



Secretariat of the Basel Convention



Report of First Workshop

on Environmentally Sound Management of Used Oil in Nigeria

Lagos, Nigeria 23rd September, 2004



**Hosted by the Government of Nigeria with the Financial Assistance
of the Secretariat of the Basel Convention (SBC/UNEP)**



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The workshop was financed by the Secretariat of the Basel Convention (SBC), Geneva, Switzerland.

This publication is produced within the framework of the Basel Convention for the Development of Regional Action Plan on Environmentally Sound Management of Used Oils

The Basel Convention Coordinating Centre for Africa (BCCC-Nigeria) for Training and Technology Transfer in Hazardous Waste Management (located at the Federal Ministry of Environment-University of Ibadan Linkage Centre for Cleaner Production Technology and Hazardous Waste Management, Nigeria; herein referred to as the "FMENV/UNIV Ibadan/BCRCC-Nigeria"), University of Ibadan, Ibadan, Nigeria was established in 1994 following Decision 111/19 made by the Parties to the Basel Convention. The purpose of the BCCC– Nigeria is to promote coordination of the policies and activities of the Basel Convention Regional Centres (BCRCs) in Pretoria South Africa for English Speaking Countries, Senegal for French Speaking countries and Egypt for Arab Speaking Countries towards ensuring successful implementation of the Basel Convention on the Development of Used Oils by countries of the African Region.

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REPORT ON TECHNICAL WORKSHOP ON THE ASSESSMENT AND RECYCLING OF USED OIL IN NIGERIA AND AFRICA, 23RD SEPTEMBER, 2004

1. BACKGROUND TO THE PILOT PROJECT

During the Conference of the Parties at its sixth meeting, the African Group requested the secretariat of the Basel Convention and its regional Centres to develop a close partnership with major oil companies operating in the region, to put in place environmentally sound management practices for used oil in order to protect the environment and human health in Africa.

The project approved by the First Open Ended Working Group on the assessment and recycling of Used oils in Africa, after being reviewed at meetings during the OEWG 2 and OEWG 3, shall be the first element of a more comprehensive work programme for a Global Partnership for Used Oil in Africa.

Therefore, this project will try to set the basis to develop a close partnership with major oil companies operating in the African region, to put in place environmentally sound management practices for used oil, similar to the partnership announced during the sixth meeting of the Conference of the Parties on end-of-life mobile telephones.

As a first level of assessment, the project is to gather information on the management of used oils in Nigeria to better define a national plan for the Environmentally Sound Management of used oils in the country. This will be used as a case study and the information gathered on the private companies during this pilot project will help to prepare recommendations to develop the global used oils partnership in Africa. These recommendations will be prepared in very close cooperation with the other Basel Convention Regional Centres in the African continent, South Africa, Egypt and Senegal, which can contribute with their experience in the subject.

UNEP/SBC will closely cooperate in the development of these recommendations and will supervise the whole issue, to maintain coherence in the developments of partnerships under the Basel Convention.

The BCCC- Nigeria will carry out this pilot phase study using Nigeria as microcosm of the Africa Region and will investigate and develop on the following issues:

- ❖ Identification of the main sources of used oils in the country and estimations of the quantities and types of used oils produced, stored and disposed.
- ❖ Identification of the main actors in the used oil market in the country (mainly those in the production, distribution, storage, refining and utilisation) as well as on the main actors on the oil market.
- ❖ Identification of existing disposal and treatment facilities and their capacity.
- ❖ Survey on the informal sector working with used oils.

1.1 OBJECTIVES OF THE PILOT PROJECT

The objectives of the project are two fold:

- (i) The BCRCC- Nigeria will carry out this pilot phase study to gather information on the management of used oils in Nigeria to better define a national plan for the Environmentally Sound Management of used oils in the country.
- (ii) Using Nigeria as microcosm of the Africa Region, use the information gathered on the private companies during this pilot project to prepare recommendations in close collaboration with the BCRCs in South Africa, Senegal and Egypt to develop the global used oils partnership in Africa similar to the partnership announced during COP6 on end-of-life mobile telephones.

