said.

Alley said the report was not intended to alarm the public, but that he hoped it would spur policy makers to prepare for the possibility of rapid temperature flux.

Greenhouse gases, emitted by fossil fuels such as oil and coal, have been linked by many researchers to a rise in global temperatures. A 1997 Kyoto treaty on global warming sought to cut emissions of such gasses by developed nations, but the Bush administration this year spurned the treaty, saying pollution controls would be too costly for the U.S. economy.

The NAS panel called for research to identify what it described as "no-regrets" measures that would cost relatively little and would be good policies regardless of the extent of environmental change.

Such measures could include regulations to reduce damage to water, air and land, or slow climate change, or helping societies cope with abrupt climate change by developing new financial instruments such as weather derivatives and catastrophe bonds to reflect the risks, it said.

"Societies have faced both gradual and abrupt climate changes for millennial and have learned to adapt through various mechanisms, such as moving indoors, developing irrigation for crops, and migrating away from inhospitable regions," the report said. "It is important not to be fatalistic about the threats posed by abrupt climate change."

29.NAS Panel Says Commercial Jets' Cabin Air May Be Polluted

The air aboard jetliners can contain pollutants that cause health problems such as skin irritations and respiratory trouble among passengers and crew, according to a scientific panel. In the first major [report](#) on the subject in 15 years, the National Academy of Sciences found areas of concern in jetliners' air quality, including cabin pressure, ozone and carbon monoxide levels, and potential exposures to pesticides and fumes from engine oil, hydraulic fluids and de-icing liquid. "Available exposure information suggests that environmental factors, including air contaminants, can be responsible for some of the numerous complaints of acute and chronic health effects in cabin crew and passengers," the report said.

But the authors said there is too little information to determine the connection between health complaints and cabin air. "There has been far too little relevant investigation of exposures that take place and very little information on the frequency of complaints or health effects," said Morton Lippman, a professor of environmental medicine at New York University and chairman of the panel.

The report calls for the federal government to launch a major investigation into jetliners' air quality, overseen by an independent advisory board.

30.Democratic Senators Request New Source Review Documents From EPA

Six Democratic senators have sent a letter seeking documents and information on the Environmental Protection Agency's effort to rewrite power plant air pollution standards.

EPA is expected shortly to unveil new standards for so-called New Source

Review, which would require U.S. utilities to install pollution-removal equipment on newly constructed or expanded plants.

The Bush administration's proposal is awaited by the head of the Senate Environment Committee, Vermont Independent Jim Jeffords, who has pledged to push ahead with legislation requiring drastic cuts of at least 75 percent in four pollutants spewed by U.S. utilities.

The senators said they "are concerned about rumored changes to the NSR program that might undermine its benefits," said a letter dated Dec. 14 to EPA Administrator Christine Todd Whitman. Democrats Bob Graham of Florida, Jeffords, Hillary Rodham Clinton of New York, Thomas Carper of Delaware, Ron Wyden of Oregon and Jon Corzine of New Jersey signed the letter.

"We therefore are requesting that EPA immediately preserve and docket for the (committee) all documents" on EPA's NSR rulemaking, its consultations with Energy Secretary Spencer Abraham, and pending enforcement actions.

At a House Energy and Commerce subcommittee hearing earlier in the month, California Democratic Rep. Henry Waxman asked Energy Department Deputy Secretary Francis Blake to submit a roster of industry executives and environmental groups he has met with on the NSR issue.

Democratic lawmakers want to require U.S. utilities to begin making steep cuts in 2002 emissions of sulfur dioxide, nitrogen oxide, mercury and carbon dioxide.

The administration favors replacing current Clean Air Act rules with a cap-and-trade regime for nitrogen oxides, sulfur dioxide and mercury - and no mandatory cuts for carbon dioxide.

ASIA-PACIFIC REGION

31. Director General Cheng-Chung Hong Modifies Air Quality Protection Policies in Taiwan

Past air pollution control efforts in Taiwan emphasized regional pollution control, said Director General Hong, and attempted to control pollution throughout specific industries or from individual sources. Under this system, the threat of fines forced firms to comply with compulsory regulations, achieving the improvement of air quality. Nevertheless, this approach delivered only limited results: The lack of economic incentives gave firms little interest in voluntary compliance. In a step forward, the revision of the *Air Pollution Control Act* in 1999 has put in place a total quantity control (TQC) system possessing economic incentives and in the future a tradable emission credits system will be used to reduce pollution emissions. Under this system, of which Director General Hong has high hopes, firms will be permitted to buy or sell their pollution emission credits, giving them a direct incentive to reduce their emissions and improve air

quality. The Bureau of Air Quality Protection and Noise Control is in the midst of planning near-term administrative targets and steps for the transition to a trading system.

The Bureau will submit its *Total Quantity Control Framework Plan* to the Executive Yuan for approval in the near future, said Director General Hong, and it is expected to be passed swiftly.

After discussing the new TQC plan, Director General Hong mentioned several measures that the Bureau of Air Quality Protection and Noise Control is now implementing. The most important of these is the promotion and subsidization of vehicles using clean energy. Specific measures include:

1. Six-Year Compressed Natural Gas (CNG) Bus Program: The EPA is preparing to submit this plan to the Executive Yuan for approval. The CNG Bus Program will raise the EPA's funding assistance for CNG busses to NT\$2 million from this year's NT\$1 million. While there are currently only six CNG busses in Taipei, the Taipei government's budget for this year allocates funds for the purchase of 25 more. The EPA's increased funding assistance will go to the two urban areas of Taipei and Kaohsiung next year.

2. Promotion of Liquefied Petroleum Gas (LPG) Vehicles: Funding is mainly given to businesses with high vehicle mileage, such as taxis operators and auto rental and leasing firms, in the hope that they will convert to LPG-powered vehicles. While this measure has already been implemented for several years, the high cost of conversion and scarcity of LPG filling stations have led to disappointing results. The EPA, however, plans to roll out more incentives to make LPG vehicles more attractive, including:

(a) Increasing fuel subsidies: The EPA approved an LPG fuel subsidy of NT\$3 per liter on October 1, up from the current NT\$2. Compared with the current gasoline price of NT\$20 per liter and LPG price of NT\$11 per liter, each liter of subsidized LPG will cost only NT\$8, or a very attractive NT\$12 less than each liter of gasoline.

(b) Adding more LPG filling stations: The fact that there are currently only ten legal LPG filling stations has hindered the promotion of LPG-powered vehicles. But when the 20 more fillings stations scheduled to be completed next year are finished, the new total of 30 stations will make fueling much more convenient.

(c) Making the price of LPG-powered vehicles more reasonable: In the past, vehicles had to be retrofitted with expensive imported equipment and materials before they could run on LPG, and the owners had to spend considerable money and effort to make the conversion. Nowadays domestic auto companies, in particular the automotive division of Formosa Plastics, are preparing to manufacture and sell their own LPG-powered vehicles. This is likely to bring down further the prices of these vehicles. These economic incentives will make low CO₂ emission LPG-powered vehicles even more appealing and competitive.

A Year-by-Year Overview of the Air Pollution Control Fund Budget

Article 1 of the *Regulations Governing the Collection, Safekeeping and Use of the Air Pollution Control Fund*, which was enacted on July 5, 1995, states, "The Air Pollution Control Fund has been established expressly to control air pollution, protect citizens' health and living environment and improve the quality of life." The Fund, over which the EPA is the competent authority, is used exclusively for air pollution control purposes.

The main tasks and projects listed in the Air Pollution Fund budget include the promotion of air pollution control strategies, stationary pollution source control, mobile pollution source control, air quality monitoring and database maintenance, implementation of urban greening and establishment of air quality purification zones, research and planning, and air quality improvement programs. Beginning in 1999, the central government has directly set aside 60% of air pollution fees collected from stationary pollution sources for the use of the city or county governments in whose areas of jurisdiction stationary pollution sources are located. There has therefore been a relative drop in funding for air pollution control programs at the local level since 1999.

Looking at the structure of the Fund budget, control of mobile pollution sources has remained a budget priority since 1997; while the amount budgeted for this item has changed, it has consistently increased in importance, and reached a new high of 48.11% in the 2002 budget. Funding for research and development and training dropped sharply by roughly NT\$100 million in the 2001 budget. Other budget items changed by a relatively small amount. While, in the beginning, the Fund dedicated a large percentage of its budget to the air pollution control programs and urban greening work of local governments, this percentage has gradually tapered off over the last few years. Although the 2002 budget is still awaiting Legislative Yuan review, it is expected to be 7.97% larger than the 2001 budget (not including fixed asset items).

32. Thailand Planning On "Green" Fuel

Thailand will officially endorse a formula for gasohol - a mixture of gasoline and ethanol - this month in a bid to cut pollution levels and lift farm prices, the head of the National Ethanol Office (NEO) announced.

"We are trying to promote the use of alternative home-grown energy sources so we can rely less on imported crude oil and also help stabilize farm prices and increase farmers' incomes," NEO director Nattaphol Nathasomboon said in an interview.

By officially approving a blend of nine parts gasoline to one part ethanol, the government hopes to boost consumer confidence in the "green" fuel. To prove the point, government vehicles will start switching to gasohol next year, Nattaphol said. The blend has been tested by state-owned oil and gas firm PTT Plc and

major vehicle manufacturers have been consulted, Nattaphol said.

"We are thinking of subsidizing the price so it would be sold at one baht per liter cheaper than gasoline octane 95," he added.

Nattaphol said the government had been running a pilot gasohol project with a production capacity of 1,500 liters/day, which was being sold at a small number of gasoline stations owned by PTT and state-controlled Bangchak Petroleum. But authorities wanted to boost production by encouraging private firms to set up ethanol plants to supply the domestic market as well as to fill growing demand in the United States and China. Eighteen firms have applied for licenses from the ministry of industry and two proposals have already gotten as far as cabinet consideration.

Farm products including molasses, sugarcane, tapioca, coconut oil, corn and rice can be used to produce ethanol. According to the ministry of industry, one ton of molasses, or around four tons of sugarcane can produce 260 liters of ethanol and one ton of corn or rice can produce 375 liters of ethanol.

Thailand is the world's top producer of rice, rubber and tapioca and one of Asia's major producers of sugar.

