

CHEMICALS AND CHEMICALS WASTE MANAGEMENT IN THE MINING SECTOR IN UGANDA

A CASE STUDY OF OIL, GAS ,SALT AND SMALL SCALE
GOLD MINING



JANUARY 2014



A publication of the National association of Professional
Environmentalists (NAPE) with support from the
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Acknowledgement

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It is my sincere belief that such cooperation will continue even after this study so that together we can work towards the sound management of chemicals and chemicals wastes in mining in the country in general.

Yours sincerely;

A handwritten signature in black ink, appearing to read 'M. Frank' with a stylized flourish at the end.

Muramuzi Frank

Executive Director, NAPE

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LIST OF ACRONYMS AND ABBREVIATIONS

AFIEGO	African Institute for Energy Governance
AIDS	Acquired Immune Deficiency Syndrome
CSOs	Civil Society Organizations
DRC	Democratic Republic of Congo
EA	Environment Audit
EIA	Environmental Impact Assessment
EPS	Early Production Scheme
FY	Fiscal Year
GDP	Growth Domestic Product
GSMD	Geological Survey and Mines Department
HIV	Human Immunodeficiency Virus
HSSP	National Health Sector Strategic Plan
ICCM	International Conference on Chemicals Management
ILO	International Labour Organisation
MAAIF	Ministry of Agriculture, Animal Husbandry and Fisheries
MDGs	Millennium Development Goals
MEMD	Ministry of Energy and Mineral Development
MoFPED	Ministry of Finance, Planning and Economic Development
MTWA	Ministry of Tourism, Wildlife and Antiquities
MWE	Ministry of Water and Environment
NaCl	Sodium Chloride
NAPE	National Association of Professional Environmentalists
NDP	National Development Plan
NEA	National Environment Act
NEMA	National Environment Management Authority
NEMP	National Environment Management Policy
NESMAC-U	Network on Sound Management of Chemicals – Uganda
NFA	National Forestry Authority
NGOs	Non-Governmental Organizations
NPA	National Planning Authority
NSSF	National Social Security Fund
PAs	Protected Areas
PCBs	Polychlorinated Biphenyls

NEMA	National Environment Management Authority
NEMP	National Environment Management Policy
NESMAC-U	Network on Sound Management of Chemicals – Uganda
NFA	National Forestry Authority
NGOs	Non-Governmental Organizations
NPA	National Planning Authority
NSSF	National Social Security Fund
PAs	Protected Areas
PCBs	Polychlorinated Biphenyls
PEAP	Poverty Eradication Action Plan
PEPD	Petroleum Exploration and Production Department
PHC	Primary Health Care
PIC	Prior Informed Consent Procedure
POPs	Persistent Organic Pollutants
PPE	Personal Protection Equipment
SAICM	Strategic Approach to International Chemicals Management
SMC	Sound Management of Chemicals
UCMP	Uganda Chamber of Mines and Petroleum
UEPB	Uganda Export Promotion Board
UGX	Uganda Shillings
UIA	Uganda Investment Authority
UNBS	Uganda National Bureau of Standards
UTB	Uganda Tourist Board
UWA	Uganda Wildlife Authority

Executive summary

This study was carried to establish the current practices, challenges and opportunities of improving the management of chemicals and chemicals wastes in the mining sector in Uganda, with the primary objective being to promote good community and environmental health. The specific objective of this study was to assess and establish the status of chemicals and chemicals waste management in identified mining areas in Uganda. The focus of this phase of the study was on salt mining on Lake Katwe, gold mining in the hills of Mubende and Oil and gas exploration and exploitation in the Albertine Graben. The study also looked at possible impacts of chemicals and chemicals wastes on people's health, their livelihoods and the environment and how the identified negative impacts could be mitigated.

Investigations were done on current and proposed management approaches on chemicals and chemicals wastes in the mining sector and suggested ways of improving human health and environment. Effort was made to assess levels of awareness on harmful aspects of chemicals and chemicals wastes and how workers in mines, the communities and the environment were being protected from such harm. An assessment was made on levels of stakeholder's consciousness, preparedness and overall, their participation in the management of chemicals and chemicals wastes. Identification of institutions, policies, laws, regulations and conventions that are instrumental in the sound management of chemicals and chemicals wastes in mining was carried out; including, identifying their roles in the industry. Ultimately recommendations and way forward were made.

The study findings indicated that mining had the potential of creating a number of employment opportunities to communities more especially; to non skilled females and males. However, it was also noted that while the industry was likely to continue playing a big role in creating employment and contributing to the social and economic well being of some members of community, mining in its current form and if not well managed had the potential of causing harm to society. Mining had high risks to workers health, community health and to the environment.

It was observed that, while NGOs play an important complimentary role to government; especially in awareness raising, it was noted that many NGOs being denied space to

operate; more especially in the oil region, although this was not the case in gold and salt mining areas. In the oil region, it was observed that, CSOs were being denied access to information, free operation and were continually being intimidated and could therefore not effectively play their role in the sound management of chemicals and chemicals wastes. Many of the artisanal gold miners and salt weaners did not have adequate protective gears and were therefore exposed to high risk of exposure to chemicals and chemicals wastes. It was noted that artisanal miners lacked the minimum knowledge and skills required for proper management of chemicals and chemicals wastes.

The study therefore recommends that;

- Government should create room for effective and meaningful participation for civil-society organisation, communities and other stakeholders
- There is need for Government to build capacity of local governments where mining is taking place to enable them address the challenges of mining in their areas
- Government should put in place a policy and law to govern small scale and artisanal miners
- There is need for small scale and artisanal miners to be organised into secure mining businesses entities.
- Government and all other stakeholders should recognise and promote community safety in mining, especially in artisanal mining, there is need to recognise the gravity of risks to women, children and the environment in general.
- There is need for all stakeholders to raise awareness on the risk of HIV and other diseases among mining communities
- Government should put in place mining standards and regulatory measures; especially in risk prone gold mining areas to minimise mining accidents in tunnels.

In conclusion, it was noted that there still a number of challenges in the mining sector regarding the sound management of chemicals. It must however be mentioned that the problem is more pronounced in artisanal mining where the chemicals that are used are not well regulated yet the workers are not adequately protected from the associated chemicals and chemicals risks. Unfortunately, not enough was being done by government, the private sector, CSOs and other stakeholders to ensure that awareness raising is carried out. It was also noted that the gap between CSOs on one hand and government and the private sector on the other was increasing to widen, making it difficult for the establishment of a cordial working relationship.



INTRODUCTION

This report is based on findings of the study carried out by the National Association of Professional Environmentalists (NAPE) on Chemicals and chemicals waste management in mining. The study area included Mubende, Kasese, Hoima and Buliisa and focussed on salt winning, artisanal gold mining and oil exploration and the consequent proposed oil extraction observations and discussions with personnel institutions communities involved in mining, government officials, Civil Society Organisations and the host communities. The report covers aspects of chemical transportation, storage and utilisation but emphasises the safety of human health and the environment. Furthermore, the report makes some suggestions and recommendations to help improve management of chemicals and chemicals wastes in mining.

Since mid-1980s the global mining industry has undergone dramatic changes, which may have far-reaching implications for Uganda. According to Government of Uganda, geological investigations carried out over a period of more than eighty years demonstrate that Uganda is endowed with favourable geological conditions associated with a rich and diverse mineral resource base and with substantial economic potential. It has also been noted that Uganda is underlain by extensive Precambrian (4,500 – 600 million years) rocks, which are host to a wide variety of mineral deposits. Younger Cenozoic (65 million years – Present) sediments and volcanics in the west and east of the country are also host to mineral deposits.

Many countries, particularly in the developing world, have embarked on wide ranging structural reforms aimed at opening up their economies to foreign trade and investment. This has led to a worldwide competition for investment. According to government reports, by the beginning of 2010, a total of 517 licenses had been issued. But for Government of Uganda to achieve its goals in the mining sector will have to open up a number of areas in the country to mining. It has already committed itself to prioritising the establishment of an “internationally competitive investment environment for the mineral sector in order to develop and maintain a strong, dynamic and profitable mining industry for the benefit of the people of Uganda”.

1.1 MINING IN UGANDA

The Geological Survey and Mines Department (GSMD) is the technical arm of Ministry of Energy and Mineral Development (MEMD) and it is directly responsible for the implementation of the mineral policy. The duties of GSMD include inter alia carrying out administration, supervising, regulating, monitoring, enforcing, training, providing extension services and promoting other sectoral activities. Under the Sustainable Management of Mineral Resources Project (SMMRP), data covering the entire country except for the Karamoja region has been generated. Reports indicate that data is being integrated using GIS, with ground geophysical data, enhanced satellite imagery, geological mapping and geochemical surveys to delineate areas of high mineral resource potential.

The Uganda Chamber of Mines and Petroleum (UCMP), a non-for-profit, non-governmental umbrella body, representing the interests of the mining and petroleum sector has been put in place. The main role of the UCMP is to work towards promoting, the growth and development of Uganda's mining and petroleum industry, for the benefit of all Ugandans and investors through the collective action of its members. This umbrella however mainly works with government and the investing companies and has not enlisted genuine participation of CSOs.

Mining in Uganda is increasingly becoming very important avenue for government for responding to the labour needs of the country. It is estimated that Uganda has over 180 artisanal and small scale miners who provide employment to over 20,000 miners with indirect and induced labour numbering over 54,000. In addition, the country has identified the development of its mineral resources as a major economic priority and has put in place a plan to realise this goal. To help realise its development goals in this direction, Government of Uganda has received financial support from international financial institutions (IFIs), including the World Bank, the African Development Fund and the Nordic Development Fund, among others.