In achieving these objectives the BCCC- Nigeria will carry out this pilot phase study using Nigeria as microcosm of the Africa Region and will investigate and develop on the following issues:

- ❖ Identification of the main sources of used oils in the country and estimations of the quantities and types of used oils produced, stored and disposed.
- ❖ Identification of the main actors in the used oil market in the country (mainly those in the production, distribution, storage, refining and utilisation) as well as on the main actors on the oil market.
- ❖ Identification of existing disposal and treatment facilities and their capacity.
- ❖ Survey on the informal sector working with used oils.

1.2 COMPONENTS OF THE PILOT PROJECT

The pilot project has the following five components:

- (i) Organisation of a one-day technical workshop
- (ii) Preparation of a National Analysis on Used Oil Management which shall require the following:
 - Desk study.
 - Compilation of information.
 - Field visits.
 - Survey on the informal sector.
 - Preparation of a report setting forth the methodology and results of the analysis.
- (iii) Feasibility study, the output of which shall be a report consisting of a set of recommendations for a preliminary national plan for the environmentally sound management of used oils in Nigeria.
- (iv) Development of recommendations for a partnership program for used oils in Africa, in close cooperation with the BCRCs of Egypt, Senegal and South Africa and UNEP/SBC, which shall include the preparation of a report by the FMENV/UNIV.Ibadan/BCRCC-Nigeria.

- (v) Organization of a final Workshop of two days to formulate recommendations for used oil management programme for Africa.

The First workshop which was meant to kick-off the project took place on Thursday 23rd September 2004, the workshop agenda addressed the following issues:

- Presentation of the project.
- Presentation and development of the desired results and follow up.
- Definition of the scope and discussion of the desired results of the national analysis.
- Presentation of the technical guidelines of the Basel Convention (Technical Guidelines on Used Oil Re-refining or Other Re-uses of Previously Used Oil) and/or draft guidelines that will be used to do the analysis.
- Establishment of a programme of activities, for the inventories in particular.
- Explanation of the methodology of work to be used in conducting the analysis.

The second and Final Workshop for the development of a Regional Action Plan which shall come later has the following objectives:

- To present the recommendations for the national plan for the environmentally sound management of used oils in Nigeria.
- To present the recommendations for the development of a used oils partnership in the African region.
- To decide on follow up action for the development of the partnership initiative in the African region, to disseminate these recommendations throughout the African region.
- To decide on follow up action for the draft national plan prepared under task 3 above for the environmentally sound management of used oils, taking into consideration the anticipated regional partnership for Africa as well as local partnerships in the country

2. OVERVIEW OF THE FIRST WORKSHOP

The pilot project took off with initial consultations and forming of task teams comprising of Professor Oladele Osibanjo (Project Coordinator), Professor Olufemi Bamiro (National Consultant), Mrs. Olakitan Ogungbuyi (Programme Officer), Dr. F. A. Dawodu, Mr. A. J. Oduola, Mr. Sadare and Mr. Omosun and Ms Tolu Olusoga as field survey/inventory officers. The team discussed the project and modalities for action and the project commenced with initial compilation of information and consultations with relevant stakeholders. Four categories of stakeholders were identified being international institutions, governmental organizations, private sector and the media. Among the private sectors the virgin oil importers and marketers used oil generators from automobile fleet companies, servicing sector, manufacturing and independent dealers respectively. Invitations letters to the technical workshop were forwarded to these stakeholders.

The workshop was held on Thursday the 23rd of September 2004 at the conference hall of the Federal Ministry of Environment, Games Village Surulere, Lagos, Nigeria. The workshop was well attended by representatives of identified stakeholders except the virgin oil importers and marketers.

List of participants is attached in this report

The workshop followed the format as in the programme in annexure I with an opening session at which the Honourable Minister of Environment, Col (Rtd) Bala Mande represented by Mrs. Funke Babade Deputy Director Pollution Control Department Declared the workshop open. The biophysical environment and current international waste oil management practices were highlighted, followed by a technical session during which the status of waste oil management within the country presented was discussed; and finally a syndicate session during which future approaches and frame works for used oil management were developed for the country.

