Status of Lead Phase-out in Gasoline in Sub-Saharan Africa

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Prepared by

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Chapter I Introduction

A Background

Urbanization and increasing motorization in sub-Saharan Africa have resulted in a high level of degradation of the air quality particularly in the large cities. Such degradation is the cause of significant health problems and economic losses. The objective of the Clean Air Initiative in Sub-Saharan African Cities (CAI-SSA), launched in 1998, is to improve air quality through the reduction of air pollution originating, particularly, from motorized transport.

The CAI-SSA, sponsored by the World Bank in collaboration with a number of partners, is part of a global effort to protect the urban environment. In Sub-Saharan Africa, these partners include in particular the World Health Organization (WHO), the United Nations Environment Programme (UNEP), the European Union (EU), the Belgium Cooperation, the Nordic Trust Fund for Environmentally and Socially Sustainable Development (NTFESSD), the Energy Sector Management Assistance Programme (ESMAP), the International Petroleum Industry Environmental Conservation Association (IPIECA), and national environmental protection agencies, in particular the United States Environmental Protection Agency (USEPA).

The CAI-SSA has concentrated its efforts on the phase-out of lead from gasoline, throughout the continent, as a first priority. To launch the Initiative a regional conference was held in June 2001 in Dakar, where the decision was made by the represented governments and the oil industry to eliminate lead in gasoline throughout SSA by the end of 2005. A Steering Committee meeting in March, 2003, confirmed the priority of lead phase-out while a second regional conference, held in Nairobi in May of 2004, demonstrated that considerable progress had been achieved : over 50 % of all gasoline sold in SSA in 2003 was unleaded and eight SSA countries had completely phased out leaded gasoline.

The third Steering Committee meeting, held late October 2004, in Brussels had among its objectives the following :

1. to identify priority actions for lead phase-out in the countries where the process was not firmly in hand ;
2. to agree on a process that allows for continued improvement in the quality of motor fuels (gasoline and diesel), including : a plan to prevent fuel adulteration ; efforts to harmonize technical specifications for fuels at the sub-regional level and the reduction of the sulfur contents of motor fuels ;
3. to begin talks on regulations to improve overall vehicle standards and to develop air quality monitoring procedures in large SSA cities ;
4. to present the scope of work and identify the local and outside partners who will cooperate in city case studies planned for the coming months (i.e. a two-stroke engines case study in Cotonou (Benin), and an air quality evaluation case study in Antananarivo, Madagascar) ;

5. to exchange information on the specific work programs and projects of the partner organizations and to establish synergies and complementary activities.

The report that follows illustrates how lead phase-out has been pursued country by country and presents the status of the current technical specifications for gasoline and diesel. This will become the base-line to continue efforts to improve the quality of fuels in SSA in the coming years.

B Study Objectives

The main objective of this assignment is to maintain the momentum of this highly successful multi-partner initiative. To describe what progress has been accomplished to date as regards lead phase-out from gasoline country by country and to identify those which still might require assistance to achieve the target phase-out date, December 2005.

A secondary objective is to set out the sulphur contents, in both gasolines and gasoil (diesel), included in the specifications of each country in preparation for shifting the focus of the oil-related aspects of the CAI towards reducing the sulphur levels in both fuels. As many sets of formal unleaded (UNL) gasoline and gasoil specifications as possible have been obtained and are included as an Annexe to the Report.

At the request of the World Bank the Report may be presented at a possible meeting in Washington DC in May 2005 and widely disseminated thereafter.

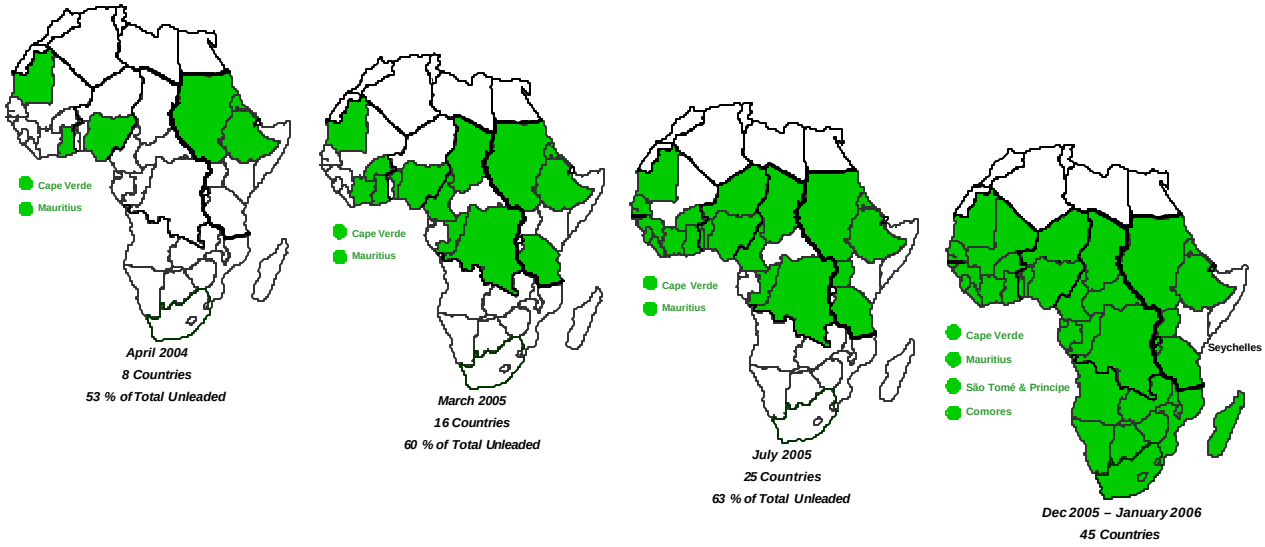
The overall approach was sub-regional and concentrated efforts first in eliminating lead in the gasoline produced by the different refineries in SSA, and second in demonstrating that importing countries – such as Mauritania, Ethiopia and Tanzania - could easily switch to unleaded gasoline. This approach was used as the unleaded gasoline produce by a refinery in one country is usually consumed neighbouring ones as well.

C Summary of Lead Phase-out Findings

The CAI's impressive lead phase-out momentum continues. As indicated in Figure 1, the ambitious target set by the Dakar Declaration in June 2001 to phase out leaded gasoline in SSA by the end of 2005 should be achieved :

- the number of (confirmed) countries which have already switched to UNL as of March, 2005 has risen from 8 to 13 with at least a further 8 expected by mid-2005 ;
- in 2004 unleaded gasoline accounted for an estimated 57 % of SSA consumption of all gasolines as opposed to 53 % in 2003 ; it should rise to 61 % by July, 2005 ;
- phase-out programmes are much more advanced. In particular, most refineries in SSA have either phased out lead (7 out of 18) or have firm plans to do so (10 out of the remaining 11) ;
- by the end of 2005 virtually all of SSA is expected to have phased out leaded gasoline with only a few countries in East Africa possibly failing to meet the target.

Figure N° 1
Progress Towards Lead Phase-out in Sub-Saharan Africa (SSA)
Number of Countries and Estimated Share of Unleaded Gasoline Out of Total Gasoline Consumption



Several factors contributed to this achievement, including :

- Experience gained in other parts of the world where leaded gasoline has already been phased out, including a better understanding of the negative health impact of even small amounts of lead.
- For countries which import their transport fuels, the price of unleaded gasoline is now typically lower than that of leaded gasoline.
- The strategy adopted which emphasizes a swift changeover to unleaded gasoline.
- The possibility of reducing the octane of gasoline by several octane numbers to the range of 90-91 RON, which is sufficient for the vast majority of new and existing vehicles.
- The political support gained at the Johannesburg Sustainable Development Summit (2002), which created the Partnership for Cleaner Fuels and Vehicles (PCFV) under the UNEP secretariat.
- The collaboration of the various international parties noted in Chapter I.A.
- The efforts to create a network of African experts on urban air quality issues.

In all of SSA there is only one significant refiner country of concern : Kenya. Otherwise a number of governments simply need encouragement to finalise their specifications (harmonised to the extent possible) and possibly, in a very few importing countries, take the decision.

Kenya's situation is complex and both economic and political as phasing out leaded gasoline requires significant investment at its refinery (KPRL). Production of unleaded gasoline at KPRL is tied to the equally important investments needed to improve its overall white oil yield and to produce gasoline of a 0.5 % wt sulphur content. The Government will soon decide on the way forward for KPRL. This is a potentially important setback as Kenya is one source of gasoline for its inland neighbours.

In terms of finalising unleaded motor gasoline specifications there is more work to do but progress is being made. Although only 15 countries have issued formal specifications (including 6 of 11 refiner countries) a further 8 (including all of the remaining refiner countries) are working on drafts. Eleven countries are known not to have formal specifications while information has yet to be received from the remaining 14.

D Lead Phase-out Recommendations

It is recommended that either the World Bank or the UNEP approach[1] the appropriate ministries responsible for establishing gasoline and gasoil specifications in several of the refiner countries which have not yet finalised their UNL specifications and offer them, if they so wish, further assistance in establishing their specifications. (And, in the case of Kenya, which has finalised its specifications, help in implementing its lead phase-out Plan.) Such an approach is particularly recommended for Angola, Gabon and, to a lesser extent, Congo (Brazzaville).

The appropriate ministries responsible for establishing gasoline and gasoil specifications in some importing countries should also be approached to see if they wish help in ensuring the phase-out of leaded gasoline by the target date. This especially applies to :

- Democratic Republic of the Congo (DRC) ;
- Madagascar ;
- Moçambique ;
- Seychelles

Other importing countries where it would be desirable to offer support include Sierra Leone and Zimbabwe.