1.2 Contribution of the Mineral Sector to GDP

Available reports indicate that mining and quarrying activities grew by 12.8 percent in fiscal year (FY) 2009/10 up from 4.3 percent during FY2008/09. The mining sector's

contribution to total GDP, at current prices, has been the lowest since FY2005/06 with a share of only 0.3 percent. It is believed that, increased issuance of licenses and increased mining activities, will increase the prominence of the mining sector in the economy in the coming years.

Mineral Production for January to December 2010

Mineral	Quantity in Tonnes		Average Value in 103 UGX	
	CY 2009	CY 2010	CY 2009	CY 2010
Limestone	588,944.71	334,673.48	70,673,365	76,160,818
Pozollana	440,292.49	446,315.90	9,246,142	9,372,634
Gold (Kg)*	0	0	0	324
Vermiculite		1,121.47	0	649,331
Cobalt**	389.16	568.24	16,941,433	33,968,655
Wolfram	8.83	55.17	185,409	1,907,330
Syenitic Aggregate	14,026.87	14,337.55	21,040	21,506
Kaolin	4,721.34	27,236.75	472,134	2,723,675
Iron Ore			68,037	265,632
Gypsum				
Lead				
Coltan (30% Purity)	0.05	0.01	8,003	255.72
Tin (75% Purity)	0.04	32	883	1,089,088
Beryl (1% Beryllium)				
Manganese (Above 46% Mn)		10		30,370
Grand Total			97,616,446	126,189,619

Source: Ministry of Energy and Mineral Development

1.3 Use of Chemicals in the Mining Sector

As the mining sector continues to grow, the use of chemicals in the sector is also expected to continue growing. This means that all stakeholders have to put in place mechanisms to counter unwise use of chemicals. In the same spirit, Government of Uganda is required to put in place the necessary legal and regulatory frameworks to regulate the sector. In addition, Uganda is signatory to a number of regional and international conventions, agreements and instruments that promote the sound management of chemicals.

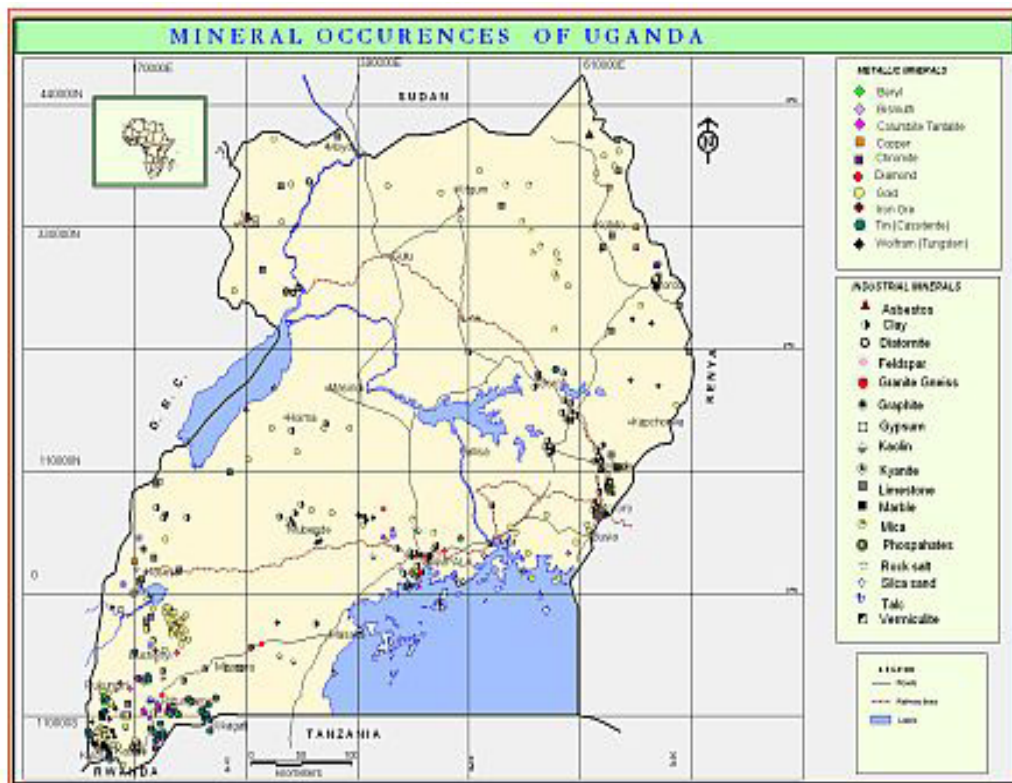
In a bid to regulate the mining sector, government put in place a Mineral Policy (2001). The goal of the mining policy is to develop the mineral sector to enable it contribute to

sustainable social and economic development through the creation of gainful employment and income, particularly to the rural population.

The objectives of the Mineral Policy 2001 are to:

- Stimulate investment in the mineral sector by promoting private participation;
- Ensure that mineral wealth supports national economic and social development;
- Regularize and improve artisanal and small scale mining;
- To mitigate the adverse social and environmental impacts of mineral exploitation;
- Remove restrictive practices on women participation in the mineral sector and protect children against mining hazards;
- Develop and strengthen local capacity for mineral development; and
- Add value to mineral ores and increase mineral trade.

MAP SHOWING MINERAL OCCURANCY IN UGANDA



1.4 Objectives of the study

The major objective of this study was to assess and establish the status of chemicals and chemicals waste management in identified mining areas. Specifically, the study focused on salt mining on Lake Katwe, Gold mining in the Hills of Mubende and Oil and gas exploration/mining in the Albertine Graben area. The study also looked at possible impacts of chemicals and chemicals wastes on people's health, their livelihood and the environment and how identified negative impacts could be mitigated.

The specific objectives of the study include;

- To assess management approaches of chemicals and chemicals wastes in mining
- To generate knowledge on improved management practices for improved human health and the environment,
- Identify instrumental policies, laws, regulations and conventions in the sound management of chemicals and chemicals wastes in mining,
- To gather information on management of chemicals in mining,
- To assess levels of stakeholders' participation in management of chemicals and chemicals wastes,
- To assess levels of awareness about harmful aspects of chemicals and chemicals wastes among mine employees and mining communities
- To assess levels of protection of mine workers from harmful aspects of chemicals and chemicals wastes
- To identify the institutional framework and the different roles they play in promoting sound management of chemicals and chemicals wastes in the mining sector
- To come up with recommendations and way forward for the mining sector

1.5 Scope of the study

The study involved the analysis of the following issues;

- Collecting, analyzing and documenting information on chemicals and chemicals wastes management in selected mining areas in Uganda
- Analyzing legal, socio-economic and gender dynamics within the mining sector
- Identifying and documenting the impacts of the identified mining activities on the people on the host communities; on their health and livelihoods

- Identifying and documenting the impacts of mining activities on the environment
- Assessing compliance of the miners to policies, laws and regulations and to international conventions on labor and the sound management of chemicals
- Making recommendations to help overcome identified challenges

1.6 Methodology

To obtain adequate information on mining in Uganda, its impacts on the environment and on people's livelihoods, the study employed the qualitative approach. A semi-structured method of interview was used. The method provided for open interviews, allowing for new ideas to be brought up during the interview. An interview guide was prepared that grouped the topics and questions to help guide and focus the interview on the topics. The approach helped the research team to obtain information based on people's knowledge, experiences, perceptions and attitudes towards the mining sector. During desk research, a number of documents pertinent to mining from a national, regional and international perspective were reviewed.

This study report therefore, has been generated from information collected through field interviews, observations, discussions and desk research. The gathered information was mainly based on people's knowledge, experiences, perceptions and attitudes on the mines.



Information gathering: Field interviews, observations, discussions and desk research.

During the study, we were able to interview some government officials, personnel and individuals from institutions that are involved in mining.

The study was also informed by information generated from communities and Civil Society Organisations (CSOs). A validation workshop for different stakeholders was conducted. Furthermore, other than identifying the different concerns and credits from different stakeholders the study was able to gather key recommendations and way forward from the participants.



Stakeholder validation workshop in Hoima

1.6.1 Data Collection

The data collected was mainly qualitative and it was collected through stakeholders' consultations and interviews. The collection took place during semi-structured, face-to-face interviews conducted over a period of five (5) months from June 2013 to October, 2013. The interviews conducted lasted between 45 to 60 minutes although in some cases, the interviews lasted as long as 2 hours. During the study both primary and secondary data was collected. Primary data was mainly collected through focussed group discussions and in depth face to face interviews with stakeholder respondents. To enrich the study literature review was carried out; this constituted the secondary data that was used in this report. All this data was carefully analysed by the research team.

1.6.2 Data Analysis

The research team analysed the content and transcribed data of each interview. This was followed by transcription of each interview. Triangulation was used for cross-checking and verifying data gathered through the use of different information sources and thereafter, conclusions were drawn from all the interviews conducted and from the information generated from the literature review.



POLICY, LEGAL AND INSTITUTIONAL FRAMEWORKS FOR SOUND MANAGEMENT OF CHEMICALS

2.1 POLICIES PROMOTING SOUND MANAGEMENT OF CHEMICALS IN UGANDA

The Constitution of the Republic of Uganda provides for the sound management of chemicals and for the safety and protection of the health of workers, communities and the environment from harmful aspects of chemicals. It also provides a basis for development and implementation of policies vital for achieving the objects of the constitution. However, lack of appropriate policies, laws and regulations to help guide the sound management of chemicals and chemicals wastes in Uganda presents a key management challenge to both government, the private sector, CSOs and the communities in general. This vacuum in policies, laws and regulations has created a degree of mistrust at different levels of society; for example, the community of Ngwedo in Buliisa resisted proposals to locate a waste disposal site in their area.