Presentation featured the following:

- Technical Presentation of the project, desired result and follow up
- Conceptual Framework for the executing of the pilot study
- Used Oil Management Initiatives in Nigeria
- Technical guideline of Basel Convention on Used – Oil Recycling

2.1 TECHNICAL PRESENTATION OF THE PROJECT, DESIRED RESULT AND FOLLOW UP

The project coordinator Prof. O. Osibanjo in presenting the project overview, the desired result and follow up activities underscored the fact that petroleum products especially lubricating oils for all types of engines are of environmental concern. With geometric increase in the consumption of several billion litres of lubricants daily which are disposed into drains or land, it is imperative for environmental and economic reasons that measures be put in place to conserve this non-renewable resource and optimize its use.

Furthermore he stated that used engine oil or crankcase oil contains toxic pollutants ranging from heavy metals such as lead and carcinogenic organic pollutants such as Polychlorinated biphenyls (PCBs) and Polyaromatic hydrocarbons (PAHs). Thus ecosystem and human health are threatened by the indiscriminate dumping of used engine oil on land or water. The United Nations joint Agencies Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP) has estimated that land based sources of oil (that is used oil) is responsible for about 70% of oil input into the coastal and marine environment globally.

Nonetheless used or waste oil recovery and reuse is a good demonstration of waste to wealth. Waste oil although dirty and highly contaminated as mentioned earlier has a high-energy value. It can be reclaimed to good lubricating oil or used as a feedstock in the production of petroleum products. It can also be reprocessed to clean fuel oil, and under special conditions be burned safely, even untreated.

In Nigeria he indicated that used oil is utilize for several purposes such as on land to control weed and on wood for termite control. While a lot also is disposed in drains, a good proportion is re-used to fire industrial boiler and furnaces while also indicating that there is bizarre application by incorporating it in cosmetic products such as hair cream.

In consonance with the Federal Government programme on poverty alleviation and the National Economic Empowerment and Development Strategy (NEEDS), a programme on used oil recycling and reuse he declared is timely as it has potential for the promotion and establishment of small and medium scale enterprises (SMEs) for Nigerian entrepreneurs.

2.2 CONCEPTUAL FRAMEWORK FOR THE EXECUTION OF THE PILOT STUDY

The National Consultant Prof. O. A. Bamiro presented the Conceptual framework for executing the pilot study under the following headings:

- (i) Main Goals of the Study
- (ii) Basic information
- (iii) Conceptual framework
- (iv) Major users of virgin oils
- (v) Major uses of used oils
- (vi) Methodology for the study
- (vii) Estimation of virgin oil production & market size
- (viii) Estimation of level of generation of used oils
- (ix) Data collection methodology
- (x) Desk study
- (xi) Governmental institutions
- (xii) International organisations
- (xiii) Non-governmental organisations
- (xiv) Different categories of questionnaires
- (xv) Quest: sellers of virgin oils
- (xvi) Quest: generators of used oils
- (xvii) Quest: dealers in used oils
- (xviii) Quest: buyers/users of used oils
- (xix) Field visits
- (xx) Data Analysis

The following main goals of the study were presented:

- Identification of the main sources of used oils in the country and estimations of the quantities and types of used oils produced, stored and disposed.
- Identification of the main actors in the used oil market in the country (mainly those in the production, distribution, storage, refining and utilisation).
- Identification of existing disposal and treatment facilities and their capacity.
- Survey on the informal sector working with used oils.

The basic information required for the study was identified as:

- Volume of sales of virgin oils in the country.
- Market structure of virgin oils in the country.
- Level of generation of used oils.
- Uses of the generated used oils.
- Current prices of virgin oils and used oils.
- Existing legislation governing the management of used oil, the storage, and the environmental controls for the collection and recycling.
- Companies having capacity for economic capability to recycle used oil.
- Estimated total number of automobile/trucks/buses registered in the country.