E Sulphur Content in Gasoline and Gasoil

In preparation for the next meetings, Tables N^{os} 1 and 2 set out the sulphur contents of both gasolines and gasoil for the approximately 35 countries in SSA which provided information. It shows them to be high relative to the EU and the USA but comparable to Latin America.

About 80 % of all gasoline sold in SSA (for countries for which data is available) is less than 1,000 ppm sulphur. On the surface this is positive relative to EU and US levels of just a few years ago. However, essentially all of this is consumed in Nigeria and South Africa. Otherwise over half is either unknown or > 2000 ppm, 35 % is < 2,000 ppm but > 500 ppm and only 12 % is < 500 ppm.

[1] To facilitate the exchange of information and organize visits to the remaining countries, as well as to start a process for the harmonization of the petroleum products specifications in the region, meetings are proposed to take place early June, 2005.

Table N° 1

Estimated 2004 Motor Gasoline Sales by Sub-region by Sulphur Levels : k m3

% wt ppm	Unknown	> 0.2 % > 2000	> 0.1< 0.2 > 1000 < 2000	> 0.05 < 0.1 > 500 < 1000	< 0.05 < 500	Total
Nigeria				8,108		8,108
South Africa				10,980		10,980
Other SSA Countries	3,087	447	1,302	1,109	925	6,870
Total SSA	3,087	447	1,302	20,197	925	25,958
Percent	12%	2%	5%	78%	4%	100%
Total excl Nigeria & South Africa	3,087	447	1,302	1,109	925	6,870
Percent excl Nigeria & South Africa	45%	7%	19%	16%	13%	100%

Source : Annexe C

Table N° 2 shows that, South Africa excepted, almost all gasoil sold in SSA is greater than 0.1 % wt or 1,000 ppm. This compares with levels in :

- 2002 of 350 ppm in the EU and 500 ppm in the USA ;
- 2005 of 50 ppm in the EU ;
- 2006 of 15 ppm in the USA ;
- 2005 (proposed) of 2,000 ppm in Latin America.

South Africa is finalising a standard for January, 2006 of 500 ppm and already has available “city diesel” at 50 ppm.

Table N° 2

Estimated 2004 Gasoil Sales by Sub-region by Sulphur Levels : k m3

% wt ppm	Unknown	> =0.5 > = 5000	> = 0.1 < 0.5 > =1000 < 5000	< 0.1 < 1000	Total
Nigeria			1,994		1,994
South Africa				7,679	7,679
Other SSA Countries	4,157	1,078	4,375	991	10,601
Total SSA	4,157	1,078	6,369	8,670	20,274
Percent	21%	5%	31%	43%	100%
Nigeria & South Africa			1,994	7,679	9,673
Percent			21%	79%	100%

Source : Annexe D

Note : The volumes given above relate only to the 24 countries which supplied gasoil consumption information.

(1) For the following 6 West African countries only : Ghana, Liberia, Mali, Mauritania, Senegal and Sierra Leone.

(2) For the following 4 West Central African countries only : Cameroun, Congo (Brazza), Gabon & Sao Tome & Principe.

(3) For the following 8 Southern African countries only : Angola, Botswana, Madagascar, Malawi, Mocambique, Namibia, South Africa & Zambia.

(4) For the following 6 East African countries only : Eritrea, Ethiopia, Kenya, Mauritius, Rwanda, & Tanzania.

F Report Format and Study Administration

This Draft Final Report contains seven chapters, this introduction, five chapters covering lead phase-out for each of the sub-regions and a final chapter addressing sulphur contents in both gasoline and gasoil. In addition supporting material is provided in the Annexes, in particular information sources and detailed gasoline and gasoil specifications for some 35 countries which responded to the Consultant's request.

The overall approach was sub-regional with SSA divided into five sub-regions. Within each sub-region efforts were first focused on changing the quality of the gasoline produced by the different refineries in SSA, and second in demonstrating that importing countries – such as Mauritania, Ethiopia and Tanzania - could easily switch to unleaded gasoline available on international markets, typically at lower prices. Refiner countries were the primary focus as gasoline produced by one refinery is usually consumed in neighbouring countries as well.

The five sub-regions are presented counter clock-wise starting with West Africa. (It should be noted that, at its request, Angola has been included in Southern Africa instead of West Central Africa as was the case in Working Paper # 19.) Within each sub-region the countries are discussed in alphabetical order in two groups : first refiner, then importing, countries.

The work has been done under the direction of Franck Bousquet and Eleodoro Mayorga-Alba by Letter of Appointment # 7638781 dated Feb 3rd, 2005. It has been undertaken in collaboration with, and the support of other institutions member of the CAI. Their assistance and that of the Bank (including World Bank field offices) various national oil companies, and several of the multinational oil companies are gratefully acknowledged.

The information provided is based on information collected from the different CAI institutions and telephone calls, faxes, and e-mails to each of the almost 50 SSA countries, including, in some cases, many follow-ups. An office-based Study was possible because of the previously-noted help and the Consultant's prior work in SSA. Specific sources for the information contained in this Draft Report are given in Annexe A. Every effort has been made to ensure the accuracy of the information ; the Consultant accepts full responsibility for any errors.

Chapter II Status of Lead Phase-out in West Africa

A Overview

There has been considerable positive movement in West Africa towards phasing out leaded gasoline. The second of the sub-region's three refineries, la Société Ivoirienne de raffinage (SIR) in Abidjan, phased out lead by January 1st 2005 while the third, la Société Africaine de raffinage (SAR) in Dakar is committed to phasing out all lead by July 2005. These two, together with the Tema oil refinery near Accra, which stopped producing leaded gasoline in 2003 , are by far the major suppliers into all eight other West African countries (and Benin, Niger and Togo). Thus there is a high probability the entire sub-region will be lead free by the end of 2005.

Table n? 3 summarises the information obtained on the status of lead phase-out from gasoline through this up-date of WP # 19 by a comparison with the UNEP information as of late 2004. Similar information is shown on the combined map of West Africa and Nigeria and neighbours given in Figure N° 2 as these two sub-regions are integrated A country-by-country commentary follows in alphabetical order starting with refiner countries.

Table N° 3

March, 2005 Up-date of UNEP Information on Lead Phase-out Plans : West Africa

	UNEP information March 16, 2005	World Bank March 2005 Up-date				
		Phase out date				Status / comment
Refiner countries		**Completed as of Mar ' 05**	**July '05**	**Dec '05**	**Jan '06**	
Côte d'Ivoire	Phased out Jan ' 05	Yes				Same as UNEP
Ghana	Phased out	Yes				" " " "
Sénégal	End 2005		Firm			July ' 05
Importing countries						
Burkina Faso	No information	Yes				Followed Côte d'Ivoire
Cape Verde	Phased out	Yes				Same as UNEP
The Gambia	Intend to phase out by July ' 05		Firm			" " " "
Guinea	No information	No information	Likely			Thought supplied from Sénégal
Guinea Bissau	" " " "	" " " "	Likely			Thought supplied from Senegal
Liberia	Preparing national action plan		Likely			Sources product from regional refineries
Mali	Working with WB to develop action plan			Firm		Supply sources will be UNL by July
Mauritania	Phased out	Yes				Same as UNEP
Sierra Leone	No information		Likely			

Source : UNEP and Annexe A

B Refiner Countries

It is noteworthy that the three West African refineries of Ghana, Côte d'Ivoire and Senegal, have coordinated their plans both to eliminate lead from gasoline and also to harmonize their fuels' technical specifications.

Côte d'Ivoire

To achieve a satisfactory octane level without lead the Société ivoirienne de raffinage (SIR) went (in January, 2005) from two grades of 95 RON and 87 RON to a single grade of 91 RON without use of any octane enhancing additive.

Ghana

Ghana has already phased out leaded gasoline and has formal 91 RON UNL specifications for domestic production. To do so it allows MMT in its local refinery-produced gasoline but imported gasoline must be both additive free and 93 RON. Indeed, it has gone beyond lead phase-out and issued environmental regulations related to vehicle emissions which are applicable to both transportation fuels, gasoline and gasoil.

Sénégal

The Société africaine de raffinage (SAR) plans to effect lead phase-out in July 2005 by reducing the RON of Super from 95 to 91 and maintaining an 87 RON UNL grade which is intended exclusively for use in outboard motors of the fishing fleet. Service stations will only carry the single 91 RON grade. Sénégal is in the process of drafting formal UNL specifications.

C Importing Countries

Of the remaining nine West African countries two are already UNL (Cape Verde and Mauritania) and at least four will likely move to UNL by July 2005 although in all probability Mali and Guinée Conakry will also. No information is available for the ninth, Guinea Bissau which may get its supplies from Angola and therefore should also switch by Dec. 2005.

Here follows the progress in six of the West African importing countries.

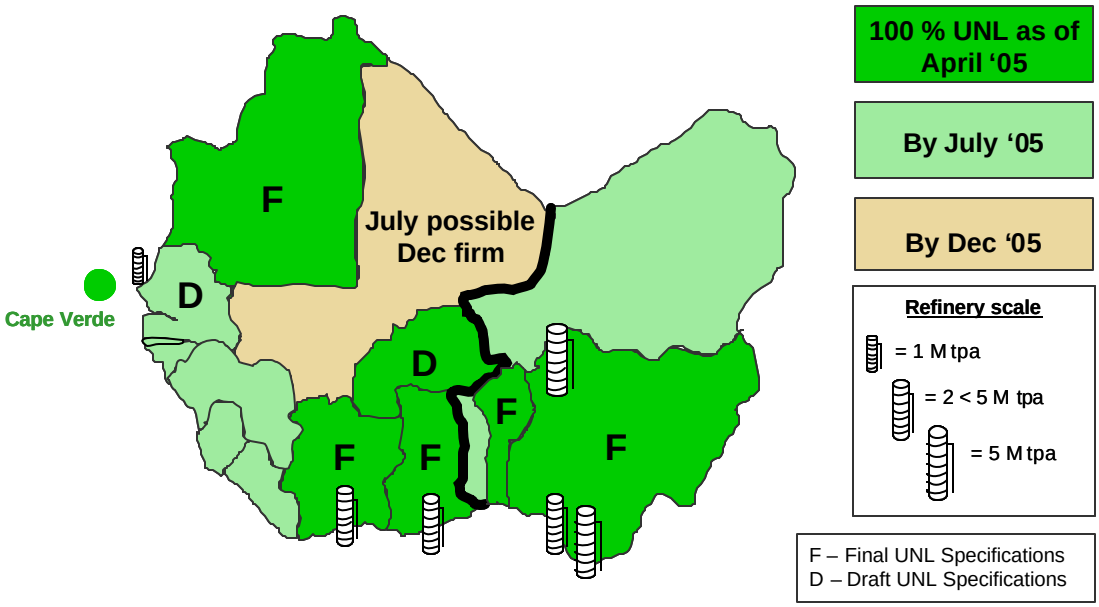
- **Burkina Faso** : While not confirmed, it is felt UNEP's information that Burkina Faso will follow the Côte d'Ivoire's lead and phase-out lead by mid-2005 is correct. All of Burkina's supplies come from : the SIR refinery, Ghana or Togo, all of which will be unleaded by July, 2005.Their Direction des Hydrocarbures possibly requires technical assistance to formalise UNL specifications.
- **Gambia** advised they will follow SAR's lead (met with UNEP week of March 14th) but has no plans to develop formal government specifications.
- **Guinea Bissau** is thought to be supplied from the SAR refinery and will likely switch when Sénégal does.
- Also **Liberia** will follow SIR's lead but its government is not in a position to develop either a plan or specifications.
- **Sierra Leone** has had lead phase-out meetings and 'reactive' plans are underway ; they expect to follow SIR's lead and will prepare formal UNL specifications. CAI support would be useful, but is not critical.
- **Mali** received considerable World Bank assistance late in 2003[2] to develop an Action Plan and is moving forward. Mali is definitely committed to achieve the December 2005 target and is the process of developing UNL specifications.

[2] World Bank CAI WP # 16 dated December, 2003.

- No information was obtained for **Guinée Conakry**, but it is thought to be supplied from Dakar ; thus the assumption that it will switch by July this year.

Figure N° 2

Progress Towards Lead Phase-out in West Africa & Nigeria and neighbours



Chapter III Status of Lead Phase-out in Nigeria & Neighbours

There is no reason why this sub-region should not meet the Dec. 2005 target for complete lead phase-out.

A Nigeria

Nigeria's Nigerian National Petroleum Company (NNPC) has confirmed yet again that since late 2002 Nigeria only consumes UNL gasoline at 90 RON. It remains, however, for them to secure funding to dismantle the lead storage and doping facilities at two of their refineries.

B Importing Countries

The other three importing countries are supplied largely from Abidjan and will almost certainly meet the Dec. 2005 goal :

- **Benin** has already phased lead out (Dec 2004) and has formal UNL specifications in place ;
- **Niger** has said it will go along with its neighbours ; but has not started preparing formal UNL specifications. Its nascant regulatory body could benefit from some low level support to complete them ;
- **Togo** has advised it will phase-out leaded gasoline by July '05 but the government has no formal specifications and there are no plans to prepare any. The Shell operated terminal in Lomé does have standards.

Table N° 4

March, 2005 Up-date of UNEP Information on Lead Phase-out Plans : Nigeria & Neighbours

	UNEP information March 16, 2005	World Bank March 2005 Up-date				
			Phase out date			Status / comment
		Completed as of Mar ' 05	July '05	Dec '05	Jan '06	
Refiner countries						
Nigeria	Lead-free in 2003	Yes				Same as UNEP
Importing countries						
Benin	Phased out Dec ' 04	Yes				Same as UNEP
Niger	Phase out date to be confirmed		Likely			Will follow Togo & Benin
Togo	To phase out mid 2005		Firm			Same as UNEP

Source : UNEP and Annexe A

Chapter IV Status of Lead Phase-out in West Central Africa

A Refiner Countries

Significant progress has been achieved in West Central Africa since April, 2004 as summarised in Table N° 5 and Figure N° 3. In particular all three of the sub-region's refineries have definite plans to eliminate lead from gasoline during 2005. Cameroun's Société nationale de raffinage (SO.NA.RA.) stopped producing leaded gasoline as of January, 2005 and the Government enacted formal UNL specifications in May 2004 with a single grade of 91 RON . Cameroun is, therefore, now fully UNL.

The Government of the Congo has a process in place to move formally to UNL, including draft specifications. At this point all that is needed is for the Government to sign the draft decrees. The Congo's Sociéte congolaise de raffinage (CORAF) *de facto* has been supplying only 91 RON UNL since March, 2005.

Table N° 5

March, 2005 Up-date of UNEP Information on Lead Phase-out Plans : West Central Africa

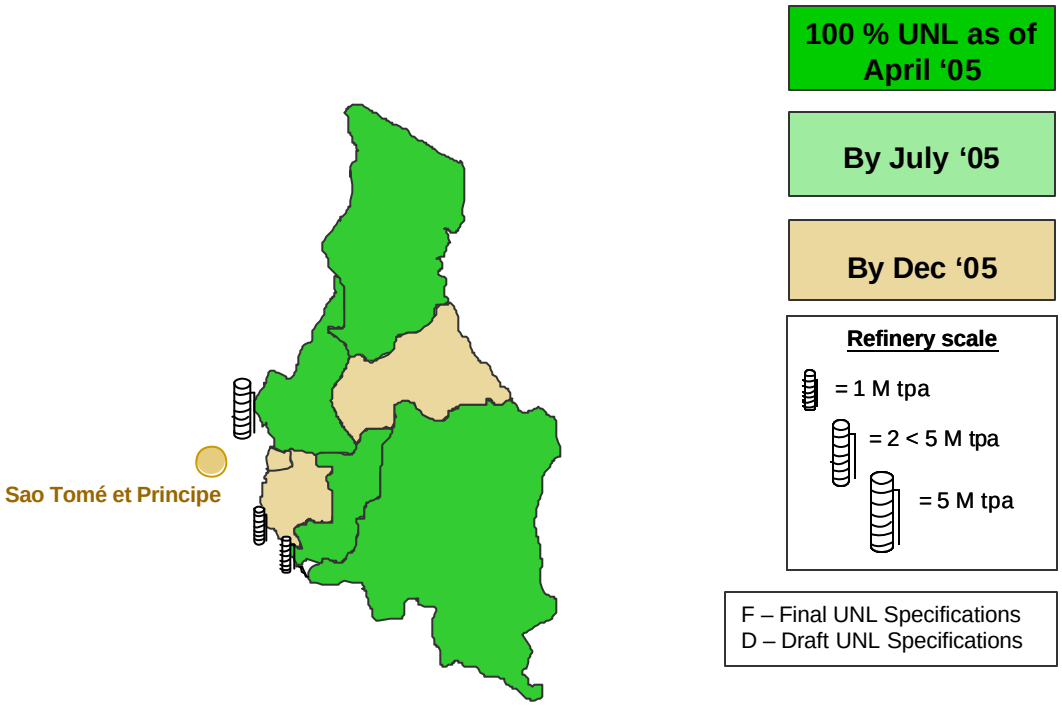
	UNEP information March 16, 2005	World Bank March 2005 Up-date				
		Phase out date				Status / comment
Refiner countries		Completed as of Mar ' 05	July '05	Dec '05	Jan '06	
Cameroun	Unleaded as of October 2004	Yes				Probably done by Jan ' 05
Congo (Brazza)	No information	Yes, *de facto*				Formal UNL specifications await approval
◀ Gabon	Will start producing unleaded at the end of 2005			Firm		Same as UNEP
Importing countries						
D R Congo	To phase out in Feb ' 05	Yes, de facto				Formal UNL specifications await approval
Equatorial Guinea	End 2005			Likely		Thought supplied from Angola
République centrafricaine	Imports from Cameroun			Firm		Only buying UNL from May ' 05
Sao Tomé & Principe	No information			Likely		Likely will follow Angola, the sole supplier
Tchad	Imports petrol from Cameroun and Nigeria	Almost certain				Cameroun is the sole formal supplier

Note : Triangle (symbol) preceeding country name and shading indicates CAI support may be beneficial.

Source : UNEP and Annexe A

Gabon has firmly committed to meet the December, 2005 target for lead phase-out. This process will, however, require an important investment for its refinery, the Société Gabonaise de raffinage (SOGARA). La Direction Générale de Raffinage, de la Distribution, des Participations et de la Commercialisation is responsible for developing and implementing the lead phase-out programme. Gabon is in the process of setting up formal product specifications. Specifications currently used are in conformity with those of the Sub-Saharan market.

Figure N^{o} 3
Progress Towards Lead Phase-out in West Central Africa



B Importing Countries

The République centrafricaine has advised it has commenced the shift to UNL gasoline. It now only purchases UNL. However it will take until the end of 2005 for the gasoline in its logistics' system to be fully UNL. The Government is aware of the CAI and has established a Plan within the Ministry de l'Energie, Mines et Hydraulique. The country has no formal petroleum product specifications.

The Democratic Republic of the Congo is well advanced in the phase-out of leaded gasoline. None has been imported through formal channels since March, 2005 and draft specifications for unleaded gasoline (including a reduction in the sulphur content of both UNL gasoline and gasoil) have been agreed upon between the oil industry and the Ministry of Energy. All that is required is official publication of the new specifications, including those of UNL fuel.

It should be noted that the Société d'entreposage des produits pétroliers du Congo (SEP-Congo) will still accept cargos of leaded gasoline up until this official publication takes place. This is because currently both leaded and unleaded fuels are legal.

Sao Tomé et Principe is supplied by Angola and should switch concurrently with them by December, 2005.

As Cameroun supplies 100 % of **Tchad**'s oil products *de facto* Tchad is almost certainly UNL. Based on previous work, Tchad is believed not to have any formal specifications of its own.

No information, is available for **Equatorial Guinea which is** believed supplied by Angola.

Chapter V Status of Lead Phase-out in Southern Africa

Southern Africa ought to be on track to phase-out lead from gasoline by January, 2006 even though South Africa has yet to finalise its UNL specifications. Current and expected plans are summarised in Table N° 6 and Figure N° 4.

Table N° 6

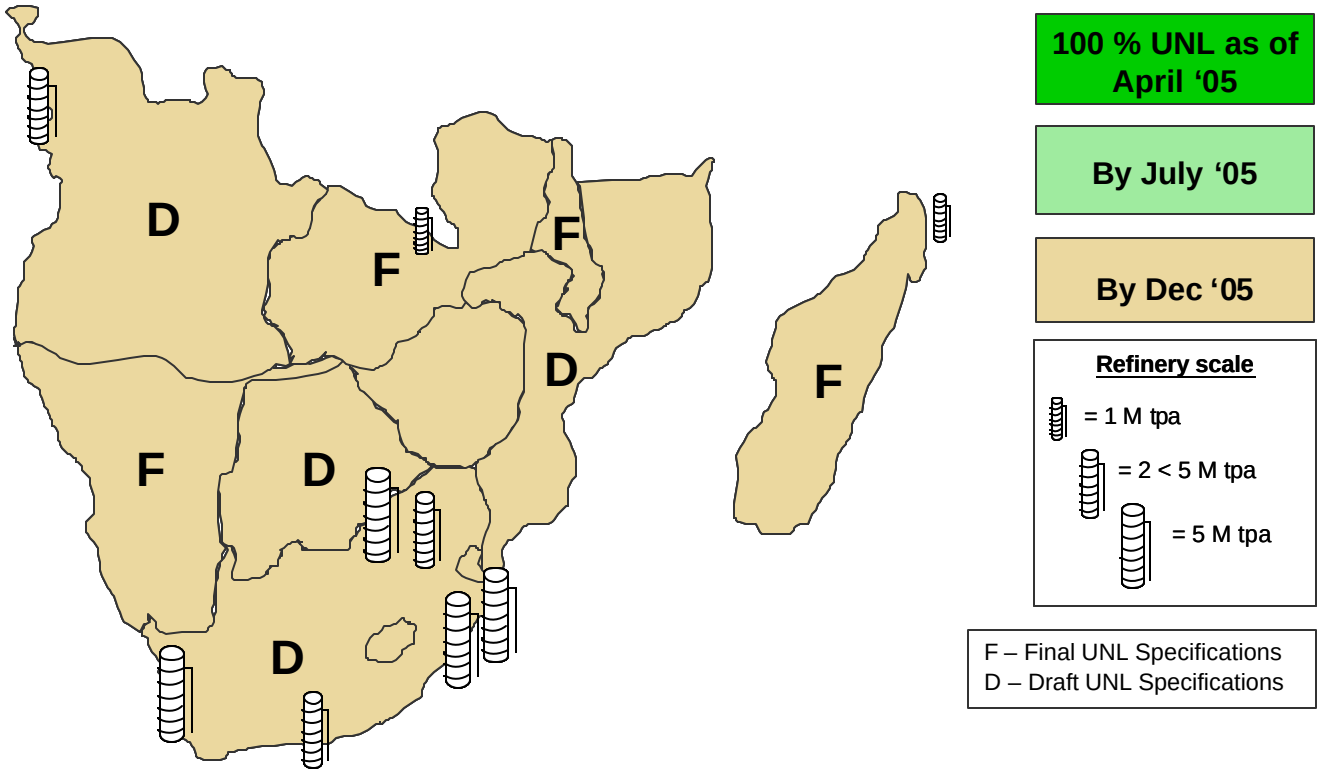
March, 2005 Up-date of UNEP Information on Lead Phase-out Plans : Southern Africa

	UNEP information March 16, 2005	World Bank March 2005 Up-date				
		Phase out date				Status / comment
Refiner countries		Completed as of Mar ' 05	July '05	Dec '05	Jan '06	
Angola	Started to import unleaded as of Dec 2004			Likely		Refinery may not meet date
South Africa	January 2006				Firm	Same as UNEP
Zambia	End 2005			Firm		Same as UNEP
Importing countries						
Botswana	January 2006				Possibly	2006 ; will follow RSA
Lesotho	January 2006				" " "	No information ; will follow RSA
◀ Madagascar	No information				Likely	Definitely, assuming refinery remains closed
Malawi	June 2005				Likely	Start in June ; end in Dec '05 ; will follow Mocambique
◀ Moçambique	June 2005				Firm	Will start in May & finish by Dec ' 05
Namibia	January 2006				" " "	Will follow RSA
Swaziland	January 2006				" " "	No information
Zimbawbwe	Will follow RSA & Moçambique				Likely	Uncertain

Note : Triangle (symbol) preceeding country name and shading indicates CAI support may be beneficial.

Source : UNEP and Annexe A

Figure N° 4
Progress Towards Lead Phase-out in Southern Africa



A Refiner Countries

SONANGOL, Angola's national oil company, advised it plans to move entirely to UNL by the second half of 2005 with two grades of (UNL) gasoline, one at 93 RON and one at 91 RON. By January, 2006 Angola is expected to have only 93 RON UNL. Meanwhile they are in the process of drafting specifications, either at 93 RON or 91 RON.

Also, the Luanda refinery, owned by Total, has developed specific plans to achieve either of the above RONs with the option of adding some MMT. However, the Luanda refinery manager reportedly stated at the Third CAI Steering Committee meeting late 2004 that the refinery might have difficulty completing the modifications at the refinery in time to satisfy the totality of the leaded gasoline national market.

South Africa's government has recently re-confirmed its 2002 decision to remove lead from gasoline with effect from January 1st 2006. The key elements of the transport fuels specifications and the octanes that will be allowed are given in a separate Annexe E-4 and include a range of octanes for both coastal and inland plateau areas. (From a combustion perspective, the latter requires less stringent octanes.) The octanes will go down approximately two numbers from RON 93 to 97 with leaded fuels in 2005 to 91 to 95 RON UNL starting January 2006.

These key specifications will be published for another round of public comment when the Petroleum Products Amendment Act come into operation in mid 2005 as this is required by that Amendment Act.

Zambia should also meet the December 2005 lead phase-out target. According to Zambia's Energy Regulation Board the small joint government-Total refinery has firm plans to move from 93 RON leaded gasoline to 91 RON UNL by the end of 2005 and formal UNL specifications have been issued. Total advises the refinery is already producing 91 RON gasoline a limited share of which is unleaded.

B Importing Countries

The four South African Customs Union countries other than South Africa are almost certain to phase-out leaded gasoline in step with South Africa. **Botswana** currently uses South African standards. Most probably **Lesotho** and **Swaziland** do the same (although no information was obtained for them). **Namibia** advised it has formal UNL specifications in place also based on South Africa's Bureau of Standards' existing UNL standards but leaded gasoline is still sold.

Malawi has advised it is also phasing out leaded gasoline starting in June, 2005. They have issued formal specifications and expect to move, more or less in tandem with Moçambique (see below) such that they should meet the target of Dec 2005.

Madagascar is expected to be entirely UNL by the target date of December, 2005. New Super UNL specifications were formally issued in December, 2004 although most gasoline sold continues to be leaded regular. There is, however, one complication. Madagascar's sole small refinery, privatised several years ago, closed in Sept 2004 for commercial reasons related to the liberalisation scheme adopted by the country. It is likely, but not certain, the refinery will remain closed. As it will be costly for the refinery to produce UNL any re-starting might possibly involve an agreement to allow it to continue producing leaded gasoline.

Moçambique plans to phase-out leaded gasoline by May, 2005 and is in the process of developing UNL specifications. This date is not dependent upon South Africa's timetable as their requirements are very small and Moçambique does not necessarily import from South Africa.

Their National Energy Directorate, within the Ministry of Mines and Energy, has requested information relating to valve seat lubricity additives for older vehicles. The UNEP is supporting Moçambique's Ministry of the Environment ; it might be helpful but not critical for the CAI to invite them to participate any future planned meetings.

Zimbabwe will also likely phase-out leaded gasoline by the end of 2005 by which time all of its neighbours will have done so. Their Ministry of Mines and Energy is reportedly enthusiastic but they lack resources and the country has no formal specifications. It would be helpful both from lead phase-out and capacity-building perspectives to invite them to possible future Steering Committee meetings.

Chapter VI Status of Lead Phase-out in East Africa

A Overview

Table N° 7 and Figure N° 5 summarise the current status of laed phase-out in East Africa. Five countries are confirmed UNL as of March, 2005, more than any other Sub-region. This includes Tanzania which eliminated leaded gasoline in December, 2004 but excludes Rwanda which has not switched as reported in WP # 19. Kenya, however, remains a key constraint. Kenya's situation is complex as phasing out leaded gasoline requires significant investment at its refinery (KPRL) and as yet no decision has been taken regarding these investments.

Table N° 7

March, 2005 Up-date of UNEP Information on Lead Phase-out Plans : East Africa

	UNEP information March 16, 2005	World Bank March 2005 Up-date				
		Phase out date				Status / comment
Refiner countries		Completed as of Mar ' 05	July '05	Dec '05	Jan '06	
◀ Kenya	Jan ' 06			Uncertain		Face decision regarding rfy future
Sudan	Phased out	Yes				No further information
Importing countries						
Burundi	Dec ' 05			Likely		No further information
Comores	No information			Likely		Using Pb 93 RON, plans unknown. Thought supplied by Total
Djibouti	Working with UNEP			Likely		Thought supplied by Total
Eritrea	Phased out	Yes				Same as UNEP
Ethiopia	Phased out	Yes				" " " "
Mauritius	Phased out	Yes				" " " "
Rwanda	Phased out August ' 04			Likely		2004 Decision not yet implemented, it depends on Kenya
◀ Seychelles	No information					No firm decision taken
Somalia	Training program planned					Chaotic ; unable to plan
Tanzania	Phased out Nov 2004	Yes				Same as UNEP
Uganda	Working with UNEP		Likely			Possibly by Dec ' 05

Note : Triangle (symbol) preceeding country name and shading indicates CAI support may be beneficial.

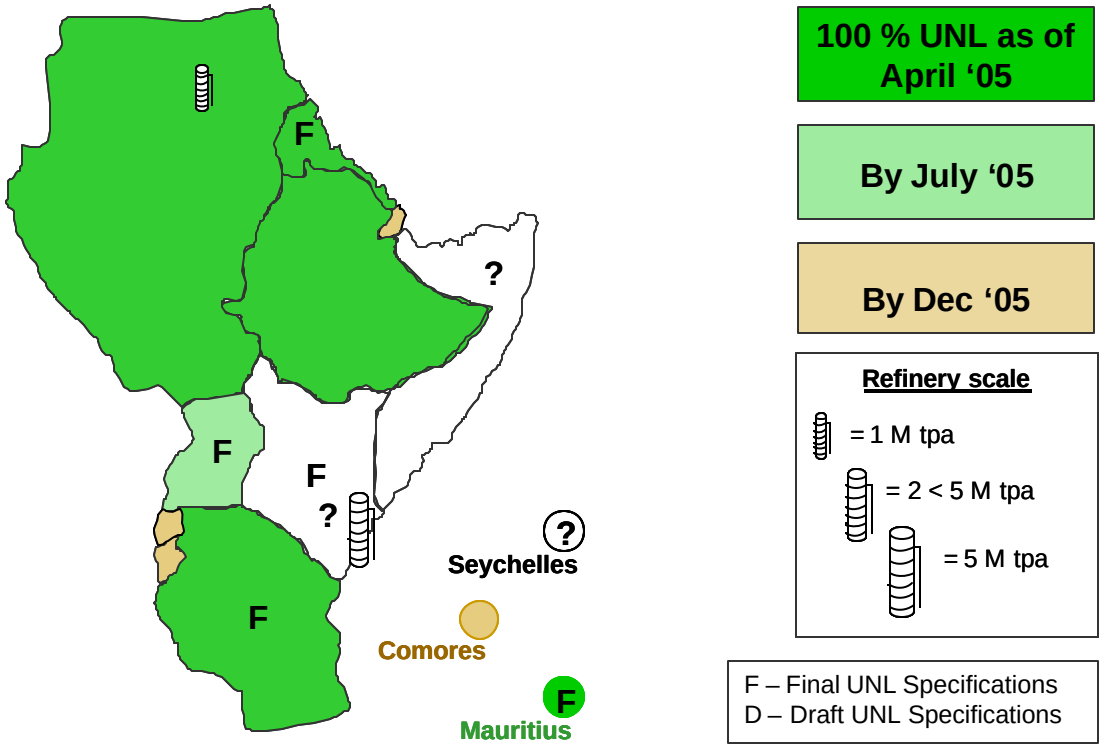
Source : UNEP and Annexe A

B Refiner Countries

Kenya's situation is complex and both economic and political as phasing out leaded gasoline requires significant investment at its refinery (KPRL). Production of unleaded gasoline at KPRL is tied to the equally important investments needed to improve its overall white oil yield and to produce gasoline of a 0.5 % wt sulphur content. The Government will soon decide on the way forward for KPRL. Until it does lead phase-out remains problematic. This is a potentially important setback as Kenya is one source of gasoline for its inland neighbours. Thus they will also find it more difficult to meet the 2005 target.

Sudan has already phased out lead from gasoline although the Consultant has been unable to obtain any new information relating to formal specifications.

Figure N° 5
Progress Towards Lead Phase-out in Eastern Africa



C Importing Countries

Directly linked to resolution of KPRL's situation are the phase-out plans of Rwanda, Somalia, Uganda, and to a lesser extent, Burundi.

UNEP reports **Burundi** will meet the 2005 target although, regrettably, no additional information was obtained to confirm this. And, despite reports in WP # 19 and by UNEP, **Rwanda** has not yet phased out leaded gasoline because of supply problems in Kenya. However, it expects to do so by the beginning of 2006. **Somalia**, still in chaos, obtains its gasoline from nearby countries and is likely to move to UNL when Kenya does. Not surprisingly, there are no formal specifications.

Uganda's programme is also indirectly tied to Kenya's lead phase-out plans. However, the Kenya P/L Company (KPC) has formally advised Uganda's Ministry of Energy and Minerals Development that when Uganda requests UNL gasoline it, the KPC will make the requested quantities available at its terminals in Eldoret and Kisumu.

Uganda remains concerned about lead contamination during shipment by KPC of UNL gasoline as long as Kenya continues to use leaded gasoline domestically even though the pipeline company says it has overcome contamination problems. Uganda has yet to formulate the proper procedures for ensuring its offtakes at Eldoret and Kisumu conform to UNL standards. Until they do Uganda will not phase out leaded gasoline.

The three small Indian Ocean island nations present a mixed picture. The **Comores** is likely to meet the 2005 target but no formal information was obtained other than that la Société Comorienne des Hydrocarbures currently uses 93 RON leaded gasoline supplied, it is understood, by Total. **Mauritius** has phased out leaded gasoline and has formal UNL specifications. The **Seychelles** is still debating whether to honour its Dakar commitment because of concerns about the (apparent) higher cost of UNL. An approach by the CAI to the Government of the Seychelles asking if they would like some assistance in their decision making would be useful

Both **Eritrea** and **Ethiopia** are confirmed to have phased out leaded gasoline. No information is available for **Djibouti** but it is assumed it will meet the target date ; quite possible it already uses only UNL as it is believed supplied by Total, although considerable quantities are smuggled in from Yemen.

Tanzania moved entirely to UNL late 2004 and has issued formal UNL specifications.

Chapter VII Product Specifications

A Motor Gasoline

Table N° 8 summarises the progress made towards developing UNL motor gasoline specifications. Information regarding motor gasoline specifications was obtained from, or for, approximately 35 countries out of 48 in SSA.

Fifteen countries have finalised formal UNL motor gasoline specifications, some of which are reportedly (i.e. Ghana with Sénégal, and Côte d'Ivoire) harmonised within there respective sub-regions. Note, however, that Table N° 8 shows Sénégal has yet to finalise its UNL specifications (based upon a Feb 3rd e-mail from Sénégal's Commission nationale des Hydrocarbures).

Six of the eleven refiner nations are included in the 14 countries which have finalised UNL gasoline specifications :

- Côte d'Ivoire
- Cameroun ;
- Ghana ;
- Kenya ;
- Nigeria ;
- Zambia.

Kenya, however, continues to have legal leaded gasoline specifications and primarily uses leaded fuel. A further five refiner countries are in the process of drafting their specifications :

- Angola ;
- Congo (Brazzaville) ;
- Gabon ;
- Sénégal ;
- South Africa.

Almost ten smaller countries are known not to have formal specifications and do not necessarily need them as either they have only one supplier/receiving terminal or are so fragile they have many other priorities :

- Botswana ;
- Gambia ;
- Liberia ;
- République centrafricaine ;
- Sierra Leone ;
- Sao Tomé & Principe ;
- Somalia ;
- Togo ;
- Zimbabwe.

Table N° 8
Progress Towards Developing Unleaded Motor Gasoline Specifications

Degree of Progress

1-Final 2-Draft in progress 3-Know that none exist
4-Know there are no formal specs but have typicals
5-Don't know if formal specs exist but have typicals 6-No information

	Degree of Progress	Unleaded Gasoline	UNL max weight % S	Document #	Document Date
West Africa					
Burkina Faso	2				
Cape Verde	6	98 RON		Working papers	
Côte d'Ivoire	1	91 RON	0.05%	225-03-1-UEMOA	01-Dec-04
Ghana (Domestic)	1	91 RON	0.10%	Document N° ???	Date - ???
(Import)	1	93 RON	0.10%	Document N° ???	
Guinea	6				
Guinea-Bissau	6				
Liberia	3				
Mali	3				
Mauritania	1	91 RON	0.1%	Document N° ???	Date - ???
Sénégal	2				
Sierra Leone	3				
The Gambia	3				
Nigeria & Neighbours					
Benin	1	91 RON	0.25%	Releve No 29/SG/REL	22-Jul-04
Niger	3				
Nigeria	1	90 RON	0.1%	NIS 116: 2003	2003
Togo	3				
West Central Africa					
Cameroun	1	91 RON	0.05%	Arrete No 000012/2004/MINMEE/MINDIC	18/05/2004
Congo (Brazzaville)	2	91 RON	0.05%	Document N° ???	Date - ???
Democratic Republic of the Congo	2				
Equitorial Guinea	6				
Gabon	2				
République Centrafricaine	3				
São Tomé & Principe	6				
Tchad	6				

Table Nº 8 (cont'd)
Progress Towards Developing Unleaded Motor Gasoline Specifications

Degree of Progress

1-Final 2-Draft in progress 3-Know that none exist
4-Know there are no formal specs but have typicals
5-Don't know if formal specs exist but have typicals 6-No information

	Degree of Progress	Unleaded Gasoline	UNL max weight % S	Document #	Document Date
Southern Africa					
Angola	2	91 RON	0.15%	Anexo II-1	Date - ???
	2	93 RON	0.15%	Anexo II-2	Date - ???
Botswana	3				
Lesotho	6				
Madagascar	1	95 RON	0.2%	Arrete No 24.538	21/12/2004
Malawi	1	95 RON	0.15%	MS 170	Date - ???
Mozambique	2				
Namibia	1	95 RON	???	SABS 1598 : 1993	1990
South Africa	2	93-97 RON	0.03%	Draft Specifications	March 2005
Swaziland	6				
Zambia	1	91 RON	0.1%	Document Nº ???	Date - ???
Zimbabwe	3				
Eastern Africa					
Burundi	6				
Comoros	6				
Djibouti	6				
Eritrea	1	87 RON	0.1%	Annexure 1 Gov. of Eritrea	Date - ???
Ethiopia	4	90 RON	0.004%	Document Nº ???	February 2004
Kenya	1	93 RON	0.15%	KS 275-2:2003	Dec-03
Mauritius	1	95 RON	0.1%	Document Nº ???	Date - ???
Rwanda	6				
Seychelles	6				
Somalia	3				
Sudan	6				
Tanzania	1	95 RON	0.05%	TZS 672:2001 ICS.75.160.20	2001
Uganda	1			US 248 : 2000/EAS 158 : 2000	

Source : Annexe A

B Gasoil Specifications

Table **N**^{o} 9 shows gasoil specifications for about the same number of countries as for UNL gasoline. As moves towards lower sulphur levels are not yet a priority with SSA countries few respondents indicated they were in the process of revising their gasoil specifications. However, South Africa certainly is moving to lower sulphur gasoil as are Angola, the Democratic République of the Congo, and Gabon. Angola also provided their current official specifications in addition to their draft ones.

The only SSA countries (for which information was provided) which come close to being classified as low sulphur are :

- Angola @ 0.3 % wt S ;
- Democratic République of the Congo at 0.35 % wt S ;
- Mauritius @ 0.25 % wt S ;
- South Africa @ 0.05 % wt S (effective January, 2006) ; it already has available “city diesel” at 50 ppm.

Table N° 9
Progress Towards Developing Gasoil Specifications

Degree of Progress

1-Final 2-Draft in progress 3-Know that none exist
4-Know there are no formal specs but have typicals
5-Don't know if formal specs exist but have typicals 6-No information

	Status	Diesel max weight % S	Document #	Document Date
West Africa				
Burkina Faso	6			
Cape Verde	6			
Côte d'Ivoire	1			
Ghana	1	0.50%	Document N° ???	Date - ???
Guinea	6			
Guinea-Bissau	6			
Liberia	3			
Mali	3			
Mauritania	1	0.50%	Document N° ???	Date - ???
Sénégal	1	0.50%	Decret No 2003.415	04-Jun-03
Sierra Leone	1	0.50%	Document N° ???	Date - ???
The Gambia	3			
Nigeria & Neighbours				
Benin	6			
Niger	1	1.0%	Arrette No 000099	Dec 28, 2001
Nigeria	1	0.50%	NIS 149: 2004	2004
Togo	3			
West Central Africa				
Cameroun	5			
Congo (Brazzaville)	1	1.0%	Decret N° 2002-262	August 2002
Democratic Republic of the Congo	2	0.35%		
Equitorial Guinea	6			
Gabon	2			
République Centrafricaine	3			
São Tomé & Principe	5	0.30%	Typicals : Document N° ???	January 2005
Tchad	6			

Table N° 9 (cont'd)
Progress Towards Developing Gasoil Specifications

Degree of Progress

1-Final 2-Draft in progress 3-Know that none exist
4-Know there are no formal specs but have typicals
5-Don't know if formal specs exist but have typicals 6-No information

	Status	Diesel max weight % S	Document #	Document Date
Southern Africa				
Angola	1	0.30%	Document N° ???	Date - ???
	2	0.30%	Anexo VII	Date - ???
Botswana	3			
Lesotho	6			
Madagascar	1	0.50%	Arrete No 24.539	21/12/2004
Malawi	1	0.55%	MS 538	Date - ???
Mozambique	1	0.55%	PMO / 550 - Issue 9	October 1994
Namibia	1	???	SABS 342 : 1998	1990
South Africa	2	0.03%	Draft Specifications	March 2005
Swaziland	6			
Zambia	1	0.75%	Document N° ???	Date - ???
Zimbabwe	3			
Eastern Africa				
Burundi	6			
Comoros	6			
Djibouti	6			
Eritrea	1	0.70%	Annexure 2 Gov. of Eritrea	Date - ???
Ethiopia	5	1.0%	Document N° ???	February 2004
Kenya	3	???	Document N° ???	Date - ???
Mauritius	1	0.25%	Document N° ???	Date - ???
Rwanda	6			
Seychelles	6			
Somalia	3			
Sudan	6			
Tanzania	1	0.50%	TZS 674:2001	2001
Uganda	3			

Source : Annexe A

List of Annexes

Annexe A

Information Sources for (1) Lead Phase-out, (2) 2004 Gasoline and Gasoil Volume Consumption Figures and (3) Product Specifications

West Africa

Burkina Faso – (1) & (3) Telecon April 15th with M. Emmanuel Nonyarma, Directeur Général, Direction de l'Energie – fax: (226) 50 32 44 41. (2) WP # 19 2003 volume increased by 2 % for 2004.

Cape Verde – (1) & (3) No new information. (2) WP # 19 2003 volume increased by 2 % for 2004.

Côte d'Ivoire – (1) Feb 1st e-mail from Kanga Konan, Directeur technique, Société ivoirienne de raffinage. (2) & (3) Fax dated April 7th from Alain Kouadio, Secrétaire Général du GPP – fax : 20 33 34 34 .

Ghana – (1), (2) & (3) E.K. Quartey, Business Development Mgr., Tema Oil Refinery - e-mail: equartey@tor.com.gh Note : (3) received via World Bank.

Guinea – (1), (2) & (3) Ibid, Cape Verde.

Guinea-Bissau – (1), (2) & (3) Ibid, Cape Verde.

Liberia – (1), (2) & (3) William G Matthews, World Bank Consultant working on oil procurement for Liberia, early 2005: e-mail: wgmatthews@rogers.com

Mali – (1) telecon Mar 1st with Abdula Yaya Seck, D.G. l'Office national des produits pétroliers (LD : 223-222-4483), (2) & (3) Fax # 0265 / MMEE / DNE dated Mar 1st from la Direction nationale de l'energie.

Mauritania -- (1) (2) & (3) M. Abdoulaye Sy, Conseiller auprès Monsieur le Ministre de l'Energie - e-mail: syabdoulayemr@yahoo.fr

Sénégal -- (1) (2) & (3) Feb 4th e-mail from Carmello SAGNA, Sécretaire, Commission nationale des hydrocarbures : carmellosagne@sentoo.sn

Sierra Leone -- (1) (2) & (3) : Fax dated Mar 1st (via WB Office in Freetown) from Sabieu Conteh, Ast Director, The Petroleum Unit, Ministry of Trade & Industry – fax:232-22-293556

The Gambia – (1) & (3) e-mail dated Mar 3rd from Bah Saho, Director of Energy, Office of President - e-mail: bahsaho@yahoo.com

Annexe A (cont'd)

Information Sources for (1) Lead Phase-out, (2) 2004 Gasoline and Gasoil Volume Consumption Figures and (3) Product Specifications

Nigeria & Neighbours

Benin – (1) & (3) Feb 18th e-mail from Théophile Worou, Conseiller technique à l'Environnement, Ministère de l'Environnement – e-mail: tworou@mehubenin.net. (2) Ibid Cape Verde.

Niger – (1) (2) & (3) : Feb 15th e-mail from M. Idrissa Moussa, Secretaire Générale, SONIDEP. E-mail : sonidep@intnet.ne

Nigeria – (1) Feb 15th e-mail from Mr T.O. Olu-Tima, Group Executive Director—Refineries' Office, NNPC – e-mail : olutima.to.nnpc-nigeria.com. (2) Feb 23rd e-mail from Mr. Joseph G Eromosele, ExxonMobil Nigeria – e-mail: joseph.eromosele@exxonmobil.com. (3) Consultant's working papers from WP # 19 for gasoline and for gasoil from Standards Organisation of Nigeria via Aminu Jalal, National Automotive Council, Abudja. e-mail : aminujalal@hotmail.com

Togo – (1) & (3) Feb 22nd e-mail from Koffi Volley, Biologiste, Direction de l'Environnement – email : kofivole@yahoo.fr (2) Feb 17th e-mail from D.G. Sociéte togolaise de stockage à Lomé (STSL) M. Roger Teko Folly. E-mail : mireille.kponton@togosh.simis.com

West Central Africa

Cameroun – (1), (2) & (3) Feb 23rd fax from M. Ibrahim Talba Malla, Directeur, Caisse de Stablisation des Prix des Hydrocarbures, Ministère de Finance - fax: (237) 220-7947

Congo (Brazzaville) - (1) (2) & (3) Feb 17th e-mail from Ele Seraphin, Chef de Service Programmes, CORAF – e-mail: eleseraphin@yahoo.fr

Democratic Republic of the Congo – (1) Apr. 15th telecon with M. Mumba, Conseiller aux hydrocarbures du Ministre, Ministère de l'Energie – tel : (243) 81.50.18.663; e-mail : mumbadieu@yahoo.re (2) & (3) April 13th email from R. Bourgue DG, SEP Congo – email: dgsep@afrinet.cd

Equitorial Guinea – (1) & (3) No new information, (2) Ibid Cape Verde

Gabon -- (1) (2) & (3) March 14th fax from François Orevouno, Directeur Général des Hydrocarbures, Ministere des Mines, de l'Energie, du Petrole et des Ressources Hydrauliques – fax: (241) 74-80-78.

République Centrafricaine – (1), (2) & (3) March 1st e-mail from Jean Léonard Mbraimous-Moimou, Directeur des Hydrocarbures, Ministère de l'Energie, Mines et Hydraulique – e-mail: mbrai2004@yahoo.fr

São Tomé & Principe – (1) & (3) March 1st e-mail to World Bank (E. Mayorga-Alba) from José Barbosa, ENCO – e-mail: enco@cstome.net. (2) Ibid Cape Verde.

Tchad – (1) & (3) No new information, (2) Ibid Cape Verde.

Annexe A (cont'd)

Information Sources for (1) Lead Phase-out, (2) 2004 Gasoline and Gasoil Volume Consumption Figures and (3) Product Specifications

Southern Africa

Angola – (1), (2) & (3) April 12th e-mail from Anabela Fonseca, Commercial Operations Director, SONANGOL – e-mail: anabela.fonseca@sonangol.co.ao

Botswana – (1), (2) & (3) Feb 28th e-mail from Dereck Poloko, Oil Products Issues, Ministry of Mines and Energy – e-mail: dpoloko@gov.bw

Lesotho – (1) & (3) no new information, (2) Ibid Cape Verde

Madagascar – (1), (2) & (3) Feb 15th e-mail from Léon Ah-Lone, Director Normilisation et Contrôle, Office Malgache des Hydrocarbures – e-mail: ah-lone.dn@omh.mg

Malawi – (1), (2) & (3) March 4th e-mail from Evans Kamanga, Petroleum Control Commission of Malawi – e-mail: eckamanga@pccmalawi.com

Mozambique – (1), (2) & (3) March 10th & 11th e-mails from Iolanda Cintura, Deputy Director, National Energy Directorate – e-mail: imc@dne.gov.mz

Namibia - (1), (2) & (3) March 1st e-mail from Immanuel Nghishoongele, Acting Deputy Director: Petroleum & Gas, Ministry of Mines & Energy – e-mail: inghishoongele@mme.gov.ne

South Africa – (1) & (3) April 12th email from Dr. R. Crompton, Deputy Director General Hydrocarbons and Energy Planning, Department of Minerals and Energy – email: rod.crompton@dme.gov.za (2) South African Petroleum Industry Association website.

Swaziland – (1) & (3) No new information, (2) South African Petroleum Industry Association website.

Zambia – (1) & (3) Feb 28th e-mail from Kenneth Kangende, Director, Infrastructure and Operations, Energy Regulations Board – e-mail: kkangende@erb.org.zm (2) Feb 2nd e-mail from Simweemba Buumba, ERB – e-mail: sbuumba@erb.org.zm

Zimbabwe – (1) Consultant's estimates based on Oct. 2004 assignment in Zimbabwe. (2) & (3) Feb 10th email from Nigel Westwood, Chevron Texaco – e-mail: njwestwood@chevrontexaco.com.

Annexe A (cont'd)

Information Sources for (1) Lead Phase-out, (2) 2004 Gasoline and Gasoil Volume Consumption Figures and (3) Product Specifications

East Africa

Burundi – (1) & (3) No new information. (2) Ibid Cape Verde.

Comoros – (1) Feb 28th telecon to M. Hassan, Chef Comptable, Société Comorienne des Hydrocarbures : tel : (269) 73-11-44 ; fax : (269) 73-18-83 (2) Ibid Cape Verde. (3) No new information.

Djibouti – (1) & (3) No new information. (2) Ibid Cape Verde.

Eritrea – (1), (2) & (3) March 10th fax from Tesfai Zekarias, General Manager, Petroleum Corporation of Eritrea – fax : (291-1) 12-62-61

Ethiopia -- (1) No new information. (2) & (3) Feb 24th fax from Tadelech Ayele, HSEQ Expert, Total Ethiopia S.C. – fax: (251) 51-01-10

Kenya – (1) Letter # ME/Conf/7/1/16 dated April 12th, 2005 to Downstream Oil Advisors Ltd. (Fred Sexsmith) from Mr. Patrick Nyoike, Permanent Secretary, Ministry of Energy. (2) Feb 24th e-mail from Jane Akumu of UNEP – e-mail: jane.akumu@unep.org. (3) No new information.

Mauritius – (1) & (2) Feb 23rd telecon and (3) Feb 23rd e-mail from Devraj Daby, Commercial Manager, State Trading Corporation – tel : 208-0181, e-mail: dev.daby@stc.intnet.mu

Rwanda - (1), (2) & (3) Feb 10th e-mail from Françoise Mukakalisa, Chargé des Hydrocarbures, Ministère des Infrastructures – e-mail: mukafranco@yahoo.fr

Seychelles – (1) April 11th telecon with Mr. Rayhoareau, General Manager, Seychelles Petroleum Corp. – tel : (248) 22-42-40. (2) Ibid Cape Verde. (3) No new information.

Somalia – (1) Feb 16th e-mail from Dr. Qasim Hersi Farah, Permanent Secretary, Ministry of Environment and Disaster Management – e-mail : qasimhersi@yahoo.com (2) Ibid Cape Verde. (3) No new information.

Sudan – (1) & (3) No new information. (2) Ibid Cape Verde.

Tanzania – (1) & (2) March 8th e-mail from Julis Gashaza, Ministry of Energy and Minerals – e-mail: jgashaza63@yahoo.com, (3) Feb 21st e-mail from Imani M. Mwabuka, Standards Officer, Tanzania Bureau of Standards – e-mail: imwabuka@yahoo.co

Uganda – (1) (2) & (3) April 4th e-mail from Ben Twodo, Ministry of Energy – e-mail: btwodo@energy.go.ug

Annexe B

Estimated 2004 Motor Gasoline Consumption by Lead Level in Sub-Saharan Africa

'000 m^3

	Unknown		Leaded (>= 0.3 g/L Pb)		Low Lead (> 0.013 < 0.3g/L Pb)		Unleaded (<= 0.013 g/L Pb)		Total	Source
	'000 m^3	%	'000 m^3	%	'000 m^3	%	'000 m^3	%	'000 m^3	
West Africa										
Burkina Faso			122						122	(1)
87 RON			108	89%						
93 RON			13	11%						
Cape Verde 95 RON							10	100%	10	(1)
Côte d'Ivoire			31				92		123	A. Kouadio GPP fax 7/04
87 RON										
91 RON							92	75%		
95 RON			31	25%						
Ghana 91 RON							777	100%	777	E.K. Quartey email of 15/02
Guinea 93 RON			124	100%					124	(1)
Guinea-Bissau 95 RON			29	100%					29	(1)
Liberia 93 RON			51	100%					51	W. Matthews email of 07/02
Mali			140						140	Fax from Min Mines 27/02
85 RON			123	88%						
95 RON			17	12%						
Mauritania 91 RON							38	100%	38	A. Sy Min de Energie email of 15/02
Sénégal					142				142	email : 03/02/05 Carmello SAGNA
87 RON					52	37%				(carmellosagne@sentoo.sn)
95 RON					90	63%				
Sierra Leone 93 RON					64	100%			64	S. Conteh, The Petroleum Unit em 1/03
The Gambia 93 RON			19	100%					19	B. Saho em of 03/03
Sub-total West Africa	**0**	**0%**	**516**	**31%**	**206**	**13%**	**916**	**56%**	**1,638**	
Nigeria & Neighbours										
Benin 91 RON							307	100%	307	RON & Pb data from Abacar KOTOKA, SONACOP em 18/02/05, consumption (1)
Niger			76						76	Idrissa MOUSSA, SONIDEP 17/02
Regular 90 RON			75	99%						
Super 95 RON			1	1%						
Nigeria 90 RON							8,108	100%	8,108	J. Eromosele, EXXONMOBIL email 23/02
Togo					151				151	R. Teko Folly fax of 17/02
87 RON					103	68%				
93 RON					48	32%				
Sub-total Nigeria & Neighbours	**0**	**0%**	**76**	**1%**	**151**	**2%**	**8,415**	**97%**	**8,642**	
West Central Africa										
Cameroun 91 RON					371	100%			371	Fax Talba Malla CSPH 23/02
Congo (Brazz) 95 RON					75	100%			75	E. Seraphin email of 17/02
DR Congo 93 RON					175	100%			175	R. BOURGUE SEP CONGO email 13/04
Equitorial Guinea 93 RON			20	100%					20	(1)
Gabon 91 RON			59	100%					59	Francois OREVOUNO em of 08/03/05
République Centrafricaine 95 RON	15	100%							15	FJS Memo # 10 May 23, 1996 pg. 3
São Tomé & Principe 90 RON					6	100%			6	J. Barbosa via E. Mayorga-Alba em of 01/03
Tchad 95 RON							29	100%	29	DOAL estimate
Sub-total West Central Africa	**15**	**2%**	**79**	**11%**	**627**	**84%**	**29**	**4%**	**750**	

Annexe B (cont'd)

Estimated 2004 Motor Gasoline Consumption by Lead Level in Sub-Saharan Africa

'000 m^3

	Unknown		Leaded (>= 0.3 g/L Pb)		Low Lead (> 0.013 < 0.3g/L Pb)		Unleaded (<= 0.013 g/L Pb)		Total	Source
	'000 m^3	%	'000 m^3	%	'000 m^3	%	'000 m^3	%	'000 m^3	
Southern Africa										
Angola 91 & 93 RON			340	100%					340	A. Fonseca, SONANGOL em 10/03/05
Botswana 93 RON					252	62%	156	38%	408	K. Kerekang, Energy Affairs Division em of 28/02
Lesotho					62	70%	26	30%	88	Sapia 2004 Annual Report - % UNL is a DOAL estimate
Madagascar					113		7		120	L. Ah-Lone, OMH em 15/02
87 RON					113	94%				
95 RON							7	6%		
Malawi 93 RON			88	97%			3	3%	91	E. Kamanga, PCC em 04/03
Mozambique 93 RON			130	97%			5	3%	135	I. Cintura, DNE em 11/02
Namibia					215	73%	80	27%	295	I. Nghishoongele, Min Mines & Energy fax of 1/03
93 RON					215					
95 RON							80			
South Africa					6,975	64%	4,006	36%	10,980	SAPIA fax 07/02/05
Swaziland					76	70%	33	30%	109	Sapia 2004 Annual Report
Zambia 93 RON					158	100%			158	Simweemba Buumba email 8/02/05 (sbuumba@erb.org.zm)
Zimbabwe 93 RON			288	96%			12	4%	300	DOAL estimate of Q3 2004/ Nigel Westwood email (njwestwood@chevrontexaco.com)
Sub-total Southern Africa	**0**	**0%**	**846**	**6%**	**7,850**	**60%**	**4,327**	**33%**	**13,024**	
Eastern Africa										
Burundi	44	100%							44	**(1)**
Comoros 93 RON			61	100%					61	**(1)**
Djibouti	31	100%							31	**(1)**
Eritrea 87 RON							15	100%	15	Pet Corp of Eritrea Fax # PCE/01.3/557/05 dated Mar 9th
Ethiopia 90 RON							188	100%	188	T. Ayele TOTAL fax 24/02
Kenya					468	100%			468	J. Akumu em of 24/02
87 RON					88					
93 RON					380					
Mauritius 95 RON							122	100%	122	D. Daby, State Trading Corp. em of 23/02
Rwanda							55	100%	55	F. Mukakalisa, Ministere des Infrastructures em 10/02
Seychelles	20	100%							20	**(1)**
Somalia			70	100%					70	**(1)**
Sudan							446	100%	446	**(1)**
Tanzania 95 RON					199	100%			199	(Leaded & Unleaded comingled) J. GASHAZA, Min of Energy and Minerals, em of 08/02/05
Uganda 93 RON					93	50%	93	50%	186	B. Twodo Dept. Energy Uganda em 04/04/05
Sub-total Eastern Africa	**95**	**5%**	**131**	**7%**	**760**	**40%**	**918**	**48%**	**1,903**	
Total SSA	**110**	**0.4%**	**1,647**	**6.3%**	**9,594**	**37.0%**	**14,606**	**56.3%**	**25,957**	

Sources:
Refer to Annexe A sources for volumes and specifications.
(1) DOAL estimate based on 2% increase from 2003 consumption
World Bank Working Paper #19

Annexe C

Estimated 2004 Motor Gasoline Consumption by Sulfur Level in Sub-Saharan Africa

'000 m^3

	Unknown	> 0.2%	> 0.10 % < 0.20 %	< 0.10 % > 0.05 %	< 0.05 %	Total
West Africa						
Burkina Faso	122					
Cape Verde	10					
Côte d'Ivoire	31				92	
Ghana				777		
Guinea	124					
Guinea-Bissau	29					
Liberia	51					
Mali	140					
Mauritania				38		
Sénégal			142			
Sierra Leone		64				
The Gambia	19					
Sub-total West Africa	**525**	**64**	**142**	**814**	**92**	**1,638**
Nigeria & Neighbours						
Benin		307				
Niger		76				
Nigeria				8,108		
Togo	151					
Sub-total Nigeria & Neighbours	**151**	**383**	**0**	**8,108**	**0**	**8,642**
West Central Africa						
Cameroun					371	
Congo (Brazz)					75	
DR Congo	175					
Equitorial Guinea	20					
Gabon	59					
République Centrafricaine	15					
São Tomé & Principe			6			
Tchad	29					
Sub-total West Central Africa	**298**	**0**	**6**	**0**	**446**	**750**

Annexe C (cont'd)

Estimated 2004 Motor Gasoline Consumption by Sulfur Level in Sub-Saharan Africa

'000 m^3

	Unknown		> 0.2%		> 0.10 % < 0.20 %		< 0.10 % > 0.05 %		< 0.05 %		Total	
Southern Africa												
Angola					340							
Botswana	408											
Lesotho	88											
Madagascar					120							
Malawi					91							
Mozambique					135							
Namibia	295											
South Africa							10,980					
Swaziland	109											
Zambia							158					
Zimbabwe	300											
Sub-total Southern Africa	**1,200**		**0**		**686**		**11,138**		**0**		**13,024**	
Eastern Africa												
Burundi	44											
Comoros	61											
Djibouti	31											
Eritrea							15					
Ethiopia									188			
Kenya					468							
Mauritius							122					
Rwanda	55											
Seychelles	20											
Somalia	70											
Sudan	446											
Tanzania									199			
Uganda	186											
Sub-total Eastern Africa	**912**		**0**		**468**		**137**		**387**		**1,904**	
Total SSA	**3,087**	**12%**	**447**	**2%**	**1,302**	**5%**	**20,197**	**78%**	**925**	**4%**	**25,957**	**100%**

Source : Refer to Annexe A sources for volumes and specifications.

Annexe D
Estimated 2004 Gasoil/Diesel Consumption by Sulphur Level in Sub-Saharan Africa
'000 m^3

	unknown		< 0.1 %		>=0.1 % < 0.2 %		>= 0.2 % < 0.5 %		>= 0.5 % < 0.8 %		>= 0.8 %		Total	
	'000 m^3	%	'000 m^3	%	'000 m^3	%	'000 m^3	%			'000 m^3	%	'000 m^3	%
West Africa														
Burkina Faso														
Cape Verde														
Côte d'Ivoire	512	100%												
Ghana							1,039	100%					1,039	100%
Guinea														
Guinea-Bissau														
Liberia			84	100%									84	100%
Mali	287	100%											287	100%
Mauritania							379	100%					379	100%
Sénégal							526	100%					526	100%
Sierra Leone							40	100%					40	100%
The Gambia														
Sub-total West Africa	**799**	**34%**	**84**	**4%**	**0**	**0%**	**1,984**	**84%**	**0**	**0%**	**0**	**0%**	**2,356**	**12%**
Nigeria & Neighbours														
Benin														
Niger			80	100%									80	100%
Nigeria							1,994	100%					1,994	100%
Togo	113	100%											113	100%
Sub-total Nigeria & Neighbours	**113**	**5%**	**80**	**4%**	**0**	**0%**	**1,994**	**91%**	**0**	**0%**	**0**	**0%**	**2,187**	**11%**
West Central Africa														
Cameroun	430	100%											430	0%
Congo (Brazz)	146	100%											146	0%
DR Congo	186													
Equitorial Guinea														
Gabon	294	100%											294	100%
République Centrafricaine														
São Tomé & Principe							16	100%					16	100%
Tchad														
Sub-total West Central Africa	**1,055**	**119%**	**0**	**0%**	**0**	**0%**	**16**	**2%**	**0**	**0%**	**0**	**0%**	**886**	**5%**

Annexe D (cont'd)
Estimated 2004 Gasoil/Diesel Consumption by Sulphur Level in Sub-Saharan Africa
'000 m^3

	unknown		< 0.1 %		>=0.1 % < 0.2 %		>= 0.2 % < 0.5 %		>= 0.5 % < 0.8 %		>= 0.8 %		Total	
	'000 m^3	%	'000 m^3	%	'000 m^3	%	'000 m^3	%			'000 m^3	%	'000 m^3	%
Southern Africa														
Angola							1,061	100%					1,061	100%
Botswana	324	100%											324	100%
Lesotho														
Madagascar							401	100%					401	100%
Malawi									146	100%			146	100%
Mozambique									502	100%			502	100%
Namibia	445	100%											445	100%
South Africa			7,679	100%									7,679	100%
Swaziland														
Zambia									300	100%			300	100%
Zimbabwe														
Sub-total Southern Africa	**769**	**7%**	**7,679**	**71%**	**0**	**0%**	**1,462**	**13%**	**949**	**9%**	**0**	**0%**	**10,859**	**56%**
Eastern Africa														
Burundi														
Comoros														
Djibouti														
Eritrea									129	100%			129	100%
Ethiopia			827	100%									827	100%
Kenya	965	100%											965	100%
Mauritius	420	100%											420	100%
Rwanda	38	100%											38	100%
Seychelles														
Somalia														
Sudan														
Tanzania							653	100%					653	100%
Uganda							261	100%						
Sub-total Eastern Africa	**1,424**	**47%**	**827**	**27%**	**0**	**0%**	**914**	**30%**	**129**	**4%**	**0**	**0%**	**3,033**	**16%**
Total SSA	**4,160**	**21.5%**	**8,670**	**44.9%**	**0**	**0.0%**	**6,369**	**33.0%**	**1,078**	**5.6%**	**0**	**0.0%**	**19,320**	**105%**

Source : Refer to Annexe A sources for volumes and specifications.