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REPORT OF THE COMMITTEE ON ENERGY, ENVIRONMENT AND TOURISM FOR THE FIFTH SESSION OF THE NINTH NATIONAL ASSEMBLY APPOINTED ON 19TH JANUARY 2006

Consisting of

Mr R Muntanga, MP (Chairperson); Mr Y D Mukanga, MP; Mr B Mushala, MP; Mr A Mwila, MP; Mr G K Nang'omba, MP; Mrs O Nkumbula-Liebenthal, MP; and Mr S Sikota, MP.

The Honourable Mr Speaker,
National Assembly,
Parliament Buildings,
LUSAKA

Sir,

Your Committee have the honour to present their Report for 2006.

Functions of the Committee

2. In addition to any other duties placed upon them by Mr Speaker or any Standing Order or any other order of the Assembly, the duties of the Committee on Energy, Environment and Tourism are as follows:

   i) to study, report and make appropriate recommendations to the Government through the House on the mandate, management and operations of the Government ministries, departments and/or agencies under their portfolio;
   ii) to carry out detailed scrutiny of certain activities being undertaken by the Government ministries, departments and/or agencies under their portfolio and make appropriate recommendations to the House for ultimate consideration by the Government;
   iii) to make, if considered necessary, recommendations to the Government on the need to review certain policies and/or certain existing legislation; and
   iv) to consider any Bills that may be referred to them by the House.

Meetings of the Committee

3. During the year under review, your Committee held ten meetings.

Procedure Adopted by the Committee

4. During the course of their deliberations, your Committee considered and adopted the following programme of work for 2006:

   (i) detailed study and consideration of submissions on the phasing out of leaded petrol in Zambia;
   (ii) detailed study and consideration of submissions on the progress made by the Government in setting up Strategic Fuel Reserves for the country; and
   (iii) tours arising from deliberations.

PART I

CONSIDERATION OF TOPICAL ISSUES

THE PHASING OUT OF LEADED PETROL IN ZAMBIA

SUBMISSION BY THE PERMANENT SECRETARY, MINISTRY OF ENERGY AND WATER DEVELOPMENT

5. Your Committee heard that Zambia signed the Dakar Declaration in 2001. The Declaration, which is part of Africa's commitment to global environment agreements, encouraged the phasing out of lead from petrol by December 2005. The metal lead, which is contained in leaded petrol, is harmful to the environment and negatively affects human health, especially children whose mental development is retarded.

Due to this fact, vehicle manufactures are expected in future to stop producing vehicles that use leaded petrol. Since the signing of the Declaration, the Ministry of Energy and Water Development had been exploring ways in which to completely phase out leaded petrol.

A Technical Committee was constituted in December, 2004 to determine the cost implications of phasing out lead from petrol and the required road map for this programme.

Based on prevailing circumstances, the Technical Committee advised to implement a phase-out approach for the programme due to the following reasons:

a) the main fuel supplier for the country, Indeni Petroleum Refinery, are required to undertake some rehabilitation before fully producing unleaded petrol;

b) the public needed to be sensitised on implementation of the programme; and

c) there was need to have a uniform price of lead and unleaded petrol as a way to encourage consumers to use unleaded petrol.

Due to the above, Indeni included, as part of its rehabilitation programme, the full-scale production of unleaded petrol. The programme could, however, not start due to the need to finish the current audits that Government was undertaking at the Refinery.

As regards information to the public, a public awareness campaign was being finalised by the Ministry and would be launched in the second quarter of 2006.

The prices of leaded and unleaded petrol were harmonised on 14th January, 2006 as a way to encourage consumers' use of unleaded petrol.

On whether Indeni and the Oil Marketing Companies (OMCs) had been consulted before the signing of the Dakar Declaration, your Committee were informed that the Declaration was a statement of intent by participating countries and that indeed all the stakeholders had been consulted and were fully aware.

On what was being done by the Ministry to ensure that an exhaustive monitoring and testing system was put in place in Zambia, bearing in mind that carbon tax had been introduced in the 2006 Budget, your Committee were informed that nothing had been done in this area. The Permanent

Secretary stated that the mandate for this fell with other Government ministries and departments. He further stated that this was a very serious issue, which needed very serious consideration.

When asked to comment on the assertion that part of the reason for Indeni's failure to produce 100% unleaded petrol by the Dakar Declaration deadline of January, 2006 were the constant ZESCO power failures and dips, the Permanent Secretary stated that the ZESCO system had a problem of dips. This affected the operations of the Refinery. He, however, stressed the need for Indeni to do something about the problem and not entirely blame ZESCO as the ideal situation was for the Refinery to have a power source of its own. He further stated the need for funds to be raised so that an Isomerisation Unit could be installed at the plant to ease production of unleaded petrol.

On whether the real reason for phasing out leaded petrol was to protect the catalytic converters that were fitted to modern motor vehicles, your Committee heard that although lead did damage these converters, it was also a contaminant and affected the mental health of children. He further stated that Zambia had almost no choice in the matter as the country did not manufacture motor vehicles and thus needed to move on with changing world trends.

SUBMISSION BY THE EXECUTIVE DIRECTOR, ENERGY REGULATION BOARD

Your Committee heard that in response to the Dakar Conference held in June 2001, the Energy Regulation Board (ERB) constituted a Task Team to review what would be required to achieve the phase-out by the Dakar agreed deadline of January, 2006. The Task Team had the following representation:

- Energy Regulation Board
- BP Zambia PLC
- Caltex Oil Zambia Limited
- Engen Petroleum Zambia Limited
- Department of Energy
- Road Traffic Commission
- Indeni Petroleum Refinery
- Zambia National Oil Company (ZNOC)
- Environmental Council of Zambia (ECZ)

The terms of reference of the Task Team were to:

- establish market demand for unleaded petrol;
- identify options for producing unleaded petrol;
- develop strategies for unleaded petrol (short and long term); and
- make appropriate recommendations.

Your Committee heard that the Task Team developed a Position Paper that was first adopted by ERB and then presented to the Ministry of Energy and Water Development in December 2001.

The Position Paper recommended the following actions:

- the immediate issuance of a policy statement from Government regarding the phase-out of leaded petrol and setting a deadline for the same;
- the announcement by Government of a dual distribution system for both unleaded and leaded petrol for a transition period;
- the preparation of vehicle emission standards by the ECZ;
- the installation of unleaded petrol dispenser nozzles; these are thinner than those used for dispensing leaded petrol and as such prevent inadvertent filling of a vehicle designed for unleaded petrol with leaded petrol;
- the review of the fuel tax policy to make it more desirable to use unleaded petrol; and

- the formation by Government of a National Committee to oversee the phase-out of leaded petrol and the introduction of unleaded petrol.

The Director stated that as a result of the recommendations of the Task Team and encouragement by the ERB, three OMCs voluntarily introduced unleaded petrol in 2002. The ERB's Technical Committee for Petroleum Product Quality also published Zambian Standard *ZS 395*- unleaded petrol (gasoline) for motor vehicles- Specification in 2003 through the Zambia Bureau of Standards.

As a follow up to the Dakar Convention, a meeting was held in Cape Town in October, 2003 and another meeting was held in Nairobi in May, 2004. Following both of these meetings, the ERB again presented the Position Paper to Government.

In order to deliberately encourage the consumption of unleaded petrol amongst consumers, the ERB made the pump prices of leaded and unleaded petrol equal in January, 2006.

Your Committee were informed that Indeni Refinery only produced small quantities of unleaded petrol because it is too costly to produce. What was needed was additional investment in the Refinery to enable it produce unleaded petrol at an economic cost. This would involve the installation of an Isomeriser and the estimated capital investment of this unit was around US$ 15 Million. The onus was, therefore, on the shareholders, i.e. Total Outré Mer and Government to provide the required funds for investment and enable the Refinery to phase out production of leaded petrol.

On whether the real reason for phasing out leaded petrol was to protect catalytic converters that were fitted to cars, your Committee heard that lead did have an effect on human beings, even though the effects may take a long time to manifest. The Executive Director stated that with the increase in the motor vehicle population, there was an increase also in the pollution effects. He further stated that Zambia was not a country in isolation and needed to move along with the rest of the world in the changing technological trends.

On whether or not the lead replacement chemical used by Indeni was harmful, your Committee heard that Indeni had a choice between Methyl Tertial Butyl Ether (MTBE) and Methylcyclopentadienyl Manganese Tricarbony (MMT). Of the two, MTBE was found to have the only documented evidence of ground water pollution. MMT was used by Indeni as it had less harmful effects than either lead or MTBE.

On the recently introduced carbon tax, your Committee were informed that it was a welcome measure as there was widespread pollution emanating from motor vehicle exhaust-fumes in the country, even though exhaust emission testing and monitoring equipment was unavailable. The motor vehicle population was on the increase and there was need for a baseline study of the air quality, especially in urban areas. There was need for co-ordinated effort between organisations such as the Ministry of Tourism, Environment and Natural Resources, the Environmental Council of Zambia and the Road Traffic and Safety Agency so that the benefits of using cleaner fuels could be effective.

On how the compromise to harmonise the prices of leaded and unleaded petrol was reached, your Committee heard that the import pricing parity mechanism was used. The assumption was that all petroleum products were imported, so that the benchmark import price used was that of unleaded petrol.

On the quality of petrol produced by Indeni, your Committee heard that although Indeni was producing petrol with a research octane number (RON) of 91, the preferred quality was petrol of 93 RON.

The Executive Director explained that most countries in the region were using 93RON petrol and thus the need for Zambia to increase the octane number. He explained that an isomeriser would help not only in easing the production of unleaded petrol, but also in increasing the octane number of the petrol.

SUBMISSION BY THE GENERAL MANAGER, INDENI PERTOLEUM REFINERY

Your Committee heard that Indeni had been responsive to policy requirements on petroleum specifications and co-operated with the call to phase out leaded petrol by the introduction of a limited quantity of unleaded petrol starting in July, 2004.

The production of unleaded petrol started initially as import substitution and had been steadily increasing as shown below.

	Unleaded %WT Produced	**Leaded %WT Produced**	**Sum**
2004 (July - December)	1.11	98.89	**100**
2005 (Jan - December)	2.0	98.0	**100**
2006 January	3.8	96.2	**100**
February	4.8	95.2	**100**
March	17.7	82.3	**100**
TARGET From January 2007	100	0	**100**

Factors causing delayed implementation of 100% unleaded petrol

Your Committee were informed that persistent and frequent electrical power dips/failures had caused equipment failures and breakdowns resulting in frequent Plant shutdowns and start-ups causing production of low octane reformate. This low octane reformate only required the use of a Lead compound to boost octane to 91 RON.

This development had, therefore, necessitated investment in standby power generation to be commissioned in 2006 in order to ensure constant production of unleaded petrol. This meant the introduction of 100% unleaded 91 RON petrol was only guaranteed beginning of 2007 after commissioning of the power generation unit in 2006. Meanwhile, production of unleaded 91RON petrol would continue to increase in response to demand side by side with production of leaded petrol.

The Managing Director highlighted the fact that current investment in unleaded petrol was on the basis that the octane for petrol would be maintained at 91 RON and that a Methylcyclopentadienyl Manganese Tricarbony (MMT) additive would be used as the octane booster.

Your Committee were informed that this was in conformity with Environment Conservation Association (IPIECA) meetings and resolutions in the sub-Saharan region where the majority of motor vehicles ran without any problems on premium (petrol) with 91 RON.

The feasibility study to produce unleaded petrol with octane above 91 RON would require investment in an Isomerisation Plant at the Refinery and this was being planned for 2010, as a function of investment climate.

The Managing Director, therefore, proposed that Indeni Refinery be afforded an opportunity to fully participate in the development of future product specifications, after which it would be possible to adjust and make necessary investment.

The table below shows the design average blending of light gasoline and reformate to make regular petrol (86 RON) using Lead compound as an octane booster. It also shows current/actual

and future blending of light gasoline and reformate to make unleaded petrol using Methylcyclopentadienyl Manganese Tricarbony (MMT) as an octane booster.

	PRESENT BLENDING SCENARIO		**PRESENT SMALL SCALE AND FUTURE BLENDING SCENARIO**	
	RON	% VOL	% VOL	REMARKS
Light Gasoline Reformate	70	30	30	
Reformate 1 Reformed Gasoline	90	70	-	Low Octane Reformate Produced During Start Ups And Shutdown
Reformate 2 Reformed Gasoline	96	-	70	High Octane Reformate Produced During Normal Operations
Total Blend %		100	100	
Total Blend RON		86	90	
Octane Shortfall To Reach 91 RON		5	1	
Octane Enhancer		Lead (TEL)	Manganese (MMT)	

On the 4 MW Watt power generator to be installed at the Refinery in the second half of 2006, your Committee were informed that this would be the main power source for the plant, while the National Grid would be on standby. The total purchase cost of the generator was estimated at four million United States dollars (US$ 4 million). Indeni would, however, install the generator on lease basis at a cost of one million United States dollars (US$1 million) before funds for outright purchase were sourced.

The Managing Director informed your Committee that the ideal situation was that the Refinery should have been fitted with a power generation plant from the very beginning, but this was not the case. He stated that since commissioning in 1973, Indeni had not had a reinvestment programme to replace old equipment or to address modifications that a changing market demanded. In order to allow Indeni to proceed with its plans, there was need for commitment from the shareholders and support from Government. He further stated that the systematic shortages of funds available to Indeni were caused by the operational margins on the imposed wholesale prices, which at times were negative and made Indeni activities very difficult and diverted a lot of energy from management that should be addressed to Indeni's specific problems.

On what percentage of Indeni's problems could be attributed to ZESCO power failures and dips, your Committee were informed that power problems were gradually increasing, more so during the rainy season. ZESCO had, however, recently connected a new line to the Refinery and it was hoped that, once commissioned, power supply would improve.

On whether there was a working contract between Indeni and ZESCO which spelt out what the exact power needs of the Refinery were, your Committee heard that there was no performance agreement in place between the two. The Zambia Bureau of Standards assured the quality of power supplied.

On whether the change from leaded to unleaded petrol would not affect the storage tanks at Indeni, your Committee heard that the lead replacement additive being used by Indeni did not contain any alcohol and was metal based just like lead and because of this, no phase separation had taken place. The storage tanks could, therefore, safely hold unleaded petrol.

When asked to comment on whether the real reason for phasing out leaded petrol was to protect the dry catalytic converters fitted to cars, the Managing Director stated that lead did indeed damage catalytic converters. He further explained that Zambia was part of a wider world and thus the need for conformity with changing world trends. The petroleum industry was continually being upgraded and there was need to move on as part of the Cleaner Fuels Programme.

On whether older vehicles that were not fitted with catalytic converters would be affected by the change to unleaded petrol, your Committee heard that there was no problem for such motor vehicles. The General Manager explained that only the reverse situation created problems in that cars fitted with catalytic converters were damaged when they were filled with leaded petrol.

SUBMISSION BY OIL MARKETING COMPANIES (OMCs)

On the issue of phasing out of leaded petrol, the following OMCs submitted:

i. The Managing Director, Total Zambia Limited;
ii. The Managing Director, Engen Zambia Limited;
iii. The Managing Director, BP Zambia Limited;

Your Committee heard that Zambia, being a net importer of fuels, whether in finished form or crude for processing, relied on the coastal countries for its sources of supply or as transit ports of overseas sourced fuels. With the rest of these sources having transitioned to cleaner fuels, it became

inevitably necessary that Zambia be well prepared to deal in equally cleaner fuels. The prime products in the agenda for cleaner fuels were largely diesel and petrol.

The mines that constituted the larger consumer sector of diesel used low sulphur diesel, particularly in conformity with international mining regulations for underground operations and in conformity with Original Equipment Manufacturers specifications (OEMs) for efficient use of equipment and prolonged equipment life.

Studies had shown the harmful effects of lead on human health and the environment, which concerns had been the driving force towards the use of unleaded petrol in vehicles. In regard to these developments, therefore, it was only prudent that Zambia moved fully to unleaded petrol and low sulphur diesel in accordance with regional protocols, global trends and market demand.

Your Committee heard that given that the general quality (with respect to octane number) of unleaded and lead replacement fuels was now equivalent to leaded fuel, engines could without exception run on either. The only time these products were not interchangeable was when a catalytic converter was fitted to the exhaust system of vehicles, when unleaded must be used.

Historically, a lead based additive (Tetra ethyl lead or TEL) had been added to the reformate emerging from the fuel distillation process. TEL improved the combustion qualities (anti knock) of petrol.

Lead, however, was a potential pollutant and more importantly poisoned systems (catalytic converters) designed to convert harmful engine exhaust emissions to more environmentally acceptable derivatives. Since most vehicles in developed countries could not be licensed unless they conformed to strict emission standards, they were generally fitted with catalytic converters. They would thus be unable to use regular leaded petrol.

It should be understood that as many worldwide studies had shown, it was not lead that was the key pollutant. The only reason to remove lead from fuel was to allow for dry catalytic converters to be fitted to cars. The main function of these converters was to convert poisonous exhaust fumes like carbon monoxide and nitrous oxides to lessen toxic compounds such as carbon dioxide and water. Lead poisoned these converters and rendered them inoperable.

Thus, if cars were not fitted with such devices, the benefits of unleaded fuel could be questionable. Should Zambia be seeking to reduce harmful emissions from vehicles, it would need to couple the introduction of unleaded petrol with an exhaust emission regulating system. This would encourage the use of catalytic converters.

For these reasons most countries had as of January 1, 2006, ceased to market leaded petrol. These countries include South Africa, Mozambique and Tanzania.

Options for introducing unleaded as sole grade of petrol in Zambia:

a) capital investment in the Indeni Refinery by way of installing an Isomerisation Unit as well as upgrading the reformer. Currently Indeni could only produce 50,000 metric tons of unleaded fuel per annum. This represented about 30% of national demand;
b) use of high octane oxygenated additives such as ethanol derived from sugar cane. The Ministry of Energy and Water Development has conducted several studies on this;
c) use of non-lead octane enhancers such as Methyl Tertial Butyl Ether (MTBE) or Methylcyclopentadienyl Manganese Tricarbony (MMT);
d) importation of finished products from Beira, Dar-es-Salaam and/or South Africa.

From the consumer perspective, unleaded fuel could immediately be introduced to the Zambian market as the sole grade of petrol. It was recommended though that the octane level of this fuel be no less than 93 RON and this should be specified by an appropriate standard.

The existing storage and distribution equipment being used to market leaded fuel needed only to be flushed before it could be utilised for unleaded petrol.

From the supply chain perspective, an economic justification would need to be undertaken on the upgrade of Indeni. If this product were to be imported in its entirety, supply routes would need to be upgraded (road and rail). Further this would render Indeni economically nonviable.

On the cost implications of phasing out leaded petrol, your Committee heard that there was need for compliance testing, high safety risk operations on tank cleaning, tank isolations and distinctive colour codes for premium and unleaded fuel. This should help OMCs evolve better and safer methods of transitioning. It was against this background that most OMCs, as distributors of finished product, therefore, recommended the following preferred changeover to full unleaded, specific for retail outlets and depot facilities respectively:

Retail sites changeover:
On specific dispensers where unleaded was already selling, there would be no change. On dispensers currently selling leaded petrol, the following process needed to take effect:

i) run down the leaded petrol stocks;
ii) all underground tanks that previously stored leaded fuel should be cleaned out and prepared to receive unleaded. Flush the bottommage using hand pumps. The sludge would be contained in drums and stored offsite for eventual safe treatment and disposal in conformity with the Environmental Council of Zambia;
iii) the flushed tanks would be filled with unleaded petrol which would be sold as leaded petrol;
iv) all nozzles and pumps converted to unleaded have to be changed from a diameter of 21mm to a diameter of 17mm to accommodate the gas tank neck sizes of modern vehicles. This, in most cases, would require the replacement of hoses as well;
v) upon exhausting the first unleaded tank fill, the tanks should be filled again with unleaded and tested for the specification outcome, after which sales should resume as full unleaded; and
vi) if the specification is not achieved first time round, repeat the process until it is satisfactory.

It is important to note that price equalisation between leaded and unleaded had since been achieved and, therefore, there are no longer transition price sensitivities that need to be dealt with.

In terms of costs, these will be associated with:

- travel by technicians country-wide to do the works specified above;
- containment, transportation and safe disposal of bottommage sludge;
- labelling of dispensers and filler points;
- restoration of underground tank inter-linkages at forecourt islands; and
- in some cases and as appropriate, nozzle replacement to right fit all vehicles - new or old.

Depot facility changeover:
There was need to allow preparation on additional tankage to take place without disrupting continuity of unleaded sales into the market.

In terms of costs, these will be associated with:

- containment and safe disposal of bottommage sludge;
- labelling of pipelines in the tank farm and loading / offloading gantry; and
- restoration of tank inter-linkages where required.

On whether or not MMT was a suitable substitute for lead taking into consideration that it also had polluting effects in that it polluted ground water surfaces and could thus cause cancer, your Committee heard that just like lead, it is a metal based compound, and could thus cannot be ingested by the human body in the form that it was released from motor vehicles because it was insoluble. Your Committee were, however, informed that the most suitable option was the Isomerisation unit, which would completely cut out additives and ensure cleaner fuels.

SUBMISSION BY THE DIRECTOR, ENVIRONMENTAL COUNCIL OF ZAMBIA

In 2001, the Energy Regulation Board constituted a task team to develop strategies for introducing unleaded petrol in Zambia. The Environmental Council of Zambia was asked to serve on this committee. The committee had the following terms of reference:

- establish market demand for unleaded petrol;
- identify options for producing unleaded petrol;
- develop strategies for unleaded petrol (short term and long term) and make recommendations; and
- any other pertinent issues.

The Committee proceeded to establish the market demand for leaded petrol as well as the traffic levels for the country.

Beyond 2001, there had been regional efforts to address the issue of phasing out leaded petrol. In 2004, a follow up conference to the Dakar conference of 2001 was held. Zambia's recommended action included the announcement of a Government policy for the implementation of the leaded petrol phase out as well as development of emission standards.

The current situation was such that the December 2005, target enshrined in the Dakar Declaration which Zambia was party to, was not met. According to the Department of Energy in the Ministry of Energy and Water Development, Zambia failed to meet the December, 2005, deadline due to technical problems at Indeni Refinery in Ndola. However, the country envisaged that the target would be met by August, 2006. In addition feasibility studies had thus far been conducted at Indeni and findings indicated that it was possible for the country to do without leaded petrol although there were cost implications to the change from leaded to unleaded.

Further to the above, studies at the global level had been conducted to showcase economic incentives that were available or would be available for phasing out leaded petrol.

As a Council with the mandate to protect the environment and human health, ECZ believed phasing out of leaded petrol from the market needed to be supplemented with economic incentives, which were aimed at promoting a clean and safe environment. Some of these were alluded to in the study prepared by P Kuch and D King made available in 2003 and included differential pricing favouring unleaded gasoline to leaded gasoline, differential taxation on fuel, environmental tax on lead additives and differential vehicle import duty based on pollution characteristics. Mention should be made here of the fact that promulgation of incentives needed to be done with the aim of enhancing economic growth. In addition to the cited incentives, some incentives could take the form of licensing, for example, of toxic substances including those that are used as additives or catalysts. Imposition of fines was another very effective approach.

The Environmental Council of Zambia had since its inception been concerned with the problem of lead in the environment. This included lead from both stationary and mobile sources. Vehicular emissions, especially from cars using leaded gasoline, had been of particular concern. ECZ had been limited to comprehensively monitor emissions mainly due to the lack of appropriate equipment as well as specific standards to deal with lead emissions.

The Environmental Council of Zambia, in accordance with the provisions of the *Environmental Protection and Pollution control Act No* 12 of 1990 *Cap* 204 of the Laws of Zambia, enforced the Pesticides and Toxic substances Regulations Statutory Instrument No. 20 of 1994. Using this Statutory Instrument, restriction and control of any toxic substance including lead in this case was provided for. ECZ was currently in the process of developing regulations for mobile source emissions under the auspices of the Copperbelt Environment Project. In addition, under the same project, it was envisaged that air-monitoring equipment including equipment specific for monitoring vehicular emissions would be procured. Using the appropriate equipment, lead in the environment was one parameter that would be closely monitored.

Emission standards would form part of the regulations. Mention should be made that the existing regulations for air and water pollution control as well as the ones for waste provide for regulating heavy metals including lead and others in this family. There is, however, no specific standard to address the problem of lead in the environment. To this effect ECZ are doing everything to ensure that the provisions of the Pesticides and Toxic Substances Regulations are enforced and that standards to do with emissions from mobile sources including vehicles are put in place as soon as it was practicable.

The incentives, including the imposition of fines, discussed above, are an important tool for ensuring control of lead exposure and ultimately curtailing the negative effects on both the environment and human health.

Sources of Lead

The sources of lead in the environment as well as humans could be traced from different areas of human activity. Below is a description of the sources of lead.

Petrol
The organic lead additives, tetra ethyl and tetra methyl lead, were first introduced into petrol in the 1920s with the sole purpose of enhancing octane, preventing knocking and lubricating engine valves. Since then, tetra methyl and mixed lead alkyls had also been added to fuels. High vehicular density, which was typical of Zambia particularly in the urbanised areas, had led to high consumption of petrol and had ultimately resulted in wide dissemination or dispersion of lead in the environment.

Research studies done in the US previously found the combustion of leaded petrol containing 0.4 g of lead resulted in:

- 75% or 300 mg of lead being emitted into the air;
- 15% or 60 mg remaining in engine and exhaust interior surfaces; and
- 10% or 40 mg remaining in lubricating oil.

Of the 300 milligrams emitted into the air, 140 milligrams was emitted to the atmosphere as lead aerosol (very small particles with the potential for long-range transport and pollution), while 160 milligrams emitted to the roadway as large particles resulting in localised pollution. The 10% of the lead remaining in lubricating oils and additional 15% on engine and exhaust parts could result in further lead emissions if burned for heat or cut apart during scrap metal recovery.

Vehicular emissions
Vehicle traffic is the largest source of lead exposure in urban areas. Given the rapid urbanisation and associated motorisation in sub-Saharan Africa in general and Zambia in particular, air pollution is going to get worse much sooner than later, unless something was done.

Mining and smelting
In Zambia, lead mining has been synonymous with the town of Kabwe. Lead mining was conducted in Kabwe, formerly Broken Hill, for almost a century from 1905 to 1994 when the mine was closed. The mining of lead had contributed significantly to the local economy as well as the national economy. Whilst there were benefits to the community and the nation, the wastes arising from the operations had negative effects on human health and the environment. Studies undertaken under the Copperbelt Environmental Project indicated that children especially had been exposed to lead showing blood levels that were way above the World Health Organisation limit. It had further been shown that the soils and vegetation in the wind falling areas had been contaminated with lead. This situation exacerbated the problem of local communities being exposed to the toxic substance.

Paint
Paint is another source of lead exposure. This was mainly true for structures that were constructed in the 50's, 60's and the 70's. There was, however, no data to show to what extent people got exposed to lead from paint. Most paint manufacturers no longer use lead as an additive.

Lead containing water pipes
Lead containing water pipes are another source of lead exposure. This is especially so for the older water reticulation infrastructure.

Consumer Products
The other source of lead exposure are consumer products. This class, however, requires identification of the products and then putting in place a system to regulate the same.

Your Committee heard that lead exposure could have far reaching effects on human health. Lead is a highly toxic substance, exposure to which could produce a wide range of adverse and/or detrimental health effects. In some cases the effects could be fatal. Studies had shown that both adults and children could suffer from the effects of lead poisoning. Childhood lead poisoning is much more frequent.

Studies conducted by the Australian New South Wales Environmental Agency showed that in adults**,** lead could increase blood pressure and cause fertility problems, nerve disorders, muscle and joint pain, irritability, and memory or concentration problems. Most adults who were lead poisoned got exposed to lead at work. Occupations related to house painting, welding, renovation and remodelling activities, smelters, firing ranges, the manufacture and disposal of car batteries, and the maintenance and repair of bridges and water towers, were particularly at risk for lead exposure. When a pregnant woman has an elevated blood lead level, that lead could easily be transferred to the foetus, as lead crossed the placenta. In fact, pregnancy itself could cause lead to be released from the bone, where lead is stored, often for decades after it first enters the blood stream (the same process could occur with the onset of menopause). Once the lead is released from the mother's bones, it re-enters the blood stream and could end up in the foetus.

In other words, if a woman has been exposed to enough lead as a child, it is possible that some lead could have been stored in her bones; the mere fact of pregnancy could trigger the release of that lead and could cause the foetus to be exposed. In such cases, the baby is born with an elevated blood lead level. This exposure could come from vehicular emissions.

On the effects of lead on the environment, your Committee heard that these could best be understood from the three media through which contamination was entrenched. The three media were air, water and soil. The contamination of air was mainly due to emissions into the atmosphere. The sources of lead contamination in air were mainly from industrial activities, including mining. Another very important source was through vehicular emissions from vehicles using leaded petrol. In addition to contamination of air, lead has high potential to

contaminate water. Lead in water could be easily assimilated by aquatic life including fish, which are ultimately consumed by human beings.

Further, lead has potential of contaminating soils. Lead in soil could accumulate in the plant tissue. Accumulation of lead in the soil leads to what is called lead toxicity, which makes it difficult for soils to be productive. Emissions from industry and vehicles propelled by leaded fuel had a very negative effect on soils. In Kabwe, there was a high average lead content in the soils in the Kasanda and Makululu areas; the soils were contaminated mainly through deposition of lead contaminated particulate matter.

Lead contaminated air, water and soils ultimately affect human health. Human beings cannot subsist in an environment that is polluted. The phasing out of leaded petrol was an important activity on the environmental calendar. As shown above, the dangers associated with lead exposure could not be underrated.

ECZ took note of the commitment from the Ministry of Energy as regards the phasing out of leaded petrol by August, 2006. There was a need to embark on sensitisation activities, which would lead to the eventual phase out of leaded petrol.

On whether MMT was a good substitute for lead, your Committee heard that MMT was also a metal and would, therefore, have the same effect on catalytic converters that lead had and so a non-metal based compound would be a better option. MMT also had some toxic effects and, therefore, such a change would just be an exchange of one toxin for another.

On whether ECZ were intending to introduce any emission monitoring and testing system, your Committee were informed that a system was already in place to monitor emissions from stationary sources like generators. However, there was no legislation in place and no equipment to monitor emissions from mobile sources.

On the recently introduced Carbon Tax, your Committee heard that ECZ were very disappointed that they were not part of the process that led to the introduction of this tax.

Committee's Observations and Recommendations

Your Committee observe the following:

(i) lead has harmful effects on both human beings and the environment;
(ii) lead damages the dry catalytic converters that are fitted to modern motor vehicles because it is a metal based compound which cannot be converted to anything else. The main function of these converters is to convert poisonous exhaust fumes like carbon monoxide and nitrous oxides to less/ non toxic compounds such as carbon dioxide and water;
(iii) the sources of lead poisoning are lead-lined water pipes, lead based paint on old buildings, old refinery tank house cells for refining copper (they are lined with lead to prevent them from corroding), and vehicle emissions; and
(iv) the use of Methylcyclopentadieryl Manganese Tricarbony (MMT) additive as a substitute for lead is not the best option as it also has harmful effects on human beings and the environment.

Arising from the above observations, your Committee recommend as follows:

(i) a monitoring and testing system and appropriate legislation be put in place for monitoring harmful emissions from both mobile and stationary sources;
(ii) sensitisation of the general public on the advantages of using unleaded petrol should be carried out by the relevant authorities;
(iii) there is need for investment in an Isomerisation Unit at Indeni if unleaded petrol of the best quality is to be produced;

(iv) Government needs to develop a policy on the disposal of lead emitting sources like lead-acid batteries and lead based pipes; and

(v) legislation should be put in place to ensure that people affected by lead poisoning are appropriately compensated.

THE SETTING UP OF STRATEGIC FUEL RESERVES

SUBMISSION BY THE PERMANENT SECRETARY, MINISTRY OF ENERGY AND WATER DEVELOPMENT

6. Your Committee heard that all of Zambia's petroleum requirements are met through imports. The upstream petroleum industry in Zambia was made up of TAZAMA Pipelines, Indeni Refinery and the Ndola Fuel Terminal. On the downstream, there are Oil Marketing Companies (OMCs) involved in the distribution and retailing of petroleum products.

When the infrastructure was built, the Government of the Republic of Zambia created the ZIMOIL Division of ZIMCO to procure the feedstock tailored to the needs of the Zambian market. It was shipped through the TAZAMA pipeline, processed at the Indeni refinery, and sold to OMCs from the adjacent Ndola Oil Storage Company (NOSCO) terminal. In 1993, following the liquidation of ZIMCO, a state-owned new company to procure feedstock was created, i.e. Zambia National Oil Company (ZNOC) and it was also given the responsibility of operating the Ndola Fuel Terminal.

In 2002, ZNOC was liquidated and, from that moment, Indeni carried out feedstock importation and the management of the Ndola Fuel Terminal (NFT). The management of the Ndola Fuel Terminal by Indeni had been a temporary arrangement with the Government of the Republic of Zambia.

The Government of the Republic of Zambia was in the process of establishing strategic petroleum reserves that would be used during emergencies. In order to achieve this, the Government would purchase thirty days strategic stocks in form of Diesel, Kerosene, Jet A1 and Petrol to be kept at the Ndola Fuel Terminal. The Government would also rehabilitate the Ndola Fuel Terminal in order to upgrade it to international standards and utilise it for the storage of the strategic reserves.

Current Status

The programme to set up strategic reserves was being implemented as follows:

(i) with effect from January, 2006, all Oil marketing Companies were obliged to keep fifteen days reserve operational stock. A statutory instrument to this effect was issued on 2nd December, 2005; and

(ii) the Zambia National Tender Board (ZNTB) was advertising a tender for the procurement of the thirty days of reserves. The tender included the rehabilitation and management of the Ndola Fuel Terminal.

With the current programme, it was estimated that by end of 2006, the country would have strategic reserves amounting to at least thirty days of national fuel consumption. This would be augmented by the additional fifteen days reserve by OMCS, thus bringing the effective total reserve stock for the country to forty-five days.

On how much money would be needed to rehabilitate the Ndola Fuel Terminal, your Committee heard that the figure was in the region of two million United States Dollars (US$2million).

On whether Indeni was the best manager for the NFT, your Committee heard that Indeni had the most experience in managing the Terminal. The Permanent Secretary, however, stated that the reason for floating a tender for management of the Terminal was to give all stakeholders an equal opportunity to vie for the management responsibility. He further stated that who ever won the tender would be in charge of rehabilitating the Terminal, purchasing sufficient strategic stocks, and managing day-to-day operations. He

stressed the point that the Terminal was Government property and anyone managing it would be doing so independently, but on behalf of the Government.

On where the money to purchase strategic stocks would come from, your Committee heard that all OMCs had been charged with the responsibility of collecting K152 per litre of petroleum products sold. The Permanent Secretary stated that the Government had originally intended to allocate fifty billion Kwacha (K50 billion) a year in the National Budget for a period of ten years, but the K152 per litre sold was adopted, as it would raise more funds. The funds raised through the cost line in the fuel would be for the purchase of the strategic reserves and the rehabilitation of the Ndola Fuel Terminal.

SUBMISSION BY THE EXECUTIVE DIRECTOR, ENERGY REGULATION BOARD

Your Committee heard that the ERB prepared a Position Paper on Strategic Stocks that was completed in 2003. The Paper was presented to the Minister of Energy & Water Development who had since formed a Technical Committee that was reviewing the modalities of creating Strategic Reserves. The report recommended that in the interim, the Government of the Republic of Zambia (GRZ) introduced national strategic fuel reserves through a Strategic Storage Statutory Instrument compelling Oil Marketing Companies and importers of petroleum feedstock to hold twenty-one days cover of fuel reserves in their facilities

In mid April 2005, Cabinet authorised the Ministry of Energy & Water Development to establish the National Petroleum Strategic Reserves (NPSR). This was in line with the 1994 National Energy policy objective on securing reliable petroleum supply for the country. The issue of Strategic Petroleum Reserves was cardinal to the Zambian economy to avoid shocks to the economy as they forestalled disruptions of fuel supply in the country.

The Department of Energy was given the task of proposing mechanisms for the operationalisation of the reserves through consultations with stakeholders.

In April 2005, the ERB presented a paper to the Minister of Energy & Water Development, the Ministry of Justice, and the Ministry of Finance and National Planning in which the following were outlined:

i.) the mode of operations of strategic fuel reserves;
ii.) the source of financing;
iii.) obligations of OMCs and Indeni;
iv.) the role of the ERB;
v.) the role of the Minister of Energy & Water Development;
vi.) the regulatory framework for the strategic reserves; and
vii.) the conditions that would necessitate a draw down from the strategic reserves.