The frame work for the used oil inventory study is contained in Fig. 1.
The following major users of virgin oil were identified:

- ✓ TRANSPORTATION
 - ❖ Automobiles
 - ❖ Buses
 - ❖ Trucks
- ✓ INDUSTRIAL
 - ❖ Chemical and allied products
 - ❖ Rubber and plastic products
 - ❖ Machines (except electrical)
 - ❖ Electrical equipment (transformers)

The current uses of used oil in the country were identified as follows:

- ❖ Re-use as lubricants
- ❖ Fuel – burning for energy recovery
- ❖ Wood preservatives
- ❖ Anti-rust for metals
- ❖ Re-refining
- ❖ Blending with grease for use as gear oil
- ❖ Hair dressing – fire suppressant
- ❖ Weed killing
- ❖ Blending for use as hydraulic oil
- ❖ Component of asphalt
- ❖ Spreading to keep down dust level on roads and parking lots.

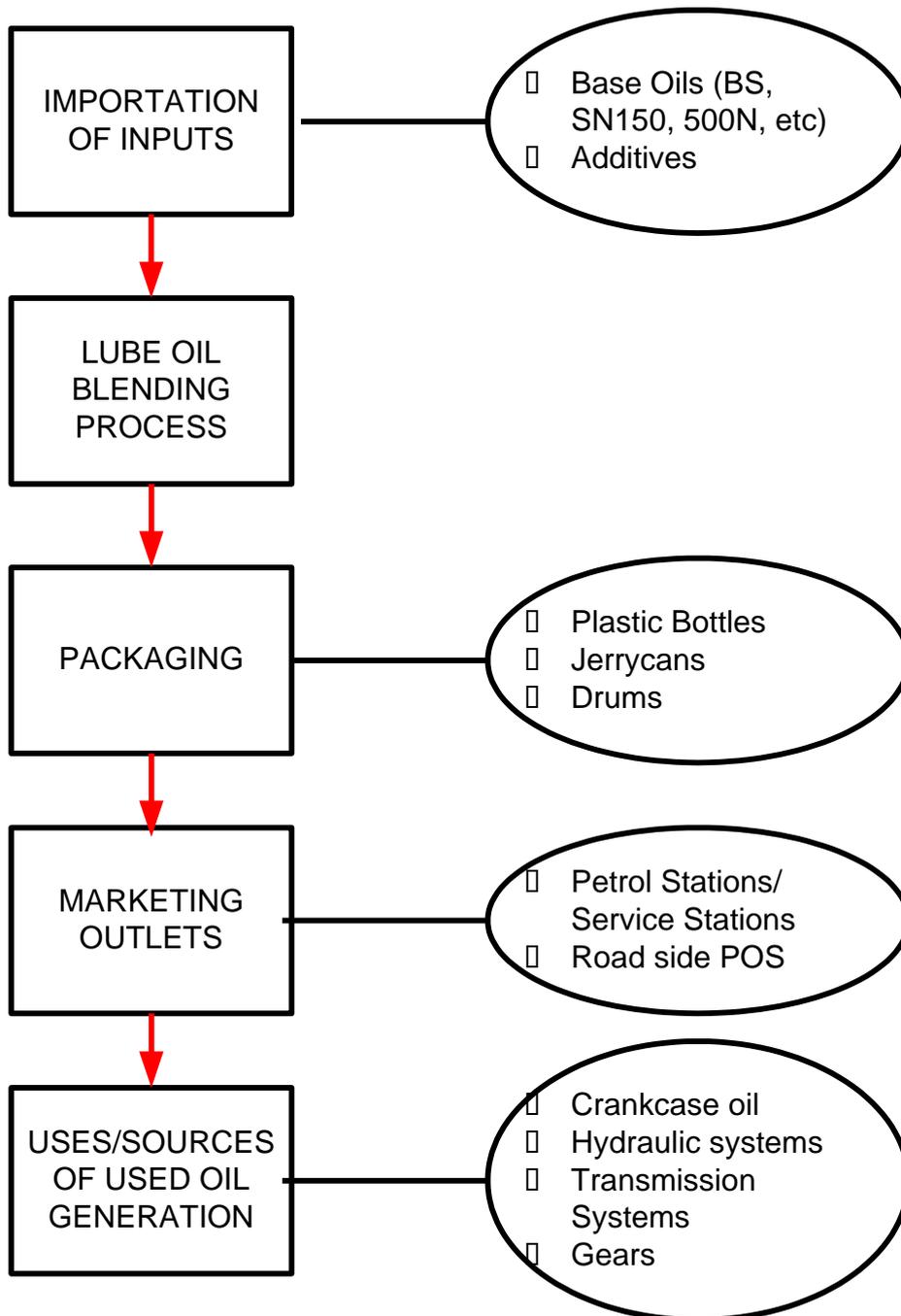


Fig.: 1 Conceptual Framework for the inventory of used oil study in Nigeria

The methodology for the used oil inventory study contains the following elements:

- Estimation of virgin oil production
- Estimation of levels of usage of the different lubricants
- Estimation of the levels of generation of used oils from the different uses

In estimating the Level of generation of used oils in Nigeria, the methodology entails the following:

- Determination of the average % of used virgin oil that ends up as used oil for the different uses in Transportation and Industry identified earlier.
- Estimation based on the combination of data of registered automobiles, buses, and trucks and estimated level of used oil generation in each segment.

The data collection methodology comprise

- ❖ Desk Study
- ❖ Development and administration of questionnaires and
- ❖ Field survey

The Nature of the information to be collected in desk study include the following:

- The legislative, economic, technical and environmental aspects of the management of used oils in the country,
- Main sources of used oils, and estimations of quantities and types of oils produced, stored and disposed.
- Identification of main actors in the used oil market, dealing with any aspect of the management cycle of oils.
- Identification of existing disposal and treatment facilities and their ownership

The identified sources of information for the desk study are:

- Governmental Institutions
- International organisations
- Private sector
- Previous Reports on used oils
- NGOs

The Government Institutions to be contacted for information gathering include:

- Nigeria National Petroleum Corporation (NNPC /NAPIMS) - Environment section
- Department of Petroleum Resources
- Federal Ministry of Environment
- Federal Ministry of Health
- Federal Ministry of Trade and Commerce
- Standard Organisation of Nigeria
- Federal Ministry of Industry
- Small and Medium Enterprises Development Agency of Nigeria (SMEDAN)
- Nigeria Port Authority (NPA)
- Nigerian Railways
- National Electric Power Authority (NEPA)

International Organisations to be approached for technical assistance and information include:

- WHO
- UNIDO
- UNEP/SBC
- NEPAD
- UNDP

Major Non-Governmental Organizations which are considered highly relevant to the study are:

- Friend of the Environment (FOTE)
- Nigerian Union of Road Transport Workers (NURTW)
- Nigerian Environmental Study Team (NEST)

Different Categories Questionnaires have been designed and administered to the following special stakeholders

- ❖ Sellers of virgin oils
- ❖ Generators of used oils
- ❖ Dealers in used engine oils
- ❖ Buyers and users of engine oils

The administration of the questionnaire was followed by field visits to six major urban industrial cities in the country namely: Lagos, Ibadan, Aba, Kano, Kaduna, P/Harcourt.

This is geared towards obtaining additional relevant information based on the analysis of information from desk study, questionnaires and suggestions from the present technical workshop.

The data from desk study questionnaires and field visit shall be subjected to data analysis comprising of:

- Development of computerised database for data storage.
- Computer-based analysis of data and report generation to provide answers to the basic underlying questions of the Pilot Study

2.3 USED OIL MANAGEMENT INITIATIVES IN NIGERIA

Engr. Chike Chikwendu of the Friends of the Environment (Fote), one of the foremost environmental NGOs in Nigeria highlighted the magnitude of the problems and implications of improper used oil disposal as follows:

- Globally, loss of used oil is estimated at about 40 million tonnes per annum (Vazquez-Duhalt, 1989) with about 4.4% discharged into water bodies (GESAMP 1993)
- In 1998, demand for base oil destined for lubrication is about 230,000 tonnes in Nigeria (Triple E Ass.) It is estimated that about 80% of lubricating oils are discharged into the environment due to poor waste management practices.
- Discharge of oil into marine environment generally prevents natural aeration processes and leads to the death of marine organisms trapped under the oil film. Discharge on land apart from being aesthetically unpleasant, prevents growth of floral and soil fauna and contaminates surface and underground water