33. BP Australia Warns Against Clean Fuels Backsliding

BP Australia managing director Greg Bourne warned yesterday against any backsliding in moving toward cleaner fuel standards. "There are people trying to roll back this, and roll back that," he told reporters. Bourne called for stronger Australian leadership and closer links between industry and government in pushing for improved environmental standards for fuels.

BP, a unit of BP Plc, has invested heavily in its Perth and Bulwer Island refineries to produce cleaner fuels, moving ahead of its competitors in Australia to meet new federal fuel standards being phased in by 2006.

States governments are also separately addressing fuel standard issues, with some refineries concerned about individual states moving ahead of national specifications. In Western Australia, where BP has the only refinery, competitors argue specifications for levels of benzene and olefins are giving it a monopoly and undermining state security of supply due to a lack of specified fuel from other sources. Shell Australia, a unit of Royal Dutch/Shell, has written to the state government requesting benzene and olefin standards be brought in line with the federal timetable.

"What we are asking for is a national approach to fuel in Australia," a spokesman said.

Australia's other refiners are Caltex Australia Ltd, half-owned by ChevronTexaco

Corp , and a local unit of ExxonMobil Corp .

BP Australia has also advised that it intends to end swap arrangements, where it supplies fuel to competitors in Western Australia in return for receiving supplies in eastern states.

34. Recent Developments in China

a. Key Motor Vehicle Expert Moves On

Li Pei, who has been responsible for SEPA's motor vehicle pollution control effort since its inception, has accepted a new position within SEPA as Deputy Director of the Human Resources Division in the Foreign Economic Cooperation Office (FECO). While this appears to be a very good career step for her, it is certainly a blow to the motor vehicle pollution control effort.

There is no designated heir apparent within SEPA. Mr. REN Hongyan, a fairly junior Project Officer, will take over Li Pei's job on an acting basis but clearly in a caretaker capacity. They will advertise for a permanent replacement. Li Pei indicated that they are looking for someone about 30 years old with a technical education and at least some experience in motor vehicle pollution control.

The good news is that Yuan Ying, the technical expert from CRAES who has been sharing Li Pei's office for the last year or two in an advisory capacity will continue in that role providing some continuity in the program.

b. Low Sulfur Fuel

There is a growing recognition that sulfur in fuel is an emerging problem. In Li Pei's words, it is "the next big topic." At present, diesel fuel is about 2000 PPM sulfur and gasoline is 800-1000. SEPA would like to get all gasoline down to 500 PPM by 2003 and have at least some 500-PPM diesel available at that same time.

Apparently, Vice Premier Wu Bangqiao has instructed several ministries including SEPA and SETC among others to study the issue. Sinopec and Petrochina have submitted a five-year plan to the State Council to improve fuel quality.

Some effort is also underway to initiate a China Auto-Oil program with initial funding of around \$1 million US.

c. Other Beijing Developments

Approximately 180,000 vehicles have been retrofitted within Beijing to date. They are moving rapidly toward instituting an ASM (steady state, loaded) I/M test program with a total of 41 lanes operational to date. In an effort to select the initial standards, about 400 cars have already been tested. They will initiate

mandatory testing but with very loose standards for at least the first six months.

d. China Gives Tax Rebates For Clean Cars

China has approved tax rebates for three automobile manufacturers whose vehicles meet Euro II emissions standards as part of a broader push to bring all cars up to the standard by 2004. The move will refund 30% of China's 5% consumption tax on domestically manufactured light duty vehicles effective on taxes paid starting last September. This will amount to a rebate of about \$181 million. Shanghai GM, Shanghai VW and Aeolus-Citroen became the first three manufacturing plants to undergo inspection procedures by SEPA to win approval. Other joint venture plants are set to receive approval soon.

e. Beijing Pursuing Euro III Standards To Prepare For Olympics

As allowed by the China Clean Air Act, Beijing's Municipal Environmental Protection Bureau has developed a plan to introduce Euro III standards for light duty vehicles in 2005 and heavy-duty vehicles in 2006. A formal request has been submitted to the State Council for approval, as required by the Clean Air Act. Local authorities have been assured by the oil industry that fuel of sufficient quality would be made available in Beijing if the standards were approved.

If low sulfur diesel fuel were made available, this would also open up opportunities for new diesel vehicles and engines to be sold as Beijing had previously banned the sale of any new diesel vehicles unless they comply with the Euro III standards.

f. Progress On Clean Fuels

Growing concern over the environmental impact of rising oil consumption also led to investments in new refining technologies and the revision of product specifications. Among the earliest policy targets was the elimination of 66 and 70 MON specification for gasoline, raising the new minimum to 90 RON (Research Octane Number) and eliminating alkyl-lead additives for octane enhancement through the increased use of alkylates, reformate, and MTBE and other oxygenates in gasoline blending. New unleaded specifications for 93 and 97 octane (RON) gasoline were added as well. MMT is also used as an octane enhancer by about 50% of China's refineries.

In China, almost all gasoline is used in transportation, while only half of diesel fuels are for this use, as presented in the Table below.

Consumption patterns for diesel fuels in China

Consumer	1995	1997
Agriculture, % (m/m)	26.2	23.4
Fishery, % (m/m)	11.9	11.4

Transportation, % (m/m)	48.1	50.0
Highway	29.8	34.4
Railway	10.3	8.8
Marine	8.0	6.8
Electricity, % (m/m)	6.9	9.5
Others, % (m/m)	6.9	5.7
Total, % (m/m)	100	100

A survey of Chinese gasolines in 1999 revealed the characteristic features of high olefin and sulfur content. Olefins in gasoline cause deposits in the intake system and fuel injectors of gasoline engines, and an increase the photochemical reactivity of engine exhaust gas. Sulfur compounds poison the catalysts of the exhaust gas emission control systems. Recently, several measures have been adopted in Chinese refineries to improve gasoline quality, including addition of innovative catalytic cracking technology, increases in catalytic reforming capacity, installation of hydrodesulfurization facilities, etc.

Gasoline specifications are driven by emissions standards. In recent years, environmental protection has received considerable attention in China, especially in the mega-cities, such as Beijing, Shanghai and Guangzhou. Consequently, the engine emission regulations have become more stringent, which will have a strong impact on the fuel industry. A new set of specifications came into effect in July 2000. The significant difference between the new specifications and the original ones is the regulatory limitation of olefin and aromatic contents. Although the maximum allowable limits of olefin and sulfur content are still higher than the standard for US and EU gasolines, the standards represent major progress, considering the current status of the Chinese petroleum refining industry. The Table below gives the new gasoline specification GB 17930-1999. The gasoline quality will be continuously improved; the next goal is reducing sulfur content to 0.02 percent by weight. The total amount of olefins and aromatics in the gasoline pool are limited to a level of 60 percent by volume maximum, while the limit of olefin content is 35 percent by volume maximum. The next gasoline specifications will be implemented in 2003.

July 2000 Unleaded petrol specification for motor vehicles [GB17930-1999]

Item	Limit		
Research octane number min.	90	93	95
Antiknock index min	85	88	90
Lead µg/L max.	0.005		

Sulfur, % m/m max.	0.10
Benzene, % v/v max.	2.5
Aromatics, % v/v max.	40
Olefins, % v/v max.	35

It is noteworthy that SINOPEC has a reference specification for exported unleaded petroleum that currently meets or exceeds the new domestic gasoline specifications. As the Chinese refining industry moves toward world standards, the complications introduced by having to produce different fuels to meet a number of differing quality specifications (other than those changes needed to maintain good performance under regional and seasonal climate variations) will gradually disappear.

Diesel fuel Chinese diesel fuel contains a small proportion of hydro-treated components that results in high sulfur content as demonstrated in the Table below. It can be seen that the sulfur content increased from 1995 to 1997, due to an increase in imported sour crude oils. The sulfur content decreased after 1997, when catalytic hydro-treating operations were improved.

Sulfur contents of Chinese diesel fuels

Sulfur content*, % (m/m)	1995	1996	1997	1998
Minimum	0.03	0.03	0.03	0.03
Maximum	0.33	0.35	0.37	0.35

*Average sulfur content of refinery's diesel fuel pool

SINOPEC distributes diesel fuel based on its enterprise's standards in all the cities in the mainland, including the broad areas around cities. So, the diesel fuel grade depends on the specific contract between the users and the fuel suppliers. Some cities are requiring specifications that exceed the national standards.

In principle, CNPC will follow the SINOPEC activities in updating the performance of domestic fuels, to meet the needs of the marketplace. In addition, CNPC has the sweet crude oil source; therefore, it isn't a difficult task to produce low-sulfur diesel fuel.

Diesel fuel specifications GB 252-2000 replaced the original state specification of diesel fuel, GB 252-1994, in January 2002. GB 252-1994 involves three grades, regular, premium and super, based on sulfur content. The maximum sulfur content of the three grades of diesel fuels is 1.0, 0.5 and 0.2 percent by weight, respectively. The cetane number limit is 45 minimum, except for the diesel fuels made from naphthenic or paraffin-naphthenic crude oils, as well as the diesel fuel containing catalytic cracking components, which have a minimum cetane number limit of 40.

GB 252-2000 includes one grade with a maximum sulfur content of 0.2% by weight. The minimum cetane number limit is 45, with an exception for the diesel fuels made from naphthenic or paraffin-naphthenic crude oils, which have a minimum cetane number limit of 40. It implies that the cetane number of the diesel fuels containing catalytic cracking components has a minimum limit of 45 rather than 40. In addition, SINOPEC issued a city diesel fuel specification Q/SHR 008-2000 last year. In this industrial specification, the maximum sulfur content limit is 0.03 percent by weight, and the minimum cetane number limit is 50 without exception. The further development of diesel fuel specifications focuses on reducing maximum sulfur content down to 0.005 percent by weight, which is the level needed to introduce Euro 4 and Euro 5 emissions limits. China has a short-term schedule of improvement of diesel fuel as shown below.

Planned Sulfur Standards

Timing	Nationwide	City
2001	Sulfur standard of light diesel fuels: 2,000 ppm (super) 5,000 ppm (premium) 10,000 ppm (regular)	SINOPEC provides 500 ppm sulfur diesel fuel to the cities
Jun. 1, 2002	Sulfur standard of light diesel fuels: 2,000 ppm	
End of 2003 or early 2004	Sulfur standard of automobile city diesel fuel: 500 ppm	SINOPEC will supply 300 ppm sulfur diesel fuel to the metropolitan area

As the Chinese economy develops, the demand for petroleum products will grow dramatically, causing a consequent shortage of crude oil. By 2010, crude oil of around 100 million metric tons will have to be imported annually to make up the shortage in the domestic supply. China is improving the quality of gasoline and diesel fuel for meeting the more stringent requirements of environmental protection and the automotive industry. The main goals will be to reduce the olefin content of gasoline, and the sulfur content of gasoline and diesel fuel.

35. Recent Developments in Japan

a. Tokyo Diesel Retrofit Program

The Tokyo Metropolitan Government (TMG) retrofit program is proceeding rapidly. The criteria for approval have been finalized with the principle requirements as follows:

Performance of PM Reduction Devices

Classification of performances of PM reduction devices required for meeting the PM emission standards	Performance of PM reduction devices meeting the PM emission standards that are stipulated in Schedule 6 of the Ordinance and will be applicable on and after October 1, 2003	Performance of PM reduction devices meeting the PM emission standards that are stipulated in Schedule 6 of the Ordinance and will be applicable on the date in and after April 2005 that is specifically fixed by the Governor October 1, 2003
Classification of Vehicle		
Vehicles meeting the regulations of 1989 and 1990 and Vehicles failing to meet even the regulations of 1989 and 1990 under the Air Pollution Control Law, etc.	Category 1 PM reduction rate: More than 60%	Category 3 PM reduction rate: More than 70%
Vehicles meeting the regulations of 1993 and 1994 under the Air Pollution Control Law, etc.	Category 2 PM reduction rate: More than 30%	Category 4 PM reduction rate: More than 40%
Vehicles meeting the regulations of 1997, 1998 and 1999 under the Air Pollution Control Law, etc.		Category 5 PM reduction rate: More than 30%
Vehicles that were manufactured in line with specific vehicle models and fitted with PM reduction devices before factory shipment	The amount of particulate matters emitted from the vehicle meets the PM emission standards	The amount of particulate matters emitted from the vehicle meets the PM emission standards

Retrofit devices are divided according to the following classification scheme:

1. Diesel Particulate Filter (DPF)

Devices that are installed in the exhaust pipe of a diesel fuelled vehicle fueled to collect particulate matter. Such devices are divided as follows according to the systems in which the collected particulate matter is treated.

- (1) the system in which the collected particulate matter is burnt using external energy such as heating wires to regenerate the filter (active regeneration system)
- (2) the system in which the collected particulate matter is oxidized and removed using the heat of the exhaust gas from the vehicle or catalytic activities to successively regenerate the filter (continuous regeneration system)
- (3) the system in which the filter is maintained when the vehicle is not in service to treat the collected particulate matters (non-regeneration system)

2. Oxidation catalysts and other systems

(1) Oxidation catalyst system

In addition to the systems mentioned in 1(1) to (3), the system in which particulate matter emitted from a vehicle is oxidized and removed under the action of the catalyst installed in the exhaust pipe of the vehicle.

(2) Other systems

Systems other than those mentioned in 1 and 2(1) for reducing particulate matters.

As of November 19th, a variety of systems have received approval from the

TMG. These are summarized below.

Supplier	Description	Vehicles Covered	Vehicle Types	Fuel Sulfur Requirements
DPFs				
Comotec	Plug In Regeneration or Removal for Regeneration	1,2,3 4,5	Maximum 200 km Per Day	No Restriction
Mitsui	JM DOC with wire mesh Filter – 3 different densities	1,2 & 4	Variety of Specific Models	50 PPM Sulfur Maximum
NABCO (Engelhard)	DPX	2,4 & 5	Only For High Speed Trucks	500 PPM Sulfur Maximum
UNICAT	UCS-05BX UCS-10BX UCS-20BX	1,2,3 4,5	For 1 & 3, only high speed vehicles	50 PPM Sulfur Maximum
TADANO	Similar to DPX	2,4,5	Only For High Speed Trucks	500 PPM Sulfur Maximum
DOCs				
Isuzu	DOC	5	Variety of Specific Models & Applications	Some 500 PPM & Some 50 PPM Fuel Limitations
Toyota	DOC	2,4	One Large Company Only	50 PPM Sulfur Maximum
Hino	6A,10A,22A	2,4,5	Variety of Models	50 PPM Sulfur Maximum
Hino	6B,10B,22B,10C,22C	5	Variety of Models	500 PPM Sulfur Maximum
Nissan Diesel	DOC	5	Variety of Models	Some 500 PPM & Some 50 PPM Fuel Limitations
Mitsubishi	DOC	5	Variety of Models	50 PPM Sulfur Maximum

Retrofits must be completed by October 1, 2003. Therefore, TMG has been

negotiating with the major oil companies to assure that all diesel fuel sold in Tokyo will be at a maximum sulfur content of 50 PPM or less by April 1, 2003, thereby allowing only 6 months for the actual retrofits to take place. The following major oil companies have agreed in principle to meet this deadline and to provide only 50-PPM fuel in Tokyo, Kanagawa, Chiba and Saitama from April 1, 2003:

- Showa Shell
- Exxon-Mobil of Japan
- Nippon Mitsubishi Corp.
- JOMO
- COSMO
- IDEMITSU

TMG estimates that about 40,000 DPFs and an undetermined number of DOCs will need to be retrofitted by October 1, 2003 in Tokyo alone. About 10,000 of those vehicles are in centrally fuelled fleets and will be able to be retrofitted prior to April 1, 2003 because they will be in a position to assure the correct fuel quality.

Several other prefectures including Saitama, Chiba and Kanagawa are in various stages of adopting requirements similar to Tokyo's and are expected to have them in place in sufficient time to have retrofits occur on the same schedule as Tokyo.

b. National Developments

Additional progress has occurred with both lower sulfur fuel and more rapid introduction of new low PM diesel vehicles.

With regard to gasoline, two grades are currently sold in Japan – Premium, which has a sulfur content of 5 to 8 PPM, and Regular grade, which has a sulfur content of 30 to 40 PPM. Negotiations have been underway between the oil industry and the government and it appears that agreement has been reached in principle to sell only gasoline with 10 PPM of sulfur or less by 2008.

With regard to diesel fuel, the oil industry has previously announced that by October 2003, at least 50% of all fuel sold in the entire country will be 50 PPM sulfur or less and by December 31, 2004, 100% of the fuel will meet this specification. Further, the 50% when provided in 2003 will be widely distributed and available throughout the entire country. Discussions between the industry and government have apparently resulted in an agreement to provide 100% of the fuel by 2008 with a maximum of 10-PPM sulfur.

With regard to new vehicles, the requirement that all new diesel vehicles sold in Japan by 2005 will be equipped with DPFs remains on track. However, there is movement toward even earlier introductions with some models. Toyota has announced that it will sell certain light trucks, which meet the long term PM standard (the 2005 standard) equipped with DPFs by October 2003; these

include their Toyo-Ace and Dyna models in the 4 to 6 ton size range. Hino will sell its similar light truck, Dutro, with identical systems in the same time frame.

Mitsubishi and Hino are inclined to equip their 8 ton trucks with DPFs by December 2003 if Isuzu can be persuaded to do the same; at present Isuzu is holding out for April 2004. Discussions are underway with Nissan Diesel as well.

36. Japan's PM Praises Clean Car; Government Pushing Technology

Prime Minister Junichiro Koizumi took time out from working to clean up Japan's economy to try out a car that is expected to do the same for the environment. Koizumi, who has been battling to carry out reforms seen as essential to boosting the nation's ailing economy, was taken for a ride in one of several fuel-cell cars on hand from four of Japan's top automakers - Toyota, Nissan, Honda and Mazda.

After a brief spin around the drive in front of Japan's parliament building, a beaming Koizumi pronounced the car "the ultimate" and said he would do all he could to promote the use of fuel-cell vehicles.

"The ride is great, it's much quieter than the cars used now and very comfortable," he said.

Koizumi, who came to power in April, singled out the environment as a key policy area and has urged government officials to switch to cars friendly to the environment.

After investing hundreds of millions of yen and years of research into the development of environmentally friendly cars, the auto industry recently received a big boost from the Japanese government.

Three government ministries have crafted a plan to significantly increase the number of low-emission vehicles on the road by 2010. Currently, only 630,000 models are in use, but officials want to push that number beyond 10 million within 10 years. Achieving this goal means that one out of every eight cars in the nation would be eco-friendly, compared with about one out of every 115 vehicles today.

To make this transition, the government has announced that it would expand tax incentives and subsidies and promote the development of fuel-cell vehicles. Under the plan, five types of vehicles would be considered eco-friendly: Those running on compressed natural gas, electric cars with rechargeable batteries, hybrid vehicles that combine gasoline engines with electric motors, vehicles running on methanol and those with gasoline engines that emit low levels of carbon dioxide and other pollutants.

In addition, Prime Minister Koizumi has asked government agencies to purchase only environmentally friendly vehicles with the aim of eventually replacing the

government's fleet of 7,000 gasoline-powered models over the next three years. He also is encouraging private corporations and local governments to do the same.

37. Honda To Start Selling Hybrid-Electric Sedan

Honda Motor Co has announced that it will start selling its fuel-efficient Civic Hybrid sedan in Japan to compete with Toyota Motor Corp's Prius, the world's first hybrid-electric production car.

The domestic price for the five-seater Hybrid will be 2.09 million yen (\$16,590), Honda said. That is 500,000 yen more than a Civic sedan with a standard gasoline engine, but cheaper than the Prius, which is priced from 2.18 million yen.

Toyota, Japan's top carmaker, launched the Prius in December 1997, with global sales totalling 76,703 vehicles as of October 2001.

Third-ranked Honda said it aimed to sell 500 Hybrids a month in Japan, and planned to start selling the vehicle in the United States next spring. The carmaker is expecting to sell about 30,000 Hybrids a year in the United States, where there is more demand for environmentally friendly vehicles.

A 1.3-litre gasoline engine and an electric motor power the Hybrid. It can run for 29.5 kilometers per liter compared with 29 km/l for the Prius, Honda said.

Buyers of the Civic Hybrid would also receive tax incentives of up to 75,400 yen under the Japanese government's green car program, it said.

Honda launched its first hybrid-electric car, the two-seater Insight, in November 1999, with sales totaling 10,061 units as of November 2001.

38. Asia Needs Large Investment For Clean Fuels

Although nearly half of Asia's 20 million barrels per day (bpd) refining capacity is less than 20 years old, many plants will need revamping if Asia is to match U.S. and European standards for lead-free gasoline and low sulphur diesel fuels. Oil industry analysts Seattle-based Trans-Energy Research Associates and Singapore-based Merrill Lynch Research estimate that necessary upgrading in the region will cost between \$20 billion and \$40 billion to reach a minimum 0.05 percent sulphur diesel standard and fully unleaded gasoline supply.

Every second barrel of Asian imported crude is from the Middle East, where oil generally has high sulphur content. This dependence on the Middle East is set to grow as Asian oil production dwindles. Asian capacity to remove sulphur stands at only about 40 percent of its refining capacity, analysts estimate. Most investment in the future will be for plants that can take the sulphur out of diesel.

South Korea, China, India and Australia top the list of countries that need to invest because their refineries are either old or too basic.

Fed up with smog-filled city streets, Asian citizens are increasingly demanding cleaner-burning fuels to raise air quality in some of the world's most populous cities. And governments have begun the clean up.

Leaded gasoline supplies have fallen to 20 percent of supply during the last 10 years from almost 50 percent at the start of the 1990s. A survey of government sources showed that leaded gasoline is only in use in Pakistan, Cambodia, Laos and some rural areas in Indonesia. Vietnam was the latest country to phase out leaded gasoline in June this year.

Asia also has sharply reduced sulphur levels in diesel fuel. Most countries now use diesel containing 0.3 to 0.05 percent sulphur compared to 0.5 to 1.5 percent in the late 1980s.

But given poor profits in the last few years, the refining industry - once a lucrative sector - may find it difficult to draw investment. Asian refiners have seen their profits crunched since the 1997/98 financial crisis as oil demand growth slowed and many have been barely able to cover costs this year. And regional refining overcapacity, which is expected to last until at least 2010, has done little to buoy returns. Refining margins - using the region's swing refining center Singapore as benchmark - were positive from 1991 to mid-1998, but have frequently fallen into the red during the last three years.

Plant upgrading will also take on greater significance as the region turns surplus in gasoline, jet-kerosene and diesel and will need to look to export markets. Increasingly Asian cargoes of these refined products have been exported to the United States, Latin America and even Europe, but future sales will depend on keeping up with more stringent product qualities in these regions.

39. Survey Says HK Citizens Want More Action On Environment

Most Hong Kong people want the government to urgently tackle environmental problems such as pesticides in vegetables, contaminated seafood, and water and air pollution, a newly released survey showed. The survey of 960 people by non-profit public policy think tank Civic Exchange found over 60 percent of respondents said the government ought to make these issues a top priority.

Fifty-six percent of respondents said they were concerned "a great deal" with drinking water pollution, 53 percent with pesticides in vegetables and 49 percent with air pollution.

Only 19 percent of respondents said environmental problems in Mainland China were a top priority, despite the fact that much of Hong Kong's drinking water

comes from the mainland, also the source of much of the air pollution that plagues the territory.

Hong Kong people have become particularly wary of food contamination after a series of food scares in recent years.

The government has twice had to slaughter the entire poultry population, once in 1998 and again this year, to stop the spread of the deadly "chicken flu" that killed six people in 1997.

Despite a pledge by Hong Kong leader Tung Chee-hwa to clean up the city, 55 percent of respondents in the survey said they were dissatisfied or very dissatisfied with efforts by top government officials to tackle air and water pollution.

While 92 percent supported tougher penalties for littering, when asked why so many people litter in Hong Kong, 53 percent of respondents said they did so because the practice was common or because there were not enough litter bins. Thirty-three percent said they littered because the city was already very dirty.

GENERAL

40. Traffic Linked To Ultrafine PM In Children's Lung Tissues

Small particles found in vehicle exhaust can penetrate into the lungs of children, according to a new study. The study shows evidence that particles from vehicle exhaust reach, and are taken up by, cells that reside on the deepest part of the lung.

Dr Jonathan Grigg and his team at the Institute for Lung Health at the University of Leicester looked for particles in cells sampled from the lungs of 22 healthy children - and found evidence of ultrafine vehicle particles in them all. The level of particles was significantly higher in children living on a main road, although there was no difference in the proportion of these particles in children of different ages.

The UK government has estimated that there are 24,000 deaths of adults a year, which can be attributed to the inhalation of PM10.

The research was published in the British Thoracic Society journal *Thorax*.¹

Alveolar macrophages (AM) from 22 children aged 3 months to 16 years with no respiratory symptoms were obtained by non-bronchoscopic bronchoalveolar lavage prior to elective surgery. In each child the size and composition of

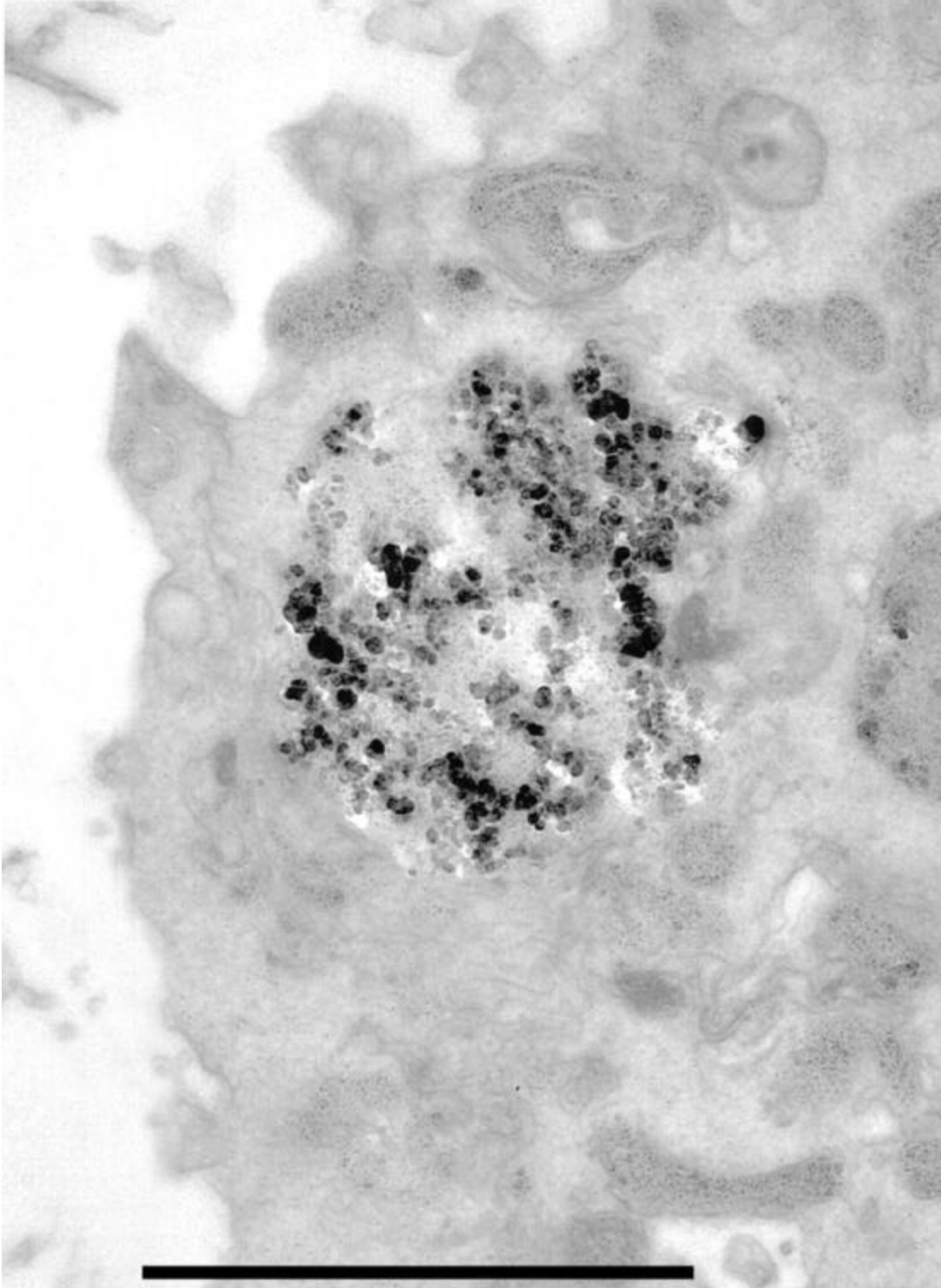
¹ Ultrafine particles in alveolar macrophages from normal children, **H J Bunn, D Dinsdale, T Smith, J Grigg**, (*Thorax* 2001;**56**:932-934)

environmental particles within single sections from 100 separate AM was determined by electron microscopy and microanalysis. Single and clusters of particles were seen in AM from all children. The percentage of particle containing AM ranged from 1% to 16% per child. Particles consisted of a carbonaceous core and all were ultrafine ($<0.1 \mu\text{m}$). Other elements such as metals and silicon were not detected. The percentage of particle containing AM did not change with age, but was increased in children whose parents lived on a main road compared with those living on a quiet residential road.

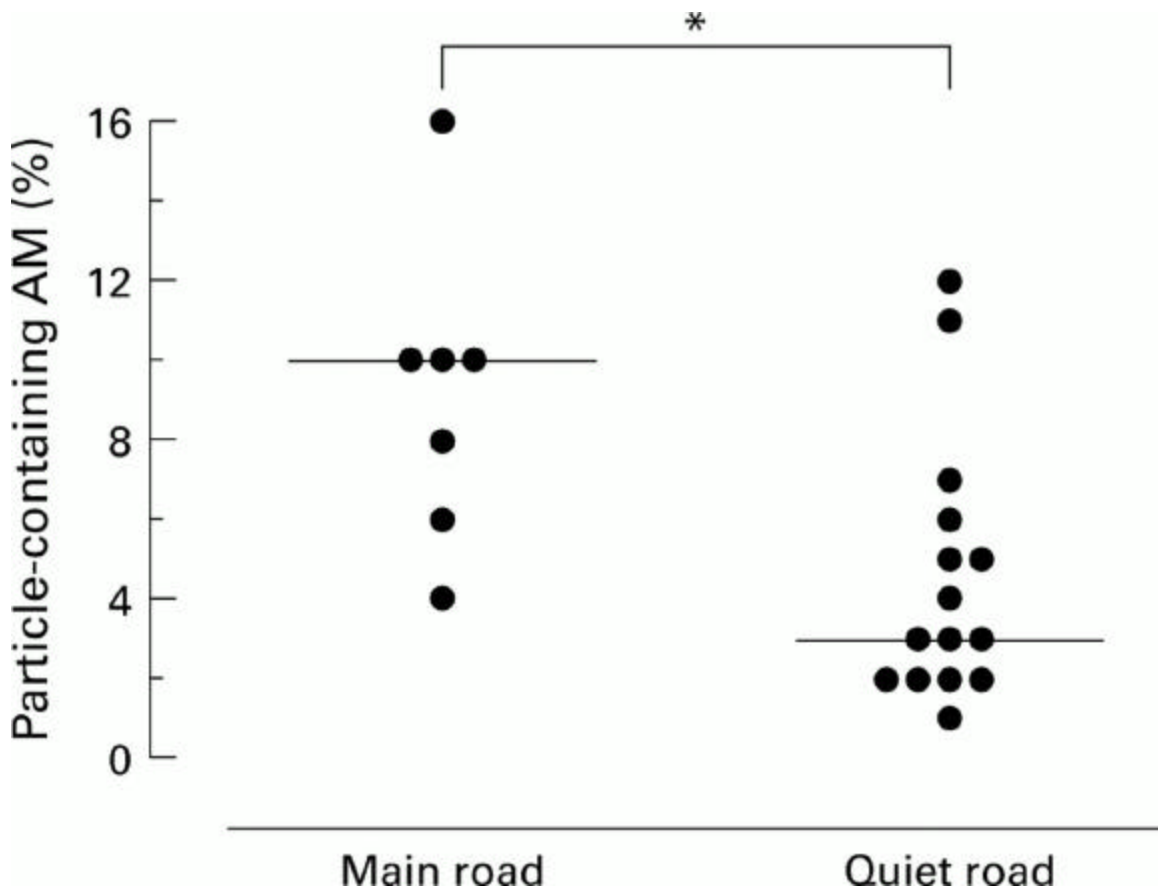
All children had AM containing ultrafine carbonaceous particles. The predominant source of these particles is most likely to be from the combustion of fossil fuels.

This study presents the first conclusive evidence that carbonaceous particles are deposited in the lower airway of normal children. Since all of the particles in pediatric AM were composed of UF elements, these data are consistent with the selective penetration of smaller size fractions of PM_{10} into the distal airway, and the hypothesis that UF particles are a major determinant of the adverse health effects associated with PM_{10} . We found that the percentage of particle-containing AM was higher in children living on a main road, a finding compatible with the epidemiological association between increased road traffic density near the home and respiratory symptoms in children.

In summary, AM from normal children contain particles, the size and composition of which suggest a fossil fuel origin. The association of an increased proportion of AM containing particles with increased traffic density near the home provides preliminary evidence for a direct relationship between exposure of the pediatric lower airway to particles and proximity to road traffic.



Electron micrograph showing carbonaceous ultrafine particles within a phagosome of an alveolar macrophage from a child aged 3 months. Bar = 1000 nm.



Percentage of particle-containing alveolar macrophages from children living on a main road and those living on a quiet road/residential street. * $p < 0.05$ versus living on a main road (Mann-Whitney U test). Horizontal bars represent median values.

41. Drive On Soot "Could Slow Global Warming"

Greenhouse gases are blamed by many scientists for contributing to global warming, but at least one researcher says the real key to modifying world temperatures is diesel soot. "If you want to control global warming, the first thing to go after is soot," according to Mark Jacobson, an associate professor of civil and environmental engineering at Stanford University.

Jacobson, in a presentation to the American Geophysical Union, said soot produced by burning diesel fuels, coal and wood had a much more severe impact on the environment relative to its mass than do greenhouse gases such as carbon dioxide and methane.

Eliminating all fossil-fuel soot - estimated at about 5 million tons per year worldwide - could cut net global warming by 40 percent in three to five years, Jacobson said.

"Controlling fossil-fuel soot will not only slow global warming but also will improve human health," he said.

A soot particle, made up primarily of black carbon, warms the air by absorbing sunlight and radiating the heat into the air. Greenhouse gases, by contrast, do not absorb sunlight but create warming by absorbing Earth's heat and then radiating it back into the environment.

Jacobson said that while soot was widely believed to be the biggest cause of global warming after carbon dioxide, controlling soot emissions could have a more immediate effect on temperatures because soot did its damage to the environment during the relatively brief time it remained in the air.

But he said that most current climate change models do not take soot into account. The 1997 Kyoto Protocol, aimed at reducing global warming, also failed to deal with soot emissions, he noted.

Jacobson, who reached his conclusions after developing a computer model to include the climactic impact of soot, said controls could be improved by tightening standards on particulate emissions, requiring industry to devise better particle traps, and switching from diesel fuel to gasoline or hydrogen fuel cells.

Diesel fuel powers almost all commercial trucks, buses and tractors worldwide and 33 percent of the passenger vehicles sold in Europe last year, according to Jacobson.

Diesel-powered passenger vehicles are much more rare in the United States - only about one in a thousand cars - but overall diesel emissions from all vehicles in the United States are still about 75 percent to 80 percent of those of Europe.

42. Divergent Paths on Fuel Cells

Automakers worldwide are joining forces in a quest to find the perfect fuel cell, an eco-friendly technology many believe will ultimately provide the clean alternative to the internal-combustion engine — at least in the short term.

Nissan Motor Co. and Renault announced that they would jointly develop cars with gasoline-powered fuel cells because they believe the technology will become the standard in America. The decision places the automakers on the same path followed by General Motors and Toyota Motor Corp., which announced earlier this year that Exxon Mobil Corp. has joined their combined effort to develop a gasoline-powered fuel cell as a stepping stone to fuel cells powered by pure hydrogen.

Meanwhile, Mazda Motor Corp. and DaimlerChrysler have opted for the methanol strategy and have begun road-testing vehicles that use liquid methanol to power their fuel cells. They believe methanol is the proper interim step because it is easier and cleaner to convert to hydrogen and can be generated from biomass, such as agricultural crops and waste byproducts. Both are working with Nippon Mitsubishi Oil, which will help them collect data on how the fuel cells behave under actual operating conditions.

Whether they are cooperating as teams or working individually, the world's automakers have an added incentive in their search. The Japanese government hopes to have 50,000 fuel-cell cars on the road by 2010 as part of a larger goal to increase the number of eco-friendly cars in use to 10 million within a decade.

In addition, a research group has concluded that Japan should be ready for full-scale commercialization of fuel cells by 2010.

Another technology is the hydrogen-powered engine, which, like pure hydrogen-powered fuel cells, holds the promise of emitting nothing but water. However, the burning of lubricants in hydrogen engines creates nitrous oxide and carbon monoxide. Also, liquid hydrogen is more expensive to produce than gasoline. Even if researchers could drive down production costs, the adoption of a new fuel system would require the installation of a network of filling stations.

Despite these hurdles, BMW has called on its competitors to join it in researching the technology and bringing a hydrogen-powered car to market.

43. Countries Agree on Kyoto Protocol Rules

On November 10, 2001 in Marrakech, Morocco, parties to the United Nations Climate Change Convention finalized the operational details of the Kyoto Protocol. The agreement came at the end of the seventh session of the Conference of the Parties to the Convention (COP 7). The October 29-November 9, 2001 conference was attended by 171 governments and a total of 4,500 participants. The action opens the way to widespread ratification by governments and the Protocol's early entry into force. The United States still considers the Kyoto Protocol "flawed," but did not put forward any new climate proposals at the conference.

The finalized Kyoto rulebook specifies how to measure emissions and reductions, the extent to which carbon dioxide absorbed by carbon sinks can be counted towards the Kyoto targets, how the joint implementation and emissions trading systems will work, and the rules for ensuring compliance with commitments. The conference also elected 15 members to the Executive Board of the Clean Development Mechanism. The CDM will promote sustainable development by encouraging investments in projects in developing countries that reduce or avoid emissions; developed countries then receive credit against their

Kyoto targets for emissions avoided by these projects.

The 1997 Kyoto Protocol will enter into force and become legally binding after it has been ratified by at least 55 Parties to the Convention, including industrialized countries representing at least 55% of the total 1990 carbon dioxide emissions from this group. So far, 40 countries have ratified, including one industrialized country (Romania). Many governments have called for the entry into force to take place in 2002. For example, the Nordic countries – Denmark, Finland, Iceland, Norway and Sweden – have stated that they will begin asking their respective federal parliaments to ratify the accord before the end of 2001. Ratification by all the Nordic countries is expected before the World Summit on Sustainable Development to be held in Johannesburg in September 2002.

44. Appendix A: Summary Of Key Points In US EPA Off Road White Paper

EPA has included examples of engine designs that incorporate emission control technologies into total emission control systems in order to demonstrate the emission control capability needed to meet the Tier 3 standards. These examples serve to show that a systems approach incorporating existing technologies can achieve compliance with the Tier 3 standards.

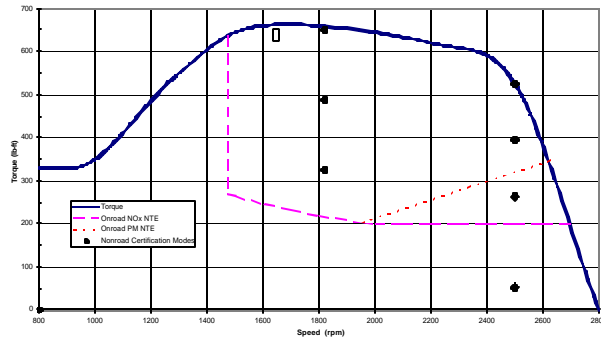
a. Optimized Engine Systems Using Cooled EGR

The use of EGR for NO_x control is a well-established technology for gasoline engines and is experiencing growing acceptance for highway diesel engines. Cooled EGR systems for diesel engines are in current production for light-duty vehicles in the U.S. and Europe as well as for some heavy-duty transit bus applications in the U.S. Several diesel engine manufacturers including Cummins, Detroit Diesel, and Mack have indicated that cooled EGR will be the primary technology used to comply with the heavy-duty highway 2004 engine standards. These same manufacturers are expected to have cooled EGR engines in production starting in 2002, more than four years earlier than the start of the Tier 3 phase-in.

One example of the emission control systems these companies will use is the system Cummins has announced it will introduce in late 2002 compliant with the heavy-duty highway emission standards set for 2004. This engine uses a high pressure loop (exhaust manifold to intake manifold) cooled EGR system, an advanced high pressure common rail fuel system, improved turbocharger system, a centrally located fuel injector, and combustion system enhancements. This system incorporates a jacket water cooled EGR cooler and a variable geometry turbocharger to drive and control the EGR rate. Lower power ratings (similar to typical nonroad engine ratings) use a conventional turbocharger with a wastegate. With this emission control system, the engine is able to meet the heavy-duty highway transient certification cycle and the Supplemental Emissions Test standards of 2.5 g/hp-hr NO_x+NMHC, 0.1 g/hp-hr PM. This engine also has to meet a Not-To-Exceed (NTE) zone cap of 3.12 g/hp-hr NO_x+NMHC and 0.125 g/hp-hr PM. The NTE zone includes six of the eight nonroad certification modes (see Figure below). The six that are included in the NTE region are the most heavily weighted test modes in terms of the total emission and work used to calculate the nonroad composite emission rate. Therefore, if an engine is compliant at those six modes it is highly likely to be compliant with the eight mode composite level. Since this engine is compliant with the NTE limit, it is likely that this highway engine would be compliant with the nonroad Tier 3 emission standards. In fact, the emissions level would likely be close to 2.5 g/hp-hr NO_x+NMHC (well under the Tier 3 standard) over the non-road certification composite. This is because compliance with the Supplemental Emissions Test standards includes testing at 13 steady-state test modes that are similar or in some cases coincident with the nonroad emission test modes. If this same

engine were sold in a nonroad application for Tier 3, it may even be possible to calibrate the engine with less reliance on cooled EGR while still meeting the Tier 3 standard.

Map of Engine Operating Range (Torque vs. Speed)

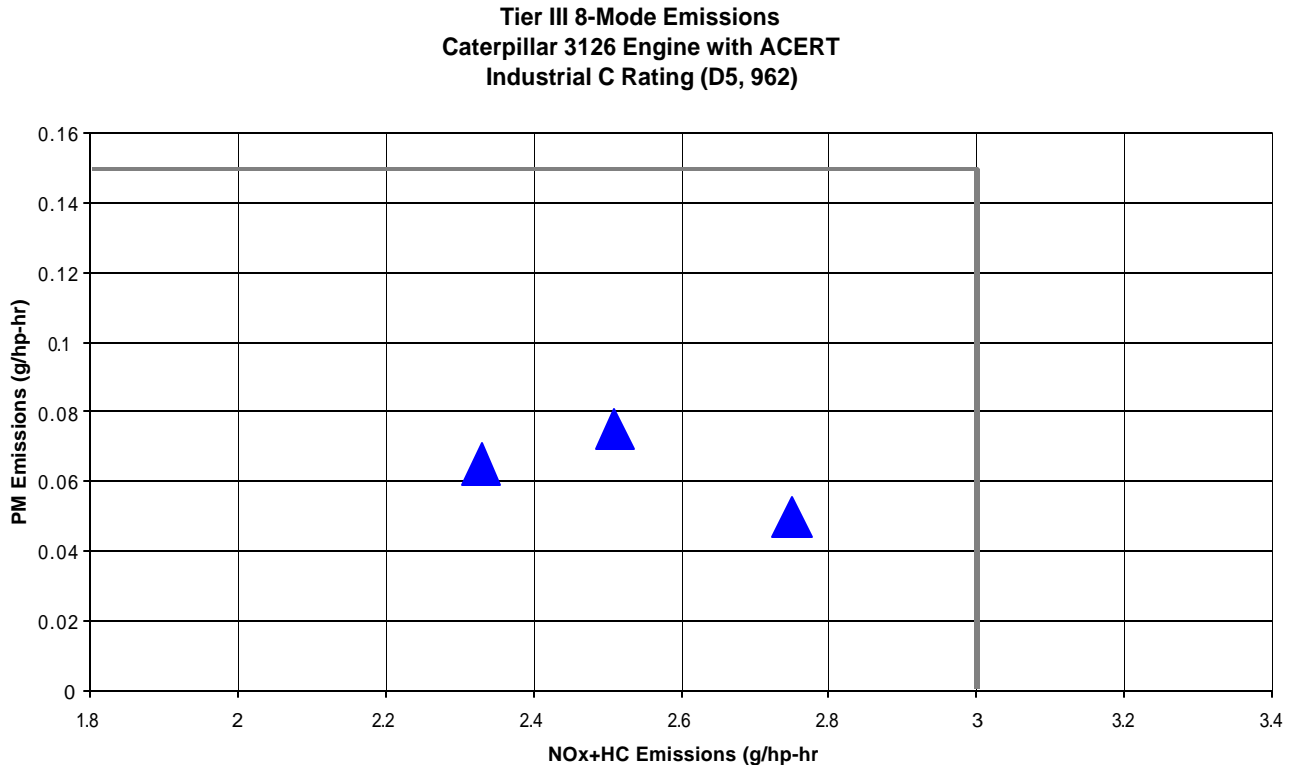


The emission control system described here represents the kind of technology that EPA anticipated would be used to meet the Tier 3 emission standards when it set the standards in 1998. EPA continues to believe that this approach can be used to meet the Tier 3 emissions standards, but it no longer is assuming that this will be the only way that emission control technologies will be combined in order to meet the Tier 3 standards. The following sections detail two more approaches that EPA believes some manufacturers could use to comply with the emission standards.

b. Caterpillar’s ACERT

Caterpillar has announced that it will produce engines compliant with the Tier 3 emission standards using existing highway diesel engine technologies. The new engines being developed by Caterpillar will be marketed under the trade name “Advanced Combustion Emissions Reduction Technology” or “ACERT.” Caterpillar indicated in a letter to the EPA that it is “prepared to license the ACERT technology, including related patents, to Caterpillar’s engine competitors.” Caterpillar has provided data for a mid-range industrial engine (Caterpillar 3126) that meets the Tier 3 standards (The Figure below shows three compliant calibrations of the ACERT system). Caterpillar describes ACERT as a combination of proven hardware components integrated in a systems approach to meet emissions and performance goals. The engines use open-loop electronic engine controls, the HEUI fuel system, a variable geometry turbocharger, valve event control, and a diesel oxidation catalyst (DOC). While Caterpillar did not identify a specific NOx or PM reduction associated with each of the technologies in the ACERT system, the following discussion describes how the identified technologies may work in the ACERT strategy.

Tier 3 Emissions Caterpillar 3126 ACERT Engine



Caterpillar has stated that the HEUI injection system used with ACERT has the ability to accurately and independently control the number of fuel injection events, fuel injection pressure and the injected quantity. Multiple injections allow the use of a late “post-injection” event for PM control, which can allow further injection timing retard for NO_x control. Caterpillar has stated that the VGT used within ACERT is used to allow the electronic control system to regulate intake air pressure. The use of VGT in concert with electronic control of injection timing and injection quantity can extend A/F and PM control over a broader range of engine operating conditions, thus reducing PM emissions while maintaining NO_x control. Control of valve events can be used to reduce NO_x emissions by allowing a degree of internal EGR either by retaining more residual gases in cylinder or by allowing exhaust flow-reversal. Control of valve events can also be used to provide a degree of expansion cooling of the cylinder contents. Caterpillar has not commented on the potential use of valve event control for reducing NO_x emissions.

The diesel oxidation catalyst used by Caterpillar provides additional HC control,

which will likely improve the ability to meet the Tier 3 NMHC+NOx standard. Using a diesel oxidation catalyst may also provide a reduction in the semi-volatile organic compounds that contribute to PM. Caterpillar provided emissions data showing that over the range of fuel sulfur levels required for in-use testing under Tier 3, sulfate-made with the DOC selected was sufficiently low to allow compliance with the Tier 3 PM emission standard.

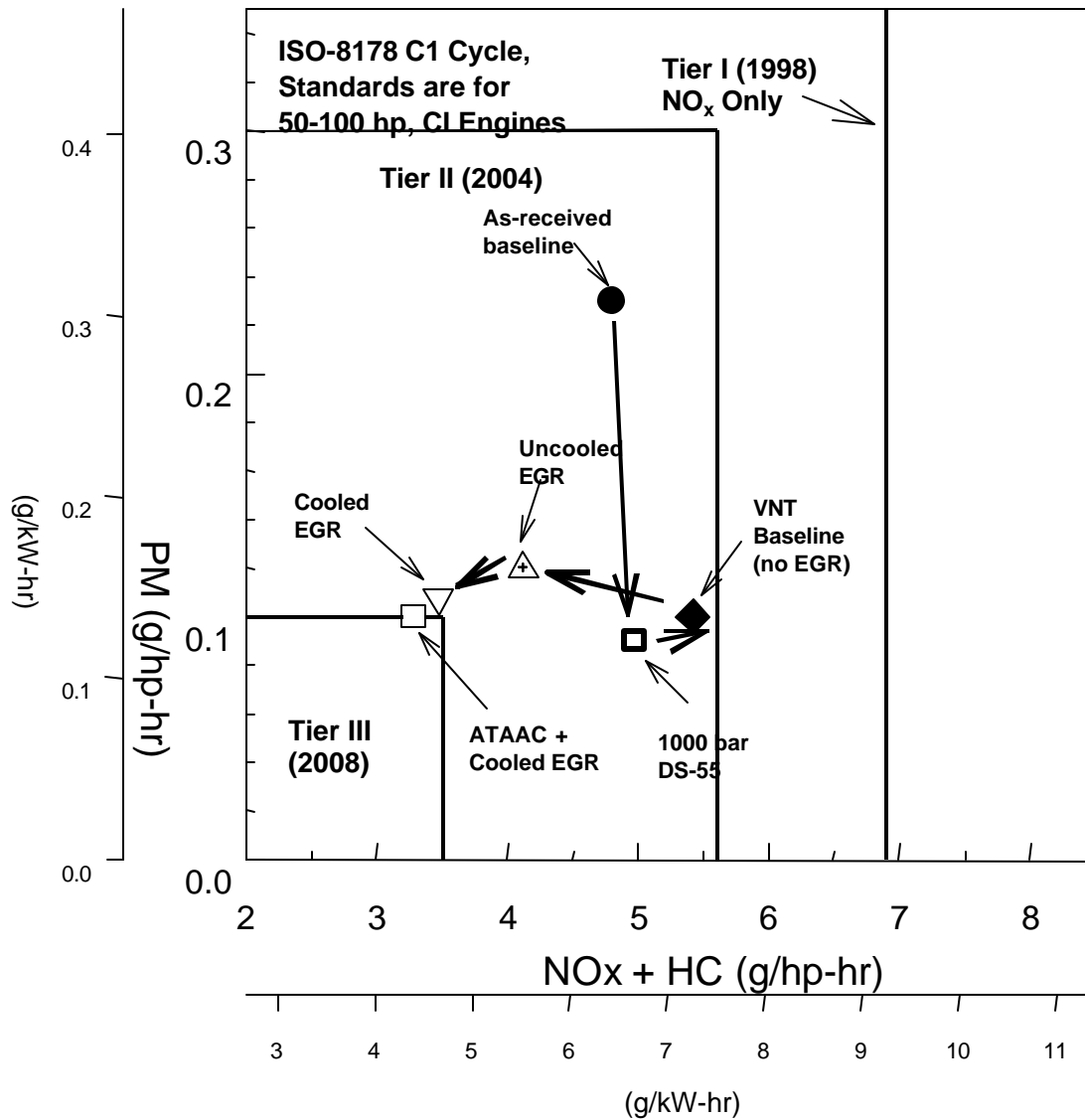
c. Hot EGR and Combustion System Optimization

Under contract with EPA, Southwest Research Institute (SwRI) has been working to evaluate a variety of means to reduce emissions from a typical nonroad engine, with engineering support from a number of engine/component manufacturers. For this work a Tier 1 compliant John Deere 4045H Powertech diesel engine was used as a baseline for emissions improvement and development. The engine, as delivered by John Deere, has a displacement of 4.5 liters, and is equipped with a turbocharger, an aftercooler, two valves per cylinder and a mechanical direct injection fuel system. John Deere has recently announced improvements to this engine that include the use of four valves per cylinder, an electronic fuel system, and higher capacity electronics. This new improved engine was not available for use at the time the test program was started.

One step in the work at SwRI included the addition of an external hot EGR system controlled by an EGR valve and variable nozzle turbocharger (a particular type of VGT) with an electronically controlled fuel system to the engine. This testing demonstrated NOx + HC emission levels of 4.0 g/hp-hr with a PM level of 0.12 g/hp-hr over the nonroad test cycle. The NOx reduction performance realized in this step of the development work was limited in part by limitations on the amount of EGR that could be achieved with the test configuration. Additional EGR flow could be achieved through the use of an intake-side venturi, an integral EGR turbo pump, or other intake flow control strategies. From the testing at SwRI, additional EGR flow to reduce NOx at rated and peak torque operating conditions could be expected to significantly reduce NOx emissions.

An additional design iteration of the engine by SwRI included the use of cooled EGR and air-to-air aftercooling. This engine demonstrated NOx+HC emissions of 3.3 g/bhp-hr and PM emissions of 0.10 g/bhp-hr over the nonroad test cycle, using fuel sulfur and aftercooling levels appropriate to nonroad engine applications. The significant NOx and PM emission reductions demonstrated in this test program were accomplished without the use of a common rail fuel system which would be expected to allow for further reductions in NOx and PM control due to the added flexibility it would provide in controlling injection pressure (rate) and multiple injection events.

The various design iteration steps of the development program at SwRI are documented in the Figure below.



Technology Sequence for SwRI Engine

John Deere has been investigating a number of system solutions to develop nonroad engines compliant with the Tier 3 emission standards. One approach that John Deere has focused on is a system incorporating a high pressure fuel injection system with injection rate shaping capabilities, a diesel oxidation catalyst (to lower HCs and PM), and hot EGR (either internal or external) This technology development approach is consistent with the types of systems solutions considered in this paper.

d. Other Considerations

The Tier 3 emission standards were developed based upon EPA's assessment that emission control technologies developed for highway diesel trucks could be applied to nonroad engines and equipment. EPA sees considerable evidence that this transfer of technology is already occurring with the introduction of Tier 2 compliant engines (e.g., the use of common rail fuel systems, air-to-air aftercooling and advanced electronics), and we continue to believe that highway technology transfer will enable Tier 3 emission compliant engines. However, EPA has always recognized that there are differences between highway vehicles and nonroad equipment that must be considered in evaluating engine technologies. These differences include acceptable levels of heat rejection, limited aftercooler performance without ram-air for nonroad, and equipment packaging constraints. In large part due to these differences, the Tier 3 standards were set at a less stringent level when compared to the corresponding highway engine standards. The standards are both numerically less restrictive and also defined under less restrictive test conditions (i.e., nonroad has a simple eight mode steady-state test cycle, highway engines must meet a demanding transient emission test including both cold and hot cycles). We continue to believe that these less stringent standards appropriately account for the unique nonroad engine and equipment issues as discussed in the following sections.

e. Nonroad Fuel Quality (Sulfur)

Diesel fuel sold for use in nonroad equipment is not currently regulated by EPA. Typical nonroad diesel fuel meets ASTM specification D975 that sets a maximum sulfur level of 5,000 ppm. Fuel meeting this standard commonly has a sulfur level of up to 3,000 ppm. For this reason, as well as for reasons of convenience and availability, many nonroad equipment users choose to operate their equipment on fuel sold for highway vehicle use. Highway diesel fuel is regulated and has a maximum sulfur content of 500 ppm with a typical average sulfur level of 300 ppm. Nonroad engines and equipment are designed to operate on the maximum fuel sulfur level that may be encountered during the vehicle's life (e.g., 5,000 ppm). Sulfur in diesel fuel can cause increased corrosion of engine components, accelerated deterioration of engine lubricating oil, accelerated engine wear and increases in PM emissions. Consideration of these issues is given in nonroad engine designs and maintenance schedules.

The use of cooled EGR to comply with the Tier 3 emission standards may be more difficult when compared to highway applications due to the higher fuel sulfur level typical of nonroad diesel fuel. Sulfur is an issue since it forms corrosive sulfuric acid (H_2SO_4) in diesel exhaust. During combustion sulfur is oxidized 97-99% to sulfur dioxide (SO_2) and trace amounts of sulfate (SO_3). SO_3 also forms in the exhaust manifold as equilibrium thermodynamics begin to favor its formation below $\sim 730^\circ C$. However, reaction kinetics limit the SO_3 formation

rate. In diesel exhaust SO_3 immediately reacts with water vapor to form aqueous sulfuric acid (~73% H_2SO_4 by wt.), and this acid begins to condense from about 80 to 145° C , depending upon engine operating conditions and fuel sulfur content. Although the acid's concentration is strong, the acid at this point only accounts for ~0.5% of the fuel sulfur. However, once the exhaust cools below the water vapor dew point (~30 to 80° C), SO_2 , which accounts for nearly all of the fuel sulfur, will begin to react significantly with condensed water to form H_2SO_4 . Since nonroad fuel has six times the sulfur content, the rate of acid condensation will increase by a similar amount relative to highway.

The increase in condensation rate is significant since the increased fuel sulfur content increases a nonroad engine's exposure to sulfuric acid. The acid impacts the engine in at least three ways: direct corrosion of engine components, secondary wear from corrosion byproducts, and acidification of the engine oil. Condensation can occur in the EGR cooler, after the EGR is mixed with the fresh air in the intake system, and on the cylinder walls. Studies have shown that increased fuel sulfur levels (350 ppm to 13,300 ppm) increase engine wear significantly, particularly in conjunction with EGR. Material selection will be key to making cooled EGR work with nonroad fuel.

In the EGR cooler, condensation can occur over a wide range of operating conditions. Condensation in the cooler is a function of the acid/water dew point temperature, which is influenced by sulfur concentration, pressure, and the air-fuel ratio of the engine. Increasing sulfur concentration, increasing pressure, and decreasing air-fuel ratio all increase the dew point temperature and the likelihood of condensation. The fuel sulfur level is not an engine design parameter, but pressure and air-fuel ratio can be manipulated by the engine designers. Unfortunately, these factors tend to work against each other such that higher air-fuel ratios require higher pressures and vice versa, so that this trade-off, while it will certainly play into the engine optimization, will not be able to completely eliminate condensation in the EGR cooler. Lower coolant temperatures also increase the condensation rate.¹ A simple solution to this could be to turn EGR off until the coolant temperature has reached its normal operating temperature. In any case, condensation will still occur in the EGR cooler. Work has already been done for EGR coolers that shows materials are available that provide suitable corrosion resistance. Higher grade stainless steels and fabrication methods (e.g., laser welding rather than brazing) will allow EGR coolers to live in this corrosive environment.

Direct corrosion of the engine components also occurs in the cylinder. Acid condensation can corrode the piston, rings, and liner. The most damaging corrosion occurs at the top ring reversal area of the liner. Due to the slow piston speed in this area, lubrication is poor, making the liner surface finish critical for oil control. The liner surface finish is carefully selected and controlled to hold oil and provide lubrication for the rings. The top ring reversal area is the liner area most exposed to high pressure combustion products, including acids. Corrosion in this

area compromises the surface finish causing loss of lubrication and further accelerated wear. Therefore it is very important to select the ring and liner materials to be corrosion resistant. In addition to careful selection of the basic materials, plasma sprays can be used to provide corrosion resistance. Tests have shown these sprayed on coatings (like FFS, a material containing 434 stainless steel and Ni-BN) to be effective in reducing formic acid corrosion of iron liners.

Condensation can also occur when the EGR is mixed with the lower temperature fresh air in the engine intake system. The same factors influence the dew point temperature and condensation rate as in the EGR cooler, with the addition of the fresh air temperature. The fresh air temperature is a function of the ambient temperature, engine load (boost level and compressor efficiency), and aftercooler efficiency. As discussed previously, the aftercooler efficiency of nonroad equipment is not likely to be as high as found in highway equipment due to the lack of ram air. Consequently, the fresh air temperature will be higher than on highway. This will reduce the condensation rate somewhat compared to highway engines at similar conditions. What this means is that the condensation rate will not quite scale directly with the fuel sulfur content but will be somewhat less depending on the particular engine and equipment.

Since condensation will be occurring in the intake system downstream of the EGR introduction point, the materials that it comes in contact with will need to be corrosion resistant. Corrosion in the intake system is particularly troublesome because it can accelerate cylinder kit wear. As the intake system corrodes, the corroded materials can flake off and find their way into the engine. Some of these corrosion products, like aluminum oxide, are very good abrasives that can rapidly abrade the cylinder liner and rings. To prevent this, coatings or materials can be used to reduce or eliminate the exposure of corrosion susceptible materials. Stainless steels or improved corrosion resistant aluminum materials might be used in place of aluminum castings in the intake system, for instance.

Should nonroad engine and equipment manufacturers choose to use cooled EGR as part of a Tier 3 engine emission strategy, we believe that they may have to make some changes in material selection and maintenance intervals compared to similar highway engines due to the high sulfur content of nonroad diesel fuel. However, we understand that the identification of these material changes will come as a natural extension of the extensive work already done by highway engine manufacturers and their suppliers to develop cooled EGR systems. It may be possible given the rapid progress of highway EGR system development that no changes will be necessary due to the very high quality and durability levels expected of highway diesel engines. Additionally, the use of low sulfur highway diesel fuel is a common practice for many users of nonroad equipment and would for those users reduce any increased maintenance levels expected when compared to highway engines.

f. Tier 3 Technology Assessment Conclusions

In 1998, when EPA set the Tier 3 emission standards, it did so with the belief that the technologies being developed for highway diesel engines (especially cooled EGR) could be carried over and applied to nonroad diesel engines. Since that time EPA has followed developments in both the highway and nonroad diesel engine markets and has observed continued advancements in emission control technologies. Moreover EPA has observed an increasing rate of highway engine technologies (especially electronic fuel system technologies) being applied to nonroad engines.

While EPA predicted that highway engine technologies could be applied to nonroad engines, the effectiveness of such an approach and the preferred technology paths developing from it are different from what EPA had assumed. In 1998 EPA assumed that cooled EGR would be the primary technology used by all engine manufacturers to comply with the Tier 3 standards. It now appears to EPA that there are several different system approaches incorporating existing technologies available to diesel engine manufacturers that will allow for compliance with the Tier 3 emission standards. The fact that diesel engine manufacturers have identified multiple system solutions to Tier 3 compliance reinforces EPA's assessment that the Tier 3 emission standards are feasible.

The application of highway engine technologies to nonroad engines can enable substantial reductions in NO_x+NMHC emissions to the levels required by the Tier 3 emission standards. While some changes to the technologies may be required in order to address unique nonroad issues, the fact that the Tier 3 emission standards do not begin to phase-in until 2006 (fully phased-in in 2008), leads EPA to conclude that there is ample lead time for these design enhancements to occur. In addition, the fact that a nonroad engine and equipment manufacturer (Caterpillar) has provided evidence that it can meet the Tier 3 standards four years in advance of 2006 provides EPA with additional assurance that the standards are feasible. For all of these reasons, EPA continues to believe these standards are technologically feasible.

g. Tier 2 Under 50 hp Technology Assessment

Nonroad diesel engines with power ratings under 50 hp were not regulated in EPA's 1994 rulemaking that set the first Tier 1 standards. Instead, Tier 1 standards for these engines were set in the 1998 rulemaking and took effect in 1999 and 2000 (phased in by horsepower). Tier 2 standards were also set for these small engines in the 1998 rule, to phase in over 2004-2005 (see Table below). These Tier 2 standards were set at stringency levels comparable to the Tier 2 standards for larger nonroad engines, which in turn were based on conventional in-cylinder control technologies already in-use in highway engines, but with allowance made in the standards levels for aspects of design and operation unique to small engines, such as the priority put in this market on simple, low-cost, non-electronic designs. Shorter useful life requirements were

also adopted. Even with these allowances made, EPA felt that it was appropriate to include the small Tier 2 engines in the technology review because at the time of the 1998 rulemaking these engines had never been regulated by EPA, and it expected that a review undertaken after Tier 1 designs and certification test results became available would be beneficial.

Small Nonroad Engine Tier 2 Standards (g/hp-hr)

Engine Power	Model Year	NMHC+ NOx	CO	PM
hp<11	2005	5.6	6.0	0.60
11#hp<25	2005	5.6	4.9	0.60
25#hp<50	2004	5.6	4.1	0.45

EPA has reviewed the latest certification testing data available in its publicly available certification database for Tier 1 engines in the under 50 hp class, consisting of 220 engines certified for the 2001 model year. Although Tier 2 standards do not take effect until 2004 at the earliest, many of these Tier 1 engines are already meeting the Tier 2 standards levels, as shown below. Although more indirect injection (IDI) engines meet the Tier 2 levels than direct injection (DI) engines, there is appreciable compliance demonstrated in both categories and across a broad range of power ratings and manufacturers.²

Among the engines that do not already meet the Tier 2 standards, roughly half of both the DI and the IDI engines do comply with the PM standard and exceed the NOx+NMHC standard by only 10 percent or less. All 220 engines demonstrated compliance with the Tier 2 carbon monoxide standard level. EPA believes that this test data, provided on engines already marketed using conventional technologies of proven durability, combined with the 3 to 4 years of lead-time remaining before Tier 2 implementation, shows conclusively that the Tier 2 small engine standards are feasible.

² DI engines inject diesel fuel directly into the combustion chamber. IDI engines employ a pre-mixing side chamber, which allows lower injection pressures. Both types of engines are common in the small nonroad diesel market and were considered in the 1998 rule in its analysis of standards feasibility.

Tier 1 Engine Compliance With Tier 2 Standards

	Tier 2 Compliant Engine Families	Total Engine Families	Percent Tier 2 Compliant
<11 hp			
IDI	9	12	75%
DI	4	18	22%
IDI+DI	13	30	43%
11-25 hp			
IDI	44	50	88%
DI	3	16	19%
IDI+DI	47	66	71%
25-50 hp *			
IDI	44	55	80%
DI	7	60	12%
IDI+DI	54	124	44%

- For this hp category, the sum of IDI and DI engines does not equal the indicated total number of engines because the certification information for 9 engines did not specify the fuel system.

h. Dealing With Future Air Quality Impacts

Nonroad diesel emissions contribute to air pollution known to have a wide range of adverse health and welfare impacts. Emissions from nonroad diesels contribute a substantial percentage of the precursors or direct components of ambient concentrations of ozone, PM, sulfur and nitrogen compounds, aldehydes, and substances known or considered likely to be carcinogens. EPA has concluded that diesel exhaust is likely to be carcinogenic to humans by inhalation at occupational and environmental levels of exposure. Nonroad diesel engine emissions also contribute to adverse environmental effects including visibility impairment, acid rain, nitrification and eutrophication of water bodies.

Today, ground-level ozone and particulate matter remain a pervasive pollution problem in the United States. In 1999, 90.8 million people (1990 census) lived in the 31 areas designated as Nonattainment areas under the 1-hour ozone national ambient air quality standards (NAAQS). Studies of 6 to 8 hour

exposures showed health effects from prolonged and repeated exposures, at moderate levels of exertion, to ozone concentrations as low as 0.08 ppm. Prolonged and repeated ozone concentrations at these levels are common in areas throughout the country, and are found in areas that are exceeding, and areas that are not exceeding, the 1-hour ozone standard. For example, 153 million people, or 87 percent of the total population in counties evaluated (176 million), lived in areas with 2 or more days with concentrations of 0.09 ppm or higher in 1998, including areas currently meeting the 1-hour NAAQS.

The most recent PM₁₀ monitoring data indicate that 14 of the designated PM₁₀ Nonattainment areas with a 1999 population of 23 million violated the PM₁₀ NAAQS between 1997 and 1999. In addition, there are 25 unclassifiable areas that have recently recorded ambient concentrations of PM₁₀ above the PM₁₀ NAAQS. Current 1999 PM_{2.5} monitored values, which cover about a third of the nation's counties, indicate that at least 40 million people live in areas where long-term ambient fine particulate matter levels are at or above 16 Fg/m³. This 16 Fg/m³ threshold is the low end of the range of long term average PM_{2.5} concentrations in cities where statistically significant associations were found with serious health effects, including premature mortality.

Future inventory projections suggest that adverse health effects caused by air pollution will continue in the future unless additional emission reductions are achieved. Emissions of NO_x, VOC, PM, and SO_x from all source categories (i.e., mobile, area, stationary) that contribute to ambient concentrations of ozone, diesel PM, and fine particulate matter are projected to begin increasing between 2010 and 2025 as economic growth overtakes expected emission reductions from current control programs. Since the 1998 nonroad diesel engine rulemaking, the belief that further action is warranted has been reinforced by growing evidence that diesel engine exhaust causes serious health problems. EPA has recently put in place programs to dramatically reduce emissions from highway diesel vehicles. As a result, nonroad diesel engines, already a major source of harmful particulate matter and ozone-forming compounds, will become a dominant mobile source of these emissions in the future.

Section 213 (a)(3) of the Clean Air Act requires EPA to establish nonroad engine standards that provide for the "greatest degree of emission reduction achievable through the application of technology which the Administrator determines will be available for the engines or vehicles to which such standards apply, giving appropriate consideration to the cost of applying such technology within the period of time available to manufacturers and to noise, energy, and safety factors associated with the application of such technology". In light of the progress being made in the development of technologies to reduce emissions from highway diesel engines and the continuing concerns about nonroad diesel impacts on air quality discussed above, we believe it may be appropriate to move the control of nonroad emissions beyond the Tier 3 program. Considering the information gathered in conducting the recent highway diesel engine and fuel rulemaking, we

also believe that a similar “systems” approach is likely to be the most cost-effective way to pursue this goal. The systems approach recognizes that significant further reductions in nonroad emissions will require fuel quality improvements and so it entails adopting nonroad fuel and engine changes in a single coordinated program.

There are many possible ways of pursuing future standards for nonroad engines and fuels. For example, one manufacturer has suggested that aftertreatment-based PM standards be introduced in 2009, along with 15 ppm sulfur fuel, with more stringent NOx standards beginning to take effect in 2012. This implementation schedule may be later than appropriate under the provisions of the Clean Air Act, but a standards-setting approach along these lines may merit consideration. In any approach taken, consideration would need to be given to appropriate lead-time periods, phase-in and other flexibility provisions, test cycles, in-use emissions control measures, coordination with highway fuel and engine regulations, State Implementation Plan emission reduction needs, and international harmonization goals. We would also expect the rulemaking to consider the interaction between the existing and new standards, including any ways in which a coordination of requirements under these sets of standards might be appropriate.