It was agreed that the function of holding of NPSR would be under the auspices of Government through the Ministry of Energy & Water Development. The Government would own these reserves. The sources of finance for the strategic reserves would include, but not be limited to, the following:

a) the national Budget- Government would allocate funds for the period 2006-2015 for the establishment and operationalisation of NPSR;
b) private sector funds under suitable financing agreements; and
c) cost line in fuel price.

Your Committee heard that following the nation-wide fuel crisis in October 2005, it was decided that OMCs should hold fifteen days operating stock as stipulated in their license conditions. The Government would hold fifteen days fuel as strategic stocks at the Ndola Fuel Terminal. The combined volume of products to be held by the OMCs and the Government were as follows:

PRODUCT	QUANTITY (cubic metres)
Petrol	13,790
Diesel	26,916
Kerosene	1,524

It was decided that the Strategic reserves would be built up through imports in a bid to give time to Indeni to build up its own stocks after the prolonged shut down of 2005 and also for the stocks to be in the form of cleaner fuels.

The ERB drafted a Statutory Instrument, which was signed by the Honorable Minister of Energy and Water Development on 2nd December 2005 - SI. No 90 of 2005 Minimum Petroleum Products Stocks Regulations. The Statutory Instrument made it mandatory for OMCs to hold fifteen days of stock. The ERB held consultations with OMCs regarding this SI and the challenges highlighted by the OMCs were as follows:

a) most OMCs did not have adequate storage facilities to store their fifteen-day stock requirement; and
b) the OMCs were of the view that the holding costs for these stocks should be recovered from the consumer.

In addressing the issue of storage limitation, the ERB advised that OMCs without sufficient storage capacity be given access to the GRZ fuel terminal in Ndola while building their own depots. Most OMCs indicated that they would be able to have adequate storage by 30th June, 2006. With regard to costs, the current pricing structure was sufficient to cover the additional cost of maintaining the working stocks.

Regarding the strategic fuel reserves to be held by GRZ, it was suggested that to "fast track" its establishment, funding should be done by the private sector that would be reimbursed later. A selected number of OMCs, based on their market share and willingness to import product, was approached by the ERB regarding the financing of Strategic Fuel Reserves and these were:

•Mobil Oil Zambia Limited;
•Engen Petroleum Zambian Limited;
•Total Zambia;
•Kobil Oil;
•BP Zambia Limited; and
•Zambezi Oil and Transport.

The ERB took part in the drafting of the 'terms of reference' of an invitation to participate in the financing of the acquisition of the strategic reserves. Of the six OMCs selected, only one OMC responded to the invitation.

The Ministry of Finance and National Planning mandated the ERB, in consultation with Minister of Energy & Water Development, to include a cost line in the price of fuel for the establishment of the National Petroleum Strategic Reserves (NPSR) by the Government. The funds required to establish fifteen days strategic reserves were computed as K73 billion and a cost line of K152 per litre was included in the price of Petrol, Diesel, Kerosene and Jet A1 effective 15 December, 2005. These funds would be used to set up the Strategic Reserves Fund (SRF), which would be managed by the ERB. The objective of this cost-line was to build up funds over a reasonable time period that would cater for the cost of product equivalent to fifteen days national consumption; the related costs of holding the stock; and the cost of rehabilitating the tanks at the Ndola Fuel Terminal. The funds raised in this account as at 28 February, 2006 were K9,641,913,818.52.

If the OMCs had been responsive to the invitation, they would have immediately commenced with the process of acquiring the strategic fuel reserves and would have then been refunded through the SRF over a period of twelve months.

Acquisition of the Strategic Stocks and Rehabilitation of the Ndola Fuel Terminal

Currently, Indeni on behalf of Government, managed the Ndola Fuel Terminal. It had been agreed in principle that the management of the Ndola Fuel Terminal would need to be tendered out. The appointed Terminal Manager would oversee the rehabilitation works, the operations of the terminal, and the acquisition and management of the strategic fuel reserves. The rehabilitation works and the purchase of the NPSR would be financed by the SRF. The Terminal Manager would be paid a management fee for these services.

The ERB took part in the drafting of a Tender document for a Terminal Manager through the Ministry of Energy & Water Development in December 2005.

Your Committee heard that the setting up of Strategic Fuel Reserves had mainly been hindered by lack of financing. Initially, it was hoped that the reserves would receive direct funding through the National Budget but unfortunately this could not be done. Therefore, the ERB actively participated in coming up with ideas of alternative sources of financing. The hindrance of the cost-line/SRF was that there was a waiting period for the funds to build up before works could commence on the Ndola Fuel Terminal and, thereafter, the acquisition of the actual stocks for the reserves.

Expressions of interest for the management of the Ndola Fuel Terminal had been invited. The establishment of the SRF had also been done. The process was, therefore, in motion to achieving this.

When asked to comment at which point the K152 per litre was collected, the Executive Director stated that it was at the point of sale at the pump. He explained that the amount was collected monthly and depended on volumes sold every month. The money was collected by the OMCs for the ERB on behalf of the Government.

On whether there was any non-compliance by the OMCs as regards remitting the K152 per litre, your Committee were told that there was an agreement in place in which the OMCs would be audited every three months to ensure compliance. Those OMCs found abrogating the condition would be penalised.

On whether rehabilitation of the TAZAMA pipeline had been carried out, your Committee heard that the pipeline was now in good working order and any rehabilitation that still needed to be done was very minor.

SUBMISSION BY THE GENERAL MANAGER, INDENI PERTOLEUM REFINERY

Your Committee heard that in response to Government policy, Indeni had placed itself towards the establishment of fiteen stock days of all finished products to be part of the Strategic Reserves.

On whether Indeni and the Ndola Fuel Terminal were one and the same, your Committee heard that the two were separate entities. The General Manager explained that Indeni had the Government mandate to manage the Terminal.

On how much fuel both Indeni and the Terminal could hold, your Committee heard that if stocks were optimised, the Terminal could hold more that fifty days of stocks, while Indeni could hold more than twenty days of stock.

On where the OMCs would keep their share of the strategic reserves, your Committee heard that the licensing agreements for OMCs were such that each one should be able to physically hold their market share of strategic stocks.

On what was being done at the Refinery to ensure that losses that the Refinery faced were minimised, the General Manager explained that there was a need for retrofitting of the entire Plant. He further explained that the Refinery in its present condition was not yet reliable until entire rehabilitation was done. It was, therefore, advisable to build up strategic reserves of fuel to avoid future shortages.

On whether Indeni was to blame for the fuel crisis experienced in the country in 2005, your Committee heard that at the time, there was no policy on strategic fuel reserves and, hence, no one knew what to do during a crisis. The General Manager explained that there had been an official letter from Total Outré Mer to the Zambian Government for the keeping of forty-five days of strategic reserves but the Zambian Government had declined. Your Committee were informed that though the fuel crisis was as a result of the shut down at Indeni, it was not the only factor.

SUBMISSION BY OIL MARKETING COMPANIES (OMCs)

Your Committee heard that fuel was a major driver of Zambia's economic activities, particularly Mining, Agriculture, Transport, Tourism and satellite activities in Commerce, Industry and Manufacturing.

Consequently, any disruption of the fuel supply chain had a huge negative impact on national productivity, well being of the people and industry output performance. To this effect, the importance of the setting up of Fuel Strategic Reserves could not be over emphasised to act as buffer stock in times of sudden and unplanned disruption of the local fuel supply, refining process or import constrains.

Having strategic reserves alone, however, was not enough security unless that was covered by adequate rail and road infrastructure and transport capacity that was able to respond adequately and flawlessly to back up and replenish the reserves.

From the aforesaid therefore, it was clear and critical that in addressing issues of supply, there be integrated attention in tackling the key components of strategic reserves, i.e. enabling infrastructure and transport capacity in the order of rail and road; pricing; and clean fuels transitioning.

The base assumptions on the country strategic reserves were founded on the following premise:

a) that the Government-owned Ndola Fuel Terminal would be the facility for storage of National Strategic Reserves;
b) that the Government-owned strategic reserves would be managed by an independent operator;
c) that there would be inevitable costs involved in retrofitting and rehabilitating the facilities to bring them to usable state for the purpose intended;
d) that there would be outlays for the strategic reserve stocks and for updating and upgrading safety standards;
e) that certain upgrades and installations for offloading/loading gantries for both rail and road as well appropriate enabling pipe works would be necessary;
f) that processes and procedures for stock management would be necessarily backed by technology;
g) that the strategic reserve requirement would be to fit 30 days national consumption cover;
h) that the product would be held in bond; and
i) as an overlay assurance measure, the Energy Regulation Board could be charged with stock level verifications as part of their statutory responsibilities.

The table below summarises the consumption profile by product using 2005 market consumption as a base and also demonstrates indicative reserve requirements per each class of product.

Product	Annual Consumption(2005)	Proposed Reserve (One Month)
Diesel**	329,342,384	27,445,198
Premium Petrol	149,002,202	12,416,850
Heavy Fuel Oil(HFO)	62,015,860	5,167,988
Jet Al	32,087,933	2,673,994
Kerosene	11,348, 946	945,745
Solvents	4,204, 820	350,401
Unleaded Petrol	2,854,289	237,857
Av gas	1,400,914	116,742
Light Fuel Oil(LFO)	500,305	41,692
Liquefied Petroleum Gas (LPG)	3,123	260
Grand Total	**592,760,774**	**49,396,727**

* Statistics courtesy of Energy Regulation Board
**Includes circa 80 Million litres Low Sulphur Diesel sold to the Mines

In order to ensure that the fuel quality was maintained, there would be need to operate the Strategic Fuel Reserve Tank Farm as an active depot, drawing and replenishing fuel, but maintaining the agreed buffer stock. This would entail participating in downstream fuels marketing to ensure the Fuel Strategic Reserve quality was maintained.

The monthly cost of maintaining the major product stocks in reserves was estimated to be US$ 590,659 for a total combined volume of 49 million litres per month, translating to 1.20 US cents per litre.

The capital required to bring the terminal to fit-for-purpose status could only be determined upon doing a full scope assessment of the works needed to be done.

On whether the OMCs were prepared in terms of liquidity and storage space to hold their share of the market of strategic reserves, your Committee heard that all OMCs had taken on a responsibility that they should be able to manage as per their individual licensing agreements. The ERB had screened all OMCs before issuing them with licenses and were satisfied that they met all requirements.

Your Committee were informed that the OMCs were expected to hold fifteen days working stock, over and above their normal day-to-day sales and not necessarily strategic reserves. The working stock was drawn from daily but replenished to levels that amount to fifteen days stock. Strategic stocks on the other hand were to be held by Government and should only be drawn from in time of need.

On the K152 per litre to be collected by OMCs, your Committee heard that this money was collected by OMCs on all petroleum products sold at the pump. This money was collected for ERB on behalf of Government. This money went into the National Strategic Fund and would be used for purchasing strategic reserves and rehabilitating the Ndola Fuel Terminal.

On who was the best manager for the Ndola Fuel Terminal, your Committee heard that any player in the petroleum industry who could face up to the challenge would be suitable. This would have to be an independent manager as this would increase reliability and accountability.

The OMCs stressed the need for continuity and urged that the Terminal manager be someone who was experienced and capable to manage the stocks to avoid disruptions in the supply chain in future.

Committee's Observations and Recommendations

Your Committee observe the following:

i) the Ndola Fuel Terminal has adequate capacity to hold strategic reserves for the nation;
ii) the proper management of the Ndola Fuel Terminal is of utmost importance if the exercise of holding strategic reserves is to succeed;
iii) not all OMCs have seen the tender floated for the management of the Terminal; and
iv) there is the collection of K152 per litre in the cost line of petroleum products sold for the build up of the National Strategic Fund.

Arising from the above observations, your Committee recommend the following:

i) the Government should transparently expedite, as a matter of urgency, the tender process for the management of the Terminal;
ii) the selected manager of the Terminal should have a proven track record of ability;
iii) the National Strategic Fund should be for the purpose for which it is truly intended; and
iv) the ERB should ensure that the audits of the OMCs as regards the cost line of K152 per litre are carried out and those found wanting should be penalised.

PART II

TOUR REPORT

INDENI PETROLEUM REFINERY

7. In view of the strategic role that Indeni Petroleum Refinery plays in the petroleum sector, your Committee undertook a tour of the Refinery in Ndola on Wednesday, 19th April 2006.

The purpose of the tour was for your Committee to get an insight into the production process of unleaded petrol. Your Committee also wanted to inspect the storage tanks for strategic reserves at the Refinery.

Your Committee were informed on the production process of the various products of the Refinery. Your Committee were informed that refining crude oil was done by a process called distillation. Distillation involved the separation of liquids based on their boiling point. The heavier liquids had the highest boiling point and so came out of the bottom of the distillation column. The lighter gases and liquids had a lower boiling point and so came out of the top of the column.

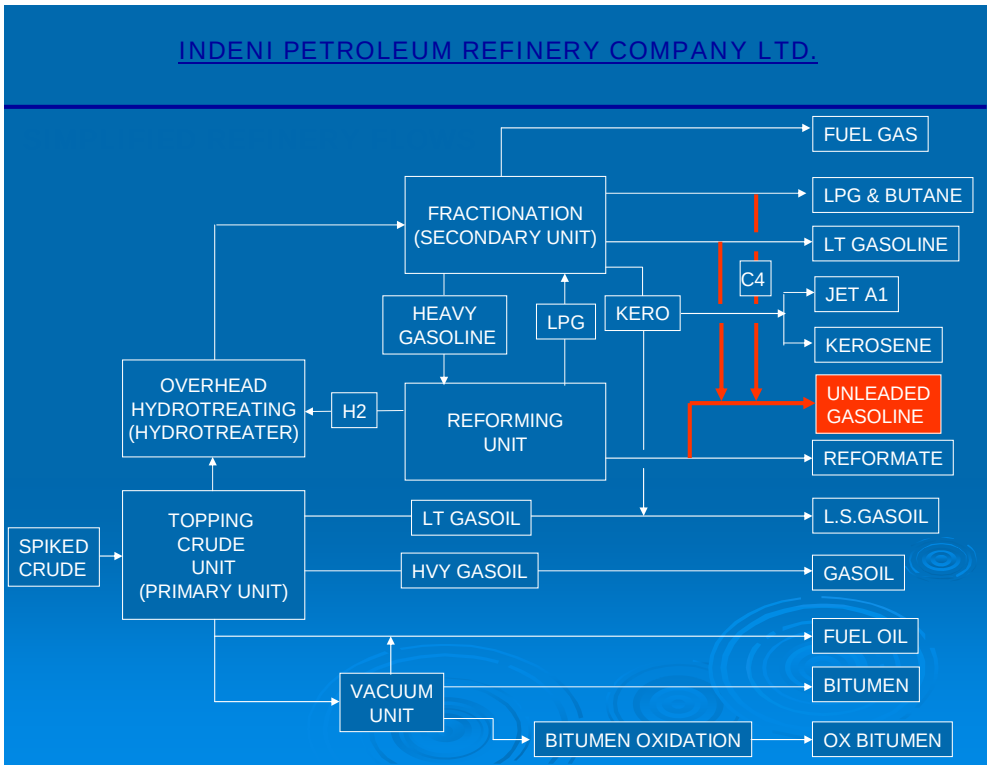
Two types of gasoline are obtained from the column and these are called light gasoline and heavy gasoline. Heavy gasoline is fed into another unit called a reformer and is chemically changed into what is called reformate. Petrol is a mixture of reformate and light gasoline.

Light gasoline has an octane number (measure of quality-the higher the octane number, the better the fuel) of around 82 whilst the reformate would have an octane number around 96 or 95. When the two of them are mixed together they make petrol, which is required to be around 91. Not as much reformate as light gasoline is required in the mixture to make petrol. This means that at times the light gasoline, which had no direct market, would accumulate in the plant. The accumulation may be slow but the end result is that the Refinery would run out of storage space for light gasoline and so would have to shut down.

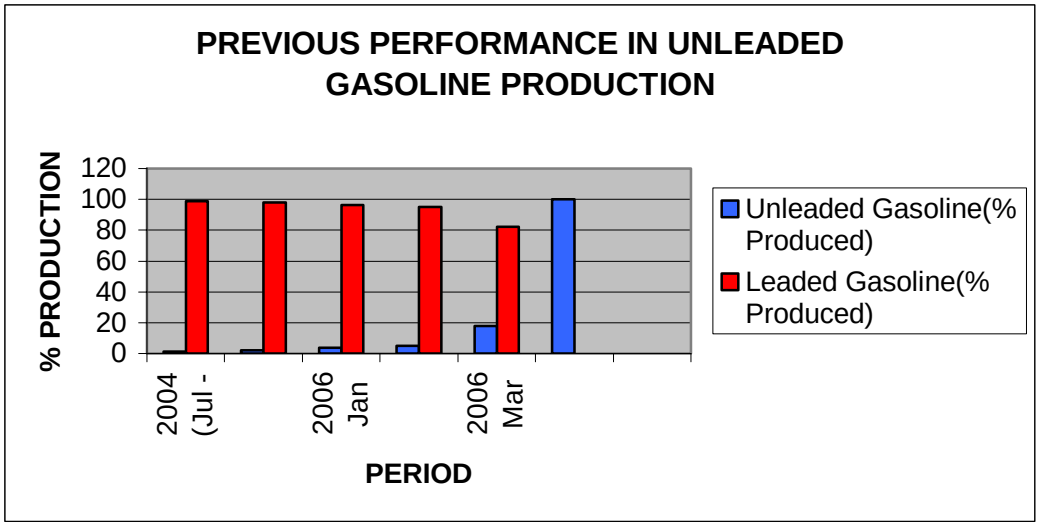
The Managing Director stated that light gasoline was not easy to refine and in order to ease the process an isomeriser was needed. This works much the same as the reformer in that it increases the octane number of the light gasoline. This means that the light gasoline could be processed into petrol directly and, therefore,

would not accumulate in the plant. In the current configuration, Indeni faced the problems of light gasoline accumulation over a period of time.

The Managing Director gave a slide show presentation to your Committee showing a simplified version of the production process and Indeni's strategy for moving to full scale production of unleaded petrol as shown below:



He informed your Committee that the trend today was that the Reforming Unit ran at higher temperatures to achieve high octane, resulting in reduced reformate yields from a design average of 88% to 75% and more liquefied petroleum gas (LPG) from 12% to 25%. Consequently, the Refinery faced higher fuel consumption and losses.



Your Committee were informed that full-scale production of unleaded petrol was scheduled for January, 2007.

Your Committee learnt that Indeni Petroleum Refinery was scheduled to shut down for about thirty to thirty-five days in August, 2006. The reason for the shut down would be rehabilitation works to try to build back the reliability of the plant. This was in a bid to try and avoid long shut downs, equipment failures and cross contamination at the Plant. Your Committee were assured that the shut down would not disrupt the fuel supply in the country, as enough stocks were available to cover the period. Spare parts for the Plant were no longer being manufactured and thus the need for upgrading and changing the whole instrumentation.

The Managing Director informed your Committee that it was hoped that the 4 MW power generator would be installed at the time of rehabilitation. He explained that the Refinery was allowed to have a certain acceptable amount of losses and to consume a certain level of its products. This consumption amount was what would be used to power the generator.

Your Committee were shown the Fire Safety Department and all the safety precautions that were in place. They also saw the Control Room where quantities and processes at different stages in the Refinery were monitored. The system at the Plant is presently analogue and plans were under way to introduce a digital system.

Committee's Observations and Recommendations

Your Committee observe the following:

(i) though Indeni is currently producing 17.7 % unleaded fuel it has undertaken to produce 100% unleaded fuel by January, 2007;
(ii) Indeni requires an Isomerisation Unit to be able to produce unleaded petrol of the highest quality in terms of octane level;
(iii) Indeni have ordered a 4 MW power generator in order to improve the electricity supply at the plant; and
(iv) Indeni is still operating on an analogue system.

Based on the above, your Committee recommend that:

(i) Indeni needs to acquire an Isomerisation Unit, which is needed to ease the production of unleaded fuel;
(ii) the Refinery needs to upgrade its Control Room to a digital system to enable it operate more efficiently;
(iii) there is need for shareholders to recapitalise Indeni if it is to upgrade all the parts of the Refinery;
(iv) the Energy Regulation Board should urgently look into the financial viability of Indeni within the existing pricing structure without causing a fuel price increase for the consumer; and
(v) the Ministry of Energy and Water Development should expeditiously provide your Committee with the audit report on Indeni.

NDOLA FUEL TERMINAL

8. Your Committee also undertook a tour of the storage facilities at the Ndola Fuel Terminal to familiarise themselves with the location of the Terminal and the processes that go on there.

Your Committee learnt that the Terminal was currently managed by Indeni and all the staff were engaged by the Refinery.

Your Committee witnessed the process of loading and offloading fuel and learnt that there were three inspectors to ensure transparency of the process; one from Indeni, one from SGS and one from the concerned OMC.

Your Committee were informed that it was a license condition for the Terminal to hold the strategic fuel reserves. They were informed that Indeni was one of the bidders for the recently floated tender to manage the Terminal.

As part of the tour, your Committee also visited the rehabilitation of the TAZAMA tank Ndola.

Committee's Observations and Recommendations

Your Committee observe the following:

i) the Ndola Fuel Terminal has the capacity to store stocks of up to fifty days diesel and seventy days petrol; and
ii) the rehabilitation programme of the rehabilitation of TAZAMA tank in Ndola, which was funded by the World bank, is still not complete.

Based on the above, your Committee recommend that:

i) the Government should continue putting in place measures for the attainment of ninety days strategic reserves; and
ii) the Government should ensure the completion of the rehabilitation of TAZAMA tanks in Ndola as a matter of urgency.

CONCLUSION

9. In conclusion, your Committee wish to express their gratitude to you, Mr Speaker, and the office of the Clerk of the National Assembly for the support rendered to them during the year. They are also indebted to all witnesses who appeared before them for their co-operation in providing the necessary

memoranda and briefs. Your Committee are hopeful that the observations and recommendations contained in this report will go a long way in improving the energy, environment and tourism sector in Zambia.

MAY 2006 R MUNTANGA, MP

LUSAKA **CHAIRPERSON**

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