He advocated the following mitigative measures for environmental degradation and pollution from used oil disposal:

1. Review of Existing Laws

- Urgent need to re-examine existing policies on used oil management and enact legislation on used oil collect and disposal

2. Public Education and Enlightenment Programmes

- Public awareness on the merits of using recycled used oil and assessment of logistics, technical and other factors responsible for non-implementation of recycling options.

3. Establishment and maintenance of collection Centres

- There is need for Oil marketing companies to installed comprehensive used oil collection facilities/centres in major urban areas of Nigeria

4. Recycling

- Inventorisation of types and sources of used oils
- Assessment of coastal and marine pollution from used oils

The presentation advocated the establishment of environmentally friendly waste recycling plants. In this regard he recounted some of the previous efforts at used oil recycling in the country:

- In 1994, FOTE undertook a survey on the collection and proper disposal of used oil. Substantial waste oil data was collected
- In 1995, FOTE teamed up with Mobil Oil to educate drivers and mechanics on the need for proper handling of used oil. A nationwide tour was planned. This was truncated after the Lagos and Ibadan tours due to lack of financial support
- In 1996, a local company Lube Oil with the assistance of UNIDO assessed the techno-economic importance of refining used lubricating oil. A major recommendation was the establishment of used oil recycling plants. Derivable benefits include a cleaner environment, cheaper lube oil, job creation and poverty reduction, and foreign exchange savings for Nigeria.
- In 1999, the revised National Policy on Environment produced by the Federal Ministry of Environment clearly articulated the establishment of waste/crankcase oil recovery and reuse systems in Nigeria.
- Again in 1999, the Nigerian National Agenda 21 further highlighted the priority and importance the government attached to the principles of reduction, reuse and recycling of wastes in all industrial processes

2.4 TECHNICAL GUIDELINE OF BASEL CONVENTION ON USED – OIL RECYCLING

Mrs. Ogungbuyi in her presentation on the Technical Guideline of Basel Convention on used oil recycling enumerated the goals of the Basel Convention as follows:

- Reduction of transboundary movements of hazardous and other waste subject to the convention,
- The prevention and minimization of their generation,
- The environmentally sound management of such waste, and
- The active promotion of the transfer and use of cleaner technologies.

- ❑ The Basel Convention promotes “environmentally sound management” (ESM) the aim of which is to protect the human health and the environment by minimizing hazardous waste production whenever possible.
- ❑ ESM means addressing the issue through an “integrated life cycle approach” which involves control during the production, use and trade of, including the disposal of hazardous waste.

She dwelt on Used Oil Definition in the context of the Basel Guidelines.

- ❑ In the context of the Basel guidelines, **used oil** means any semi-solid or liquid used oil consisting totally or partially of mineral oil or synthesized hydrocarbon (synthetic or oils) oily residues from tanks, oil-water mixtures and emulsions.
- ❑ These arising from industrial or non-industrial sources which have been used for lubricating or other purposes and have become unsuitable for its original purpose due to the presence of contaminants or impurities and loss of original properties.

The presentation dwelt on Recycling, Reuse, and Recovery within the context of Basel Convention as follows:

- ❑ First option in management hierarchy is to conserve the original properties of the oil allowing for direct reuse.
- ❑ The second option is to recover its heating value.
- ❑ Third option is to recycle (reprocessing and re-refining) the hydrocarbon content of used oil.- which has beneficial effect of reducing the consumption of virgin oils but sensitive to the scale and the economics of operation

Reprocessing and Re-refining were considered along the following lines with the context of Basel Convention:

- ❑ Reprocessing and re-refining involves operations which will separate and remove contaminants in used oil so that this oil becomes suitable for reuse.
- ❑ Contaminants remove from this processes will be part of waste streams which must be disposed of in an environmentally sound manner.
- ❑ In reprocessing, relatively simple physical chemical treatments such as settling, dehydration, flash evaporation, filtration, coagulation and centrifugation are applied to remove basic contaminants in used oils, for use in less demanding industrial applications and not to produce a product comparable to virgin oil.
- ❑ Re-refining requires modern processes which are expensive to operate when all safety and environmental considerations are included into the overall operating system.
- ❑ In the re-refining process a continuous feed of used oil is heated and in stages it is de-watered vacuumed distilled into separate grades of distilled oil.
- ❑ These oils may then be hydro-treated to produce a fine clear product. The by-products which have marginal value include distillation bottoms (used as an asphalt extender or in fuel oil blending) and de-metallised filter cakes (used as road base material).

- ❑ The remainder of the materials are residues streams such as acid tar, spent clay, centrifuge sludge and process water that are directed to treatment and /or disposal

Comparative Evaluation of Re-refining Techniques was provided as follows:

- ❑ Technological capabilities of the Re-refining industry allow most used oils to be regenerated, some limitations on used oil feedstock are necessary.
- ❑ Used oil commonly re-refined by the Canadian association of re-refiners:
 - High Viscosity Index (HVI) oils,
 - All diesel and gasoline crankcase
- ❑ The final oil yield and quality differ in relation to the technology employed

The following Criteria for Environmentally Sound Reuse or Recycling Options with the context of the Basel Convention were provided:

- ❑ Feedstock (upstream) quality: degree and nature of contamination and environmental/health risks associated with handling and processing, volume types.
- ❑ Treatment processes for getting appropriate quality feedstock for downstream industries or user, impacts on resource conservation, percentage of the product recovered, energy savings.
- ❑ Impacts of treatment processes on public health and environment.
- ❑ Final disposal of end-of-pipe output of treatment processes in the framework of environmentally sound management of hazardous waste.
- ❑ Economics (economic viability/sustainable market and commercial feasibility; product value).
- ❑ Technology & techniques (treatment capacity, feedstock capability) & their potential impacts on the environment.
- ❑ Location of existing or planned facilities.
- ❑ Infrastructure for clean & efficient collection, storage, and transport of used oil
- ❑ Public perception.
- ❑ Legislation (i.e. on air emission).
- ❑ Socioeconomic benefits (i.e. employment opportunities).
- ❑ Knowledge of cases or processes which have gone wrong in the past.
- ❑ Availability of cleaner production methods & clean technologies

Finally, she declared that the Codes of Practice for Environmentally Sound Management (ESM) of Used Oil in Nigeria should focus on two major areas namely:

- ❑ Observance of the relevant Federal and State Laws/regulations and guidelines in Nigeria.
- ❑ Establishing a sectoral association to ensure and enforce compliance.

3. CONCLUSION AND RECOMMENDATIONS

The workshop identified that in order to effectively manage used oil within the country there is a need to intensify activities to develop national used oil management infrastructure in the country.

Identified activities of immediate concern are:

- Development of a comprehensive used oil potential and existing sources and releases;
- Establishment of a forum of the formal and informal stakeholders of used oil;
- Establishment of an information exchange network on used oil hazards and risks and contaminated site; (hand bill, posters, electronic media)
- Education and enlightenment of relevant end users on a regular basis
- Development of case studies on most urgent used oil problem, or contaminated site including identification of risks and possible alternative.
- Introduce alternatives including cleaner technologies
- Introduce more efficient and effective waste disposal technologies and techniques.

Towards implementation of the above identified activities, the workshop then recommended the following actions as a matter of priority:

- Development of a national action plan which incorporates the strengthening of national chemicals management in the country;
- Development of national guideline and laws on used oil management
- Establish national coordinating mechanism involving relevant government authorities, the national partners/stakeholders and the concerned public.
- Conduct regular information campaigns;
- Encourage relevant programmes by the downstream sector of the oil industry to include research on clean technologies and scholarship grants to tertiary institutions.
- Compliance monitoring of regulations when in place.
- Develop low cost technologies for used oil recycling at national and regional levels

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