There are several policies that promote sustainable mining and to ensure that the rich mineral potential in the country benefit the people. Among other things, the policies are supposed to help in ensuring that mining processes are done in a manner that does not lead to the degradation of both fauna and flora. Furthermore, the policies help in ensuring that the mineral resources in the country help in stimulating socio-economic development, wealth creation and poverty reduction.

2.1.1 The Mineral Policy 2001

The Policy direction for the mining sector in Uganda is the responsibility of the Ministry of Energy and Mineral Development (MEMD). The mission of MEMD is: To promote, develop, strategically manage and safeguard the rational and sustainable utilisation of energy and mineral resources for economic and social development and the vision is; “to attract investment in, build capacity for acquisition and utilisation of geodata and increase mineral production for social and economic development of Uganda”.

The goal of the Mineral Policy 2001 is to develop the mineral sector and enable it contribute to sustainable economic and social growth by creating gainful employment and income, particularly to the rural population. However, the Mineral Policy does not provide a good basis for the sound management of chemicals in the mining sector.

The objectives of the policy include:

- To stimulate investment in the mineral sector by promoting private participation;
- To ensure that mineral wealth supports national economic and social development;
- To regularize and improve artisanal and small scale mining;
- To stimulate and mitigate the adverse social and environmental impacts of mineral exploitation;
- To remove restrictive practices on women participation in the mineral sector and protect children against mining hazards;
- To develop and strengthen local capacity for mineral development; and add value to mineral ores and increase mineral trade.

2.1.2 The National Land Policy

All mining activities are carried out on land; this means that land is a very vital resource for any mining activities. The vision of the land policy in Uganda is to promote the “sustainable and optimal use of land and land based - resources for the transformation of the Ugandan society and the economy”. The policy puts the people of Uganda and the economy at the fore front. The policy also has a goal of ensuring efficient, equitable and sustainable utilization and management of Uganda’s land and land based resources for poverty reduction, wealth creation and overall socio-economic development. The land policy also plays a vital role of reforming and streamlining land rights administration to ensure efficient, effective and equitable delivery of land services.

The land policy is also important in ensuring planned, environmentally-friendly, affordable and orderly development. The policy recognizes the need for land to be used productively and to be sustainably managed for increased contribution to economic productivity and commercial competitiveness. The policy recognizes the need for harmonization in development planning to ensure harmony within land, forestry, wildlife, energy and minerals among others.

2.1.3 The National Health Policy 1989

The National Health Policy of Uganda was developed in line with the Primary Health Care (PHC) of the Alma-Ata declaration of 1978. Among other things, the Policy aims at

promoting equitable access to all means of achieving health, participation in decision-making on issues of health, planning and implementation of activities aimed at improving health.

2.1.4 National Health Sector Strategic Plan II (HSSP II) for 2005/06 – 2009

The HSSP II aims at fulfilling the health sector contribution to the Poverty Eradication Action Plan (PEAP) and the Millennium Development Goals (MDGs). Under the HSSP II the role of communities and households is emphasized.

2.1.5 The National Environment Management Policy (NEMP) for Uganda (1994)

The policy specifically looks at the management of the environment and its overall goal is to achieve sustainable social and economic development. The policy is implemented by National Environment Management Authority (NEMA) and has specific provisions regarding the control of pollution in Uganda. One of the policy objectives is aimed at controlling pollution of water, land and air from domestic, industrial and other emissions and discharges, and promotes environmentally sound management of wastes and hazardous materials.

2.2 LEGAL FRAMEWORKS FOR SOUND MANAGEMENT OF CHEMICALS

2.2.1 The Constitution of the Republic of Uganda (1995) as amended in 2006

The constitution of the Republic of Uganda is the supreme law of the land and therefore, the sustainable management of mineral resources is derived from this constitution. The Constitution of has provisions that promote the sound management of chemicals in Uganda. Parts of the objectives of the constitution promote the sound management of chemicals and the protection of important natural resources, including land, water, wetlands, minerals, fauna and flora on behalf of the people of Uganda. Several provisions of the constitution make it incumbent on government to ensure that mining in Uganda is carried out in a sustainable manner. The use, trade, export, importation, production, storage, transportation and disposal of chemicals in Uganda, is regulated by national laws. These laws are implemented by different government ministries and agencies.

The constitution requires the state to take possible measures to prevent or minimize

damage and destruction to land, air and water resources resulting from pollution or other causes. Article 39, provides for the right of every Uganda to a clean and healthy environment while Article 34 (4), provides for the protection of children from social or economic exploitation and prohibits the employment or performance of children in work likely to be hazardous or to interfere with their education or to be harmful to their health or physical, mental, spiritual, moral or social development.

Article 40(1), provides for Parliament to enact laws that provide for the right of persons to work under satisfactory, safe and healthy conditions. Further to these articles, Article 245, provides for Parliament to provide for measures intended to protect and preserve the environment from abuse, pollution and degradation; to manage the environment for sustainable development; and to promote awareness on the environment.

2.2.2 The Mining Act, 2003

All mining activities in Uganda are regulated by the Mining Act. “The Mining Act 2003 repealed and replaced the Mining Act 1964, Cap. 248, with a new legislation on mining and mineral development, which conforms, and otherwise gives effect, to the relevant provisions of the Constitution; to vest the ownership and control of all minerals in Uganda in the Government; to provide for the acquisition of mineral rights; and to provide for other related matters”. The Act also provides for the acquisition of mineral rights; and other related matters. Subject to the provisions of this Act, a person may acquire the right to search for, retain, mine and dispose of any mineral in Uganda by acquiring such right under and in accordance with the provisions of this Act.

Under the Mining Act 2003, land is defined to include “land beneath any water, the seabed and sub-soil of such land. The Mining Act also defines a “mine” to include any place, excavation or working where any operation connected with mining is carried on, together with all buildings, premises, erections and appliances used for or in connection with such operation, and includes a quarry where building minerals and industrial minerals are mined. Furthermore, “mining” or “to mine” is defined to mean “intentionally to dig or excavate for minerals and includes any operation directly or indirectly necessary for, or incidental to, the digging or excavation for minerals”.

Under the Mining Act 2003 several conditions have to be observed while acquiring licences or mineral rights. The Act provides for Mineral Agreements to be signed in relation to operations in order to stabilize legal, social and economic obligations of either party. It also provides for the sound management of the environment; it has provisions on the protection of the environment peculiar to mining operations. However, the sound management of chemicals is not specifically addressed under the policy.

2.2.3 The Land Acquisition Act 1965

This Act facilitates the compulsory acquisition of land for public purposes and for matters incidental thereto and connected. The Act provides for powers to enter on and examine land in order to ascertain the suitability of any land for a public purpose. Under the policy, any person authorized by the Minister may enter the land and survey the land; dig or bore into the subsoil and remove samples.

2.2.4 Registration of Titles Act 2000

Under this Act, provision is provided for with respect to the registration of and certification and rectification of titles respecting land are stipulated. The Act also provides for rules relative to lease of land and other matters regarding land such as mortgage and legal actions regarding land and the bringing of land under this Act. The Act provides for basic legislation; land registration; land tenure; transfer; certification; lease; land based credit; legal proceedings/administrative proceedings.

2.2.5 The Uganda Wildlife Act 1996

The Uganda Wildlife Act 1996 provides for the sustainable management of wildlife resources in the country. It also consolidates the law relating to wildlife management; establishes a coordinating, monitoring and supervisory body; the Uganda Wildlife Authority (UWA) for that purpose and for other matters incidental to or connected with the foregoing. The Act is among other things aimed at promoting the sustainable management of wildlife conservation areas; the implementation of relevant international treaties, conventions, agreements or other arrangement to which Uganda is a party and to coordinate the implementation of Government policies in the field of wildlife management.

2.2.6 The National Forestry and Tree Planting Act, 8/2003

This Act provides for the conservation, sustainable management and development of forests for the benefit of the people of Uganda; to provide for the declaration of forest reserves for purposes of protection and production of forests and forest produce; to provide for the sustainable use of forest resources and the enhancement of the productive capacity of forests; to provide for the promotion of tree planting; to consolidate the law relating to the forest sector and trade in forest produce; to establish a National Forestry Authority (NFA); to repeal the Forests Act, Cap. 147 and the Timber (Export) Act Cap. 151 and for related matters. The Act is important for ensuring the sustainable management of forests but also for promoting sustainable mining in forested areas. However, the act does not give adequate guidelines for those intending to carry out mining activities in a gazetted forest reserves.

2.2.7 The National Environment Act (NEA) Cap. 153 Laws of Uganda

The National Environment Act Cap. 153 provides for the sustainable management of the environment and defines a chemical as any a substance in any form whether by itself or in a mixture or preparation whether manufactured or derived from nature and for the purposes of the Act to include industrial chemicals, pesticides, fertilizers and drugs. The Act prohibits the discharge of hazardous substances into any part of the environment except in accordance with the guidelines of the National Environment Management Authority. The Act among other things prohibits pollution contrary to established standards and imposes on any person generating hazardous wastes the duty of managing such wastes. The guidelines and measures called for under this Act, to manage chemicals, include inter alia: registration, labelling, packaging, advertising, control of importation and exportation, distribution, storage, transportation, monitoring of effects, disposal, restriction and banning of toxic and hazardous chemicals and materials. The policy also puts in place the polluter-pays-principle which requires the polluter to pay the cost of removal. The Authority is empowered to seize the production facility, motor vehicle or vessel until mitigation measures are taken.

The Waste and Hazardous Wastes Regulations, 1999 make provision for the disposal of expired and surplus chemicals and materials which have then become wastes.

The Act under section 57 creates duties on people discharging hazardous substances, chemicals, oils or a mixture containing oil into any waters or other segment of the environment. It creates a criminal offence on the person discharging the material and it creates mitigation duties and measures for accidental discharge and how to handle such accidents.

Overall, the role of overseeing the sound management of chemicals in the mining sector lies with the National Environment Management Authority which is responsible for approving Environmental Impact Assessments (EIA) and reports for mining projects, in collaboration with the lead agencies. NEMA is also responsible for the implementation/enforcement of the National Environment Act Cap. 153.

2.2.8 The Occupational Safety and Health Act No 9 2006

The Act addresses the handling of hazardous chemicals during manufacture, storage, transport and sale. It is aimed at improving working conditions of workers and in particular their safety, health, and hygiene of their working environment - to ensure that they work in an environment, which is reasonably free from all hazards that can lead to their injury and poor health. Among other objectives, the policy controls the keeping and use of chemical substances which may be explosive or highly flammable or toxic, otherwise dangerous substances, or generally preventing the unlawful acquisition, possession and use of such chemical substances at work. The Act provides opportunity for the worker to participate on his own safety and health care. Section 13, puts the responsibility of protection of the worker and the general environment to the employer. Sections 95-97 provides for the requirement by the employer; to take all preventive measure to prevent or reduce contamination of the working environment.

2.2.9 The Uganda National Bureau of Standards (UNBS) Act Cap 237

The Act sets up the Uganda National Bureau of Standards (UNBS) whose objectives are to formulate and promote the use of national standards and to develop quality control and quality assurance systems that will enhance consumer protection, public health and safety, industrial and commercial development and international trade, among others.

Section 21(1) of the Act prohibits import, distribution, sell, manufacture or possession for sale or distribution any commodity for which a compulsory standard specification has been declared unless such commodity conforms to the compulsory standard or unless the commodity bears a distinctive mark.

2.2.10 Public Health Act Cap 281

Part IX of the Act prohibits causing of a nuisance. The Act defines what constitutes a nuisance to among others include, any factory or trade premises not ventilated so as to destroy or render harmless and inoffensive any gases, vapours, dust or other impurities, or so over-crowded as to be injurious or dangerous to the health of those employed therein. The Act prohibits the deposition into sewers or drains chemical refuse, petroleum, spirit, and carbide of calcium. The Act also lays emphasis on the prevention and suppression of infectious diseases and epidemic or endemic diseases. It also sets up drainage and Sanitation Rules, which specifically mention technical aspects of waste disposal. The Act prohibits throwing or emptying any matter likely to injure public sewers or drain or interfere with the free flow of the contents of sewers into a public sewer. Local authorities have a duty to take all lawful, necessary and reasonably practicable measures to prevent pollution of water supplies and food.

2.2.11 The Investment Code Act Cap 92

This Act relates to local and foreign investments in Uganda. The Act establishes the Uganda Investment Authority with the mandate of promoting, facilitating and supervising of investments in Uganda. Chemical industries and pharmaceutical industries are listed among the priority areas of investment under the Act. The Act provides for carrying out Environmental Impact Assessment (EIA) for investment projects. It also provides for an investor where necessary being required to take necessary steps to ensure that the operations of his/her business enterprise do not cause injury to the ecology or environment.

2.2.12 The Mineral Act, 2003

The mining Act regulates all mining activities in Uganda. The Act requires the duty holders - persons holding exploration licenses or a mining lease, to ensure that their activities are carried out after carrying out an EIA (section 108(1)), an annual environment audit (EA) (section.108 (3)) and only commence the activities to be undertaken after securing a certificate of approval of the said activities from the Lead Agency.

2.2.13 Petroleum (Exploration and Production) Act

The Act prohibits exploration or development operations on petroleum without a license. Under the Act, obligations and duties are imposed on the licensee to ensure control of flow or prevent escape of any mixture of water or drilling fluid and petroleum, prevent pollution and where it occurs to disperse it in an environmentally acceptable manner.

2.2.14 The Water Act Cap 152

The Act, establishes the Water Policy Committee that among other things, coordinates the preparation, implementation and amendment of the Water Action Plan and recommend the same to the Minister to advise the Minister at his/her request, on issues of policy relevant to investigations, use, control, protection, management or administration of water sources.

The Water act provides for the ministerial powers to prescribe water which may not be discharged, trades which may not discharge waste or classes of premises or particular premises from which waste may not be discharged except in accordance with a waste discharge permit. Under the Act, pollution of water is prohibited unless authorized; a Pollution license is required for any person to do so.

2.3 INTERNATIONAL CONVENTIONS

2.3.1 The Stockholm Convention on Persistent Organic Pollutants 2001

The Convention was adopted in May 2001 and entered into force in May 2004. It deals specifically with chemical management and in particular with POPs, Polychlorinated Biphenyls (PCBs) and dioxins. The objective of this convention is to protect human health and the environment. Parties were required to take action on an initial group of 12 specified chemicals however; nine more chemicals have been added on the list.

2.3.2 The Rotterdam Convention (1998)

The Rotterdam Convention on the Prior Informed Consent Procedure (PIC) for Certain Hazardous Chemicals and Pesticides in International Trade was adopted in 1998 in response to gaps within international law related to trade in hazardous chemicals and entered into force in 2004. The convention promotes shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm

2.3.3 International Labour Organisation (ILO) Conventions

The International Labour Organization since the beginning has been the establishment of international standards on labour and social matters. These international labour standards take the form of Conventions and Recommendations. In addition to the ILO Conventions and Recommendations dealing with occupational safety and health matters, further guidance is provided in Codes of Practice and manuals used as reference material by those in charge of formulating detailed regulations or responsible for occupational safety and health.

2.3.4 Convention concerning Prevention and Control of Occupational Hazards caused by Carcinogenic Substances and Agents

This convention seeks to protect workers against hazards arising from occupational exposure to carcinogenic substances and agents.

2.3.5 Convention concerning Protection of Workers against Occupational Hazards in the Working Environment due to Air tobacco product Pollution, Noise and Vibration

This seeks to protect workers against occupational hazards in the working environment. The Convention concerning Occupational Safety and Health and the Working Environment seeks to prevent accidents and injury by minimizing the causes of hazards inherent in the working environment.

2.3.6 Occupational Safety and Health Convention, 1981 (No. 155)

The convention provides for the adoption of a coherent national occupational safety and health policy, as well as action to be taken by governments and within enterprises to promote occupational safety and health and to improve working conditions. This policy shall be developed by taking into consideration national conditions and practice. The Protocol calls for the establishment and the periodic review of requirements and procedures for the recording and notification of occupational accidents and diseases, and for the publication of related annual statistics.

2.3.7 Occupational Health Services Convention, 1985 (No. 161)

This convention provides for the establishment of enterprise-level occupational health services which are entrusted with essentially preventive functions and which are responsible for advising the employer, the workers and their representatives in the enterprise on maintaining a safe and healthy working environment.

2.3.8 Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187)

This Convention aims at promoting a preventative safety and health culture and progressively achieving a safe and healthy working environment. It requires ratifying States to develop, in consultation with the most representative organizations of employers and workers, a national policy, national system, and national programme on occupational safety and health.

2.3.9 Convention concerning Safety in the use of Chemicals as at Work

In 1974 the ILO adopted Convention No. 139 - Convention Concerning Prevention and Control of Occupational Hazards Caused by Carcinogenic Substances and Agents (7). The convention seeks to minimise exposure of employees to carcinogenic substances through measures such as the substitution, where possible, of less harmful substances for carcinogenic ones, and the provision of employees with relevant personal protective equipment. Ratifying nations are required to periodically determine which carcinogenic substances and agents are to be prohibited or controlled.

2.3.10 Convention Concerning Protection of Workers against Ionizing Radiations, Geneva 1960

It seeks to protect workers as regards their health and safety against ionizing radiations. The objective of this convention is to protect workers, regarding to their Health and safety, against Ionizing Radiations. The convention provides for all parties to the convention to draw up regulations, codes of practice or other appropriate measures. The convention applies to all activities which involves exposure of workers to ionizing radiations during work. It stipulates that only maximum Permissible doses should be applied for various categories of workers.

2.3.11 Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

The objectives of this Convention are: to promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm; and to contribute to their environmentally sound use by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to Parties.

2.3.12 The Strategic Approach to International Chemicals Management (SAICM)

The Strategic Approach to International Chemicals Management (SAICM) was adopted by the International Conference on Chemicals Management (ICCM) in February 2006. It is a policy framework to promote chemical safety around the world. SAICM has as its overall objective the achievement of the sound management of chemicals throughout their life cycle so that, by 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment. This “2020 goal” was adopted by the World Summit on Sustainable Development in 2002 as part of the Johannesburg Plan of Implementation.

2.3.13 The Universal Declaration of Human Rights

Article 25(1) of the Universal Declaration of Human Rights provides that each person has the right to a standard of living that ensures the health and well-being of one ‘self and one’s family, especially for medical care as well as for the necessary social services. It adds that every person has the right to security in case of unemployment, sickness, disability or in case of loss of earnings due to circumstances beyond the person’s control. Uganda is a party to this instrument and so Ugandan consumers have a right to protection against harmful commercial products.

2.3.14 Agenda 21

Agenda 21 has a chapter on Environmentally Sound Management of Toxic Chemicals including prevention of illegal international traffic in toxic and dangerous products. Chapter 19 provides that substantial use of chemicals is essential to meet the social and economic goals of the world community and today’s best practice demonstrates that they can be used widely in a cost-effective manner and with a high degree of safety. Other important laws enacted by the Government of Uganda that affect mining and exploration, besides the Mining Act 2003 and Mining Regulations 2004, include: Contracts Act 2000 and the Arbitration and Conciliation Act 2000

2.4. Institutional Framework for the Management of Chemicals in Uganda

This section of the study identifies relevant institutions regarding sound management chemicals and chemicals wastes in Uganda. It identified the mandates of some of these ministries, agencies, governmental institutions and NGOs regarding sound management of chemicals and chemicals wastes in the mining sector. It recognizes the fact that the sound management of chemicals in all aspects of mining; including in the oil and gas industry, is a collective responsibility of all Ugandans and therefore, a number role players including the local communities, NGOs, private sector and government must be given opportunity to participate.

2.4.1 Responsible Ministries:

During the study, it was observed that the roles and responsibilities of ensuring that chemicals and chemicals wastes are managed in a sound manner is a shared responsibility among many ministries. It was also noted that in mining not only minerals talked about but also the people that are involved in mining and the environment that is greatly impacted upon by the activities of the mining industry. This therefore means that the ministries and agencies that are involved in ensuring good practices in the mining sector are numerous. Among others, these include the Ministry of Energy and Mineral Development (MEMD), the Ministry of Water and Environment (MWE), Ministry of Gender, Labor and Social Development, Ministry of lands, housing and urban development and the Ministry of Tourism, Trade and Industry (MTTI). These ministries play the following roles;

2.4.1.1 Ministry of Energy and Mineral Development:

The Ministry Of Energy And Mineral Development is responsible for regulating the oil and gas industry. The ministry also regulates the use of chemicals and it is responsible for profiling the type of chemicals used and how they are used and disposed off. The ministry is also supposed to play a coordination role for all the different ministries and departments that are involved in the oil monitoring activities. Under the Ministry of Energy and Mineral Development, there are several institutions and agencies that are responsible for ensuring that oil and gas mining is done in a manner that does not compromise people's health and the environment.

a) Geological Survey and Mines Department (GSMD)

The Geological Survey and Mines Department (GSMD), is among other things mandated with the duty of collecting, collating, processing and disseminating geosciences data.

b) Petroleum Exploration and Production Department (PEPD)

The Petroleum Exploration and Production Department (PEPD) of the Ministry of Energy and Mineral Development implements the policy objectives of the Petroleum Exploration Sector that include the following: To promote petroleum exploration in the country by attracting oil companies to invest in the sector.

2.4.1.2 Ministry of Water and Environment (MWE):

The Ministry of Water and Environment (MWE) promotes the Sound management and sustainable utilisation of water and environment resources for the betterment of the population of Uganda. The ministry is very important in the oil and gas exploration and exploitation processes. The ministry aims at promoting and ensuring the rational and sustainable utilisation, development and effective management of water and environment resources for socio-economic development of the country. Among other things, the ministry is responsible for setting national policies and standards, managing and regulating water resources. That National Environment Management Authority (NEMA), District Environmental officer, Uganda Wildlife Authority (UWA), drilling Oil companies, NGOs and the communities.

a) National Environment Management Authority (NEMA)

The National Environment Management Authority (NEMA) was established in May 1995 under the National Environment Act CAP 153. It is the principal agency in Uganda that is charged with the responsibility of coordinating, monitoring, regulating and supervising environmental management in the country. On top of advising government, NEMA also spearheads the development of environmental policies, laws, regulations, standards and guidelines; and guides Government on sound environmental management.

Its activities are focused at providing support to government's main goal of ensuring sustainable development through the National Development Plan (NDP); in accordance with the policy framework of Government and the Millennium Development Goals (MDGs). NEMA therefore, is supposed to develop guidelines on the proper use of chemicals, waste treatment and disposal and disseminate these guide lines to the public.

It was noted that, it is within the mandate of NEMA to; among other things; develop policies and regulations and to guide companies in the development and implementation of appropriate strategies for proper use, storage transportation and disposal of chemicals and chemicals wastes. It is the responsibility of NEMA in collaboration

with lead agencies to guide all activities in the area of chemicals and chemicals waste treatment, disposal and to disseminate guidelines to the public and to all the other stakeholders. Generally speaking, NEMA's role is to ensure that the environment and all natural resources are managed well.

b) District Environment Officer:

District Environment Officers (DEOs) are mandated with the coordination of activities of district councils relating to management of the environment and natural resources and to ensure that environmental concerns are integrated. They are also supposed to assist in the development and formulation of byelaws as well as in the dissemination of information relating to management of the environment among other things. DEOs being on ground, are very important role players in the regulation of the oil industry.

2.4.1.3 Ministry for Tourism, Wildlife and Heritage:

The mandate of the Ministry of Tourism, Wildlife and Heritage (MTWH) is derived from Article 189 and Sixth Schedule of the Constitution of the Republic of Uganda (1995), Uganda Wildlife Act Cap 200, Uganda Tourism Act, 2008, Historical Monuments Act 1967, Universities and Other Tertiary Institutions Act, 2006. The ministry is mandated to "To formulate and implement policies, strategies, plans and programs that promote tourism, wildlife and cultural heritage conservation for socio-economic development and transformation of the country".

a) Uganda Wildlife Authority (UWA)

Under the Ministry of Tourism, Wildlife and Antiquities, is the Uganda Wildlife Authority (UWA), which is a statutory body established by the Uganda Wildlife Act 2000. UWA is responsible for the protection of flora and fauna in the wilderness and it became operational in August 1996 after the merger of the then Game Department with the Uganda National Parks. The mandate of UWA among other things is, to manage and conserve wildlife in Uganda, both in and outside the wildlife protected areas (PAs), to promote public participation in wildlife management, to ensure the protection of rare, endangered and endemic species of wild plants and animals, to enhance economic benefits from wildlife management through promotion of tourism and to implement relevant international treaties, conventions, agreements or other arrangements to which Uganda is a party. The aims of UWA are to conserve and sustainably manage wildlife and protected areas of Uganda in partnership with neighboring communities and other stakeholders, for the benefit of the people of Uganda and the global community.



Chemicals and chemicals wastes are threat to wildlife in the oil and gas industry

Since oil exploration and drilling is mainly taking place in game reserves, it is within the mandate of UWA to ensure that oil and gas activities do not cause significant damage to wildlife. UWA is supposed to ensure that chemicals and chemicals wastes are not dumped in protected areas as this would jeopardize life in the wilderness. It is therefore prudent that oil companies; in collaboration with NEMA, UWA and other relevant institutions, develop appropriate chemicals and chemicals wastes management and disposal plans for approval before venturing into drilling.

Others Ministries that are responsible include;

- Ministry of Agriculture, Animal Husbandry and Fisheries (MAAIF)
- Ministry of Finance, Planning and Economic Development (MoFPED)
- Ministry of Gender, Labor and Social Development
- Ministry of Lands, Housing and Urban Development
- Ministry of Local Government
- Ministry of Internal Affairs
- Ministry of Works and Transport
- Ministry of Health (MOH)

Other institutions of government that are responsible for promoting sound management of chemicals and chemical wastes and for ensuring the safety of human health and the environment include;

- National Forestry Authority (NFA)
- National Planning Authority (NPA)
- Uganda Government Enterprise Reform and Divestiture Program
- Uganda Investment Authority (UIA)
- Directorate for Ethics and Integrity Uganda
- Government Analytical Laboratory (GAL)
- National Drug Authority (NDA)
- Uganda Revenue Authority (URA)
- Uganda Industrial Research Institute

These institutions are supposed to play a very important role in ensuring that the rights of workers and those of the communities are respected. They are also important for ensuring good health of the people and that of the environment. The Ministry of Energy and mineral development is responsible for regulating mining activities.

2.4.2 Civil Society Organisations (CSOs):

The CSOs are responsible for advocating for proper chemicals management throughout their life cycle. They raise awareness and advocate for good policies and guidelines to be put in place, build capacity of communities and other stakeholders, give strategies and

guidance on waste disposal options and bring local and international expertise to train the different other stakeholders.

2.4.3 Mining Affected Communities:

Mining has been taking place in areas settled by communities and their participation is very essential for sustainable health and environment. In the case of oil for example, its exploration and exploitation within the Albertine region is a new business in the region that requires the host communities to play a pivotal role in the management of chemicals and chemicals wastes. However, effective community participation requires transparency and community access to adequate information to help them ensure that their environment is not abused or misused.



FINDINGS ON CHEMICALS AND CHEMICALS WASTE MANAGEMENT IN OIL AND GAS MINING:

3.1 Introduction

Vast quantities of oil and gas have been discovered in Uganda within the Albertine Graben region. The Albertine Graben region is located in the western arm of the East African Rift Valley system and it is where most game reserves in Uganda are located; it is an ecologically sensitive area. The region is the most species rich eco-region for vertebrates in Africa and contains 39% of Africa's mammal species, 35% of Africa's butterflies, 51% of its bird species, 19% of its amphibian species and 14% of its plant and reptile species and it has five national parks namely; Murchison Falls, Queen Elizabeth, Kibale, Semuliki and Rwenzori Mountain and more than five wildlife and forest reserves. This makes the region very critical for biodiversity conservation yet currently, a number of oil wells are located in this sensitive ecosystem.

An estimated 31 oil wells are currently located in Murchison Falls National Park, Queen Elizabeth National Park, Kabwoya Game Reserve and Bugungu Wildlife Reserves and this number is expected to grow to 49 wells. The sensitivity of this area and its detailed biodiversity is well articulated (NEMA 2009). In addition, this oil and gas exploration and consequent exploitation is located in places with rich water ecosystems such as Lake Albert, River Nile and many other water sources. It would suffice to emphasize that this sensitivity poses a challenge that needs to be very carefully tackled.

The history of oil in Uganda dates way back to the 1920's, and the first Oil wells were drilled in 1938 followed by shallow wells, which were drilled in the 1940s and 1950s. Massive Oil Explorations and drilling took place between 2000 and 2008 and the regions oil and gas potential as of January 2013 was estimated at more than 3.5 billion barrels of oil. It is expected that Uganda will enter into oil and gas production in the last quarter of 2019, with a set up refinery production capacity of 30,000 barrels per day that is expected to be located in Kyapaloni-in Kabaale-Buseruka Sub County in Hoima district.

Effort is being made by government to exploit the oil and gas by putting in place a refinery to help meet local demand and provide surplus processed petroleum products for export.

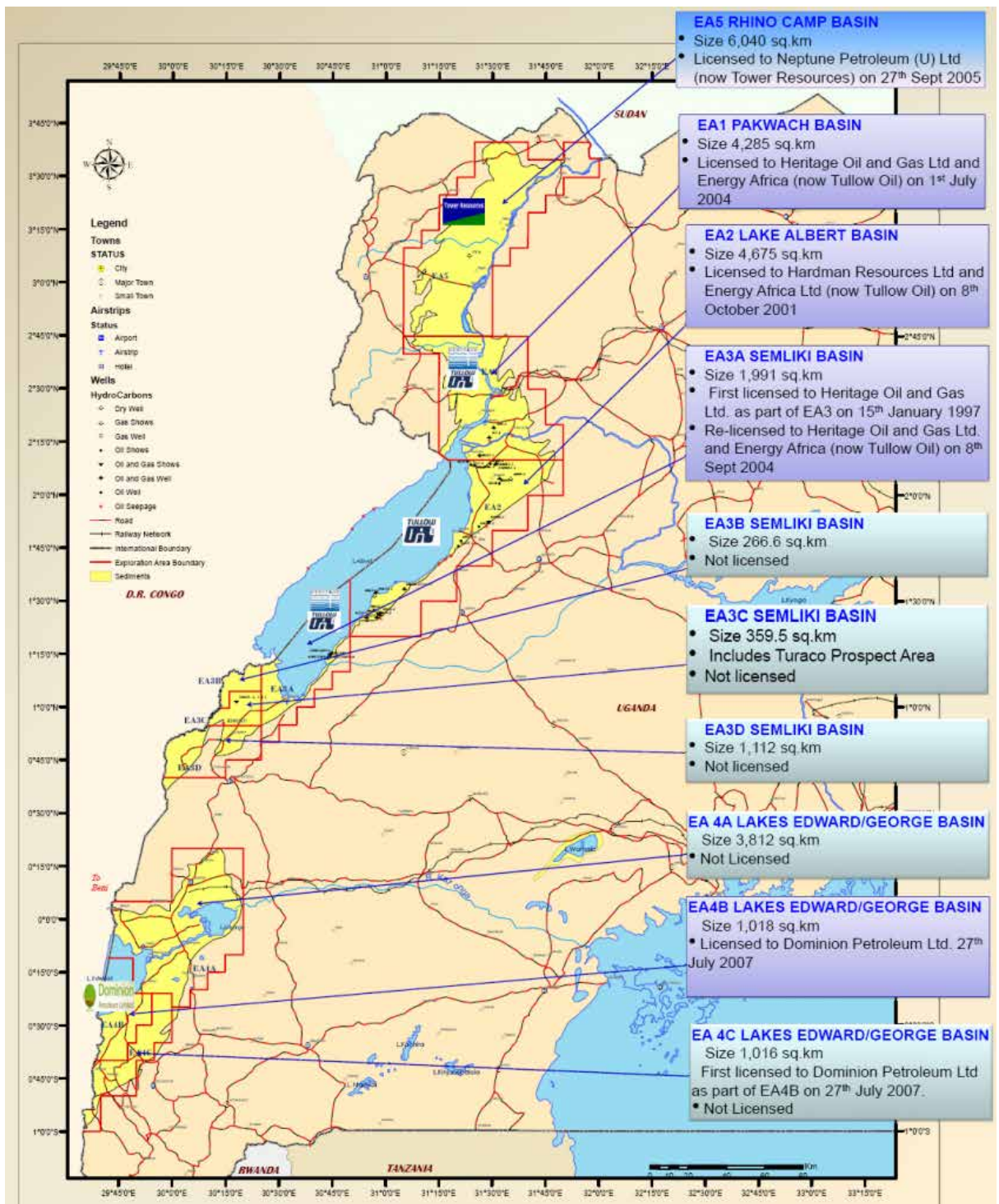
Through the Early Production Scheme (EPS), Government is planning to construct a refinery that will be located at Kabale Parish, Buseruka Sub country, Bugahya County in Hoima district. Although the refinery was earlier expected to be completed by 2010, its construction was delayed by several factors. However, the view of government is that the best way for Ugandans to benefit from oil and gas is by ensuring that oil is refined within the country.

Undoubtedly, the use of chemicals during exploration is largely expected to take place in in-house laboratories and in the field during drilling and seismic data acquisition. Investigations indicated that during seismic data acquisition in the field, chemicals contained in explosives, cement additives and special mud formulation(s) were used. The use of chemicals in the field during drilling accounted for the largest use of chemicals. To facilitate easy movement of the cuttings, the mud formulation have desired specifications of density, viscosity and weight and that this was made possible by mixing chemical mud additives. The mud cuttings among other things included Weighting agents, emulsifiers, viscoifiers, wetting agents, deforming agents, dispersants and defloculants, and fluid loss control additives but that were expected to be varied from site to site. Additives were also being used to prevent cement from foaming. Oil and gas itself is a chemical which requires minimization of negative impacts of contamination through oil spills. In the oil and gas industry, oil spills may occur during transportation, through leakages in the pipe network or even through unsafe disposal of oil wastes.



Poor Waste management Practice - A heap Chemical wastes at the mining sites (*Photo by WABA Consults*)

MAP OF UGANDA SHOWING OIL WELLS IN THE ARBERTINE REGION



3.2 Study and Findings:

The study investigated aspects of chemicals management practices that among others include; transportation, storage, use, their treatment and safe disposal of chemical wastes. Emphasis was put on safety of human health and the environment.

The study found that the oil and gas industry in Uganda has been using a number of chemicals during petroleum exploration and mining; especially in the field during drilling and seismic data acquisition and in laboratory activities.

A number of the chemicals that are used if not well handled have a likelihood of entering into the environment during; transportation, loading and off-loading, storage, use, accidental spillages and during waste disposal and these could affect human health and could damage other aspects of the environment. It was noted that the Albertine Graben region is known to be an ecologically sensitive area and therefore, it requires sound chemicals management practices.

Most of the respondents noted that while oil companies have a primary objective of making money, they are also responsible for ensuring that they exhibit internationally accepted good practices and standards during exploration, drilling and exploitation in the oil and gas industry. These companies are therefore responsible for developing plans for sound chemicals management and for responsible disposal of chemicals wastes for approval before they venture into the drilling business. Oil companies are also supposed to ensure that policies, laws



Mud storage and liquid waste storage at the mining sites

and regulations regarding chemicals and chemicals wastes management are adhered to. It was also found out that a number of smaller companies were subcontracted and were therefore involved in the exploration process of petroleum in the Albertine region.

3.3 Chemicals and Chemicals waste Management:

A number of chemicals are procured and stored during the process of exploration and drilling. It was noted that the amount of chemicals that are used during drilling at any well depends on many factors, more especially on the prevailing geology.



Fractured geological formations resulting from the Construction of a waste consolidation site.

Information generated indicates that, fractured geological formations may absorb all the drilling mud used for the lubrication of the bit during drilling. In order to sustain drilling, more mud has to be formulated and pumped in. Such occurrences make the demand for chemicals during drilling unpredictable.

This kind of situation makes it important that storage of chemicals is taken into consideration to ensure that chemicals are available all the time.

Wastes Consolidation Sites

The storage of mud and liquid waste are today feared to be one of the potential ways through which contamination of both human health and the environment from chemicals used in exploration and drilling, is likely to occur. Apparently, it was noted that during exploration and drilling, transportation of chemicals did not present high risks to both human health and the environment since no accidents were reported.

There is a waste consolidation site in Buliisa; here the mud cutting wastes are kept in bands which are surrounded by moulds of soil. These bands are covered by thick tapeline which reduces it from exposure to the environment. According to Tullow Oil, the wastes stored at the consolidation site are composed of a number of chemicals including; calcium carbonate, Barium sulphate, sodium carbonate and clay materials although, citric acid is added to reduce PH of the wastes. On the other hand, waste fluids are stored in pits with slanting iron roofing which is about 1 meter high. The waste is treated with Hydrogen sulphide to reduce on the PH and then mixed with potassium acetate solution. During drilling, there is crude oil of about 250,000 barrels that was brought to the surface and is being stored in 40ft containers at the waste consolidation sites.

3.4 Transportation and storage of chemicals and chemicals wastes

It was noted that, transportation of chemicals during oil and gas exploration and well drilling is done by carefully procured companies exhibiting capacity to execute the work efficiently. According to most respondents, chemicals are transported in specialised trucks when being delivered to the company stores, this minimises as much possible the mixing of chemicals with other merchandise during transportation. When trailers arrive at the site, the chemicals are off-loaded into storage areas. However, it was noted that transportation of chemicals between the storage facilities and oil well site is done by open trucks, creating the possibility of chemicals contaminating human health and the environment or affecting humans. This risk of contamination to human health and the environment is more pronounced in cases the bags are transported on open trucks when they are damaged, that the bags are damaged and bad weather.

Storage of chemicals was identified as one of the most challenging issues as it was noted

that, the quantities of chemicals delivered; often times, out match the storage capacity of the shade and as a consequence, some chemicals are left outside for some time. This was also the case with chemicals that are required at the well site. Some of these chemicals are kept outside for some time, sometimes they are not adequately covered; the only protection being their packaging material. However, the communities fear that during oil and gas exploitation risks of accidents during transportation are likely to increase, if this happens, it will have significant impact on human health and the environment.

Transportation of wastes from the refinery to the treatment plant was identified as being one of the challenges to oil and gas processing. The communities are not aware of plans for transporting wastes from the refinery to the waste treatment plant neither are they aware of the mitigation measures suggested to prevent wastes from contaminating their gardens and water sources; more especially Wambabya River and Lake Albert. Generally, the communities are not aware of the impacts of the waste treatment plant to their health and to the environment.

3.5 Awareness and Protection from Harmful Aspects of Chemicals and Chemicals Wastes

Personnel awareness and protection during oil and gas exploration and drilling was being considered by some companies. During field work, the study team was able to access some of the training materials used to raise awareness to personnel; more especially those involved in drilling processes. However, it was noted that, while personnel involved in drilling are required to put on respirators during mixing and during the time of use of the mixed chemicals, in some cases this was not adhered to. It was also noted from the interviews that some rig personnel are not equipped with breathing apparatus yet they go on to work around the mud tanks where vapours from mud stuff the atmosphere. On a positive note however, oil companies were making effort to provide signposts around areas where personal protection equipment (PPE) is required; including the type of personnel protective gear supposed to be put on.



Awareness signpost erected by Tullow Uganda



Tullow staff with protective gear

3.6 Accidental Oil Spillages and their Management

Oil and gas exploitation in Africa; Uganda inclusive, has been associated with accidents that have resulted into oil spills and leakages into the environment. In Uganda for example, currently there are inadequate regulations regarding oil spillages and leakages. This therefore calls for; as urgently as possible, the putting in place of an oil spills/leakages plan and/or an environment monitoring Plan to respond to any future accidents leading to oil spillage and/or leakages. On a positive note however, some respondents indicated that government together with oil companies were working towards putting in place an oil spillage/leakage response mechanism or plan.

3.7 Key Public Concerns on Dangers of Chemicals and Chemicals Wastes in the Oil Industry

The waste consolidation sites continue to generate a lot of community concern. The fluid and mud cutting wastes pose a management challenge to both the oil companies and government. In Buliisa; for example, the communities expressed concern that this wastes have the potential of poisoning water points and community grazing lands. River Zoliya runs just 1 Km adjacent to the waste consolidation area, raising fears from residents that the wastes would percolate through the underground and contaminate the river waters which are a source of water for domestic use and for livestock.

It was noted that there were a lot of uncertainties regarding the impacts of the fluid and

the mud cutting wastes. As a safeguard measure, waste consolidation sites were introduced at Kissinger and Ngara (1) partly because due to lack of oil wastes management guidelines.

Although wastes at Ngara (1) wastes consolidation site look securely confined, the site is characterised by a strong smell of gaseous emission from the fluid wastes arising from the high temperatures from solar radiation that is exerted on the fluid wastes in the storage pits. According to the respondents, the fluids at the wastes consolidation sites were reducing in quantity due to evaporation.



A community house roofed with thick polythene material used at the waste consolidation site



Kasemene 3 Oil Well in Kisimo, Buliisa District, near Lake Albert

Kasamene (111) and Wairindi oil wells are so close to the waters of Lake Albert raising the potential risk of contaminating the lake in an oil spill occurred. Contamination of the lake would jeopardise fishing which is the main economic activity for the communities.

Some communities reported a chemicals accident one time on Kaiso Tonya landing sight, a chemical was seen floating on the water. The colour of the water turned green and fish eventually died and

up to today nobody has ever known what type of chemical it was.

Some members of the community in Kaiso Tonya landing site use some of the thick polyethane bag materials (black) which are used at waste consolidation sites for roofing their houses. It was also noted that the communities also use empty chemicals containers for water collection and storage of other liquids. These containers are smuggled from stores of Tullow and other oil companies and sold to communities. However, the short and long term impacts of the chemicals that were in the containers on people's health and to the environment are not known to these communities.

By the time of the study, it was observed that the bulk of the solid and liquid wastes generated from exploration and drilling had been stored at waste consolidation sites pending development and approval of appropriate waste disposal methods. Waste fluids are stored in pits with slanting iron roofing which is about 1 meter high. Liquid wastes are treated with Hydrogen sulphide to reduce on its PH; it is then mixed with potassium acetate solution. Mud cutting wastes are kept in bands which are surrounded by moulds of soil. The bands are covered by thick tapeline which reduces its exposure to the environment. Mud cuttings comprise of Barium sulphate, calcium carbonate, sodium carbonate, biocides (bacteria) and clay materials. However as a point of emphasis, it is noteworthy to say that there is still a lot of uncertainty on the best method for disposal of the wastes stored at consolidation sites.



Liquid wastes were being stored in pits with slanting iron roofing .



Liquid wastes were being stored in Metallic containers

Concern was raised over wastes consolidation sites which were considered to be a health hazard, since the communities did know the composition and the risks associated these wastes sites were located near R. Zoliya and L. Albert which provide water for both domestic use and for livestock. There were fears that this would eventually be the most popular way through which chemicals would get into the environment although, in the opinion of Tullow Oil, everything was being done to ensure that the risk of contamination was; as much as possible, minimised. It was Tullow practice, wastes to be disposed to undergo tests before being disposal off.

**MAIN FAMILIES WITH MINERAL COMPOUNDS CHEMICALS MINERAL DATING IN THE MOST FEATURES
FRACTURING FLUIDS**

MINERAL CHEMICAL FAMILY	MAIN MINERAL CHEMICAL COMPOUND IN FRACTURING FLUIDS	TOXICITY	
		Acute and Sub-acute	In the long term
Nitrogen compounds	Dinitrogen (Nitrogen) (N ₂)	Anoxia	
	Nitrites (NO ₂)		Méthémoglobinisant
	Nitrates NO ₃		Méthémoglobinisant
	Ammonia (NH ₃)	Asphyxia	Respiratory irritant
Compounds brominated	Sodium bromide (NaBr)	Hypnotic	
	Sodium bromate (NaO ₃ Br)	Méthémoglobinisant	Reprotoxic
Chlorinated compounds	Chlorine (Chlorine) (Cl ₂)	Corrosive	Irritant
	Chlorine dioxide (ClO ₂)	Irritant	Bronchial
	Chloride hydrogen, (HCl) (Acid hydrochloric)	Corrosive	Irritant
	Chlorides (Cl) ⁺		Hypertension
	Sodium hypochlorite (from Water bleach) (NaOCl)	Irritant	
	Sodium chlorite (NaO ₂ Cl)	Irritant	
Compounds of Aluminium	Aluminum Al ° Alumina (Aluminium oxide) (Al ₂ O ₃)	Irritant	Neurotoxic central
	Aluminum trichloride (AlCl ₃)		
Compounds Calcium	Calcium oxide (Lime) (CaO)	Corrosive	Irritant
	Calcium hypochlorite (Ca (OCl) ₂)		
Compounds Inorganic carbon	Carbon dioxide (Carbon Dioxide supercritical) (CO ₂)	Anoxia, Frostbite	
	Carbon Black		
	Graphite		
	Chromium ((Metal) ° Cr)		
Compounds Chromium	Trivalent chromium acetate (Chromic acetate) (Cr(CH ₃ COO) ₃)	Allergenic	
Copper compounds	Copper (metal) Cu °		
	Cupric chloride, dehydrate (CuCl ₂), 2H ₂ O	Irritant	
	Cupric sulfate (CuSO ₄)	Irritant	
Compounds of Iron	Iron (metal) Fe °		
	Ferric chloride FeCl ₃	Irritant	
	Ferrous sulfate heptahydrate (Fe SO ₄ , 7H ₂ O)	Irritant	
	Ferric oxide (Fe ₂ O ₃)		
Compounds Nickel	Nickel sulphate (NiSO ₄)		Allergenic
Compounds Potassium	Potassium hydroxide (Potash) (KOH)	Corrosive	Irritant
	Potassium chloride (KCl)		
Compounds Silicon	Crystalline silica (Cristobalite, Quartz, Tridymite) (SiO ₂) _n	Irritant	Fibrosis (silicosis), Carcinogen in form of particles (IARC Group 1)
	Talc (Magnesium silicate, anhydrous) (Mg ₃ (SiO ₃) ₂)		
	Mica	Lung irritant	If the presence of quartz fibrosis
	Sodium hydroxide (Caustic Soda) (NaOH)	Corrosive	Irritant
	Sodium hydrogen carbonate (NaHCO ₃)		
	Sodium carbonate (Na ₂ CO ₃)	Irritant	Irritant
	Sodium nitrite (NaNO ₂)	Méthémoglobinisant	Méthémoglobinisant, Carcinogen (Group 2A IARC)
	Sodium nitrate (NaNO ₃)	Méthémoglobinisant	Méthémoglobinisant, Carcinogen

Compounds Sodium	Sodium sulphite (Na ₂ SO ₃)	Irritant	(Group 2A IARC)
	Sodium sulfate (Na ₂ SO ₄)		
Compounds Sulfur	Sulfuric acid (H ₂ SO ₄)	Corrosive	Irritating, Carcinogen form Aerosols (Group 1 IARC)
	Sulfamic acid (Amino sulfonic acid) (HOSO ₂ NH ₂)	Skin irritant, mucous	
	Ammonium sulfate ((NH ₄) ₂ SO ₄)		
	Ammonium thiocyanate ((NH ₄) ₂ SO ₃)		
	Ammonium persulfate (Ammonium peroxydisulfate) (NH ₄) ₂ S ₂ O ₈	Eye irritant, kin, respiratory	Allergenic
Compounds Titanium	Titanium (metal) (Ti *)		
	Titanium dioxide (TiO ₂)		Carcinogen possible (Group 2B IARC)
Compounds Zirconium	Zirconium nitrate (Zr (NO ₃) ₄)		
	Zirconium sulfate (Zr(SO ₄) ₂)		
	Zirconium oxychloride (Zirconyl chloride) (ZrOCl ₂)	Corrosive	Irritant
Compounds Boron	Boric acid (H ₃ BO ₃)	Skin irritant	Reprotoxic (Repro2)
	Borates (BO ₃ ³⁻)	Irritant	Reprotoxic
	Sodium metaborate, octahydrate (Na BO ₂), (8 H ₂ O)	Irritant	
	Boric oxide (B ₂ O ₃)	Skin irritant, ocular	Reprotoxic
	Sodium perborate, tetrahydrate Na BO ₄ , 4 H ₂ O	Eye irritant	Reprotoxic (Repro2/Repro3)
	Hydrogen fluoride (Hydrofluoric acid) HF	Corrosive	Irritant
Fluorinated	Ammonium bifluoride F ₂ (NH ₄) ₂	Corrosive	Irritant
	Hydrogen peroxide (Hydrogen peroxide) (H ₂ O ₂)	Irritating, skin, ocular	Promoter carcinogenesis
Compounds oxygenated	Dipotassium phosphate (K ₂ H (PO ₄))		
	Trisodium phosphate (Na ₃ (PO ₄))		

ORGANIC CHEMICAL FAMILIES	MAIN ORGANIC CHEMICAL COMPOUNDS	HUMAN TOXICITY	
		Acute or subacute	In the long
Hydrocarbons Saturated Alkanes	Methane CH ₄	Asphyxiant	
	Ethane CH ₃ -CH ₃	Asphyxiant	
	Propane CH ₃ -CH ₂ -CH ₃	Asphyxiant	
	Butane CH ₃ -CH ₂ -CH ₂ -CH ₃	Asphyxiant	
	Pentane CH ₃ -(CH ₂) ₃ -CH ₃	Narcotic	
	Hexane CH ₃ -(CH ₂) ₄ -CH ₃	Narcotic	Neurotoxic peripheral (Polyneuritis)
	Heptane CH ₃ -(CH ₂) ₅ -CH ₃	Narcotic	
Hydrocarbons unsaturated ethylene: Alkenes	d-Limonene	Irritating, Allergenic cutaneous	Irritating, Allergic skin
	Styrene	Irritant	Neurotoxic, Carcinogen possible (group 2B IARC)
	Benzene	Neurotoxic central	Haematological, Carcinogen (Leukemia) (Group 1 IARC)
	Toluene	Irritating, Neurotoxic central	Neurotoxic central Ototoxic, Reprotoxic (Repro3)
	Xylene (three isomers)	Irritating, Neurotoxic central	Neurotoxic central
Hydrocarbons Aromatic (Arenas)	Ethylbenzene	Irritating, Neurotoxic moderate central	Skin irritant, Neurotoxic central moderate Carcinogen possible (group 2BIARC)
	Cumene (Isopropylbenzene)	Eye irritant	Carcinogen possible (group 2BIARC, 2012)
	Pseudocumene (1 ,2,4-Trimethylbenzene)	Irritating, Neurotoxic moderate central	
Hydrocarbons	Diethylbenzene (Mixture of 3 isomers)	Irritant	
	Naphthalene	Irritant gastrointestinal	Haematotoxic (Anemia hemolytic) Cataract, Carcinogen possible (Group 2

Aromatic (Arenas)		Hepatotoxic Haematotoxic	B IARC)
	1- ethylnaphthalene		Mutagenic
	2-Methylnaphthalene		Mutagenic
	9H-Fluorene		Mutagenic
	Phenanthrene	Photo-sensitizing	Mutagenic
	Turpentine (Pine oil)	Allergy	Allergic skin (by origin)
	Aromatic solvents (benzene, toluene, xylene, ethylbenzene)	Irritant	Benzene is Carcinogen (Group 1 IARC)
	Poly aromatic hydrocarbons (PAHs)	Irritant	Several PAHs Carcinogens are in humans [Benzo (a) pyrene ...]
Mixtures Hydrocarbons	Refined petroleum	Irritant	
	Light oil, hydrogenated	Irritant	
	Naphthalene heavy, hydrogenated	Irritant	
	Motor gasoline (Gasoline)	Irritant	Carcinogen possible (group 2B IARC)
	Diesel	Irritant	Carcinogen (Group 1, IARC)
	Heavy naphtha	Irritant	Carcinogen possible
	Kerosene	Irritant	
	Asphalt	Irritant	May contain products carcinogenic
Compounds Organochlorine	Vinylidene chloride (1,1-dichloroethylene)	Eye irritant, skin, respiratory	Hepatotoxic Nephrotoxic, Carcinogen possible
	Tetrachloroethylene (Perchloroethylene)	Eye irritant, skin, respiratory	Hepatotoxic Carcinogen probable (group 2A IARC)
	Benzyl chloride	Eye irritant, skin, respiratory	Mutagenic, Carcinogen (Group 2A IARC)
Alcohols	Methanol (CH ₃ -OH)	Eye irritant, cutaneous	Neurotoxic peripheral (Optic nerve) Acidosis
	Ethanol (CH ₃ -CH ₂ -OH)	Eye irritant, cutaneous	Toxic ingestion, Hepatotoxic Carcinogen (Group 1 IARC), Reprotoxic
	Propanol (CH ₃ -CH ₂ -CH ₂ -OH)	Eye irritant, cutaneous	
	Isopropanol	Eye irritant, cutaneous	
	Butanol (CH ₃ -CH ₂ -CH ₂ -CH ₂ -OH)	Eye irritant, Cutaneous, narcotic	
	Isobutanol	Eye irritant, cutaneous	
	Isooctanol	Eye irritant, cutaneous	
	2-Ethyl hexanol	Eye irritant	Reprotoxic
	Propargyl alcohol (H-C ≡ C-CH ₂ -OH)	Irritant	
	Undecanol	Skin irritant	
	Ethylene glycol	Neurotoxic, Nephrotoxic	
	Glycerol HOCH ₂ -CHOH-CH ₂ OH	Eye irritant, cutaneous	
	Sorbito - HOCH ₂ -(CH ₂) ₄ -CH ₂ OH	Intestinal irritant	
Amino Alcohols	Ethanolamine	Irritant	
	Diethanolamine	Eye irritant, skin, respiratory	Allergenic Possibility of formation of N-nitrosodiethanolamine, carcinogenic
Ether-oxides (Epoxides Glycol ethers, Ether-oxides Polymers)	Ethylene oxide	Eye irritant, cutaneous	Mutagenic, Carcinogen (Group 1 IARC)
	2-Methoxyethanol (Methyl ether of ethylene glycol)	Eye irritant, cutaneous	Reprotoxic (Repro-2)
	Méthoxyéthylacétate (methyl ether of ethylene glycol acetate)	Eye irritant, bronchial	Reprotoxic (Repro-2)
	2-Ethoxyethanol (ethyl ether of ethylene glycol)	Eye irritant, cutaneous	Reprotoxic (Repro-2)
	2 Ethoxyéthylacétate (Ethyl ether of ethylene glycol acetate)	Eye irritant, cutaneous	Reprotoxic (Repro-2)
	Diethylene glycol	Eye irritant, cutaneous	Nephrotoxic
	1,4-Dioxane	Eye irritant, cutaneous	Carcinogen possible (Category 2B IARC)
	1,2-Dimethoxyethane	Irritant	Reprotoxic (Repro-2)
	1,2-Diethoxyethane	Eye irritant	Reprotoxic (Repro-2/3)

	Dipropylene glycol		
Ether-oxides	2-Butoxyethanol (Butyl ether of ethylene glycol)	Skin irritant	Toxic blood Disruptive endocrine (Ovaries, adrenal)
(Epoxides Glycol ethers, Ether-oxides Polymers)	2 - (2-Methoxyethoxy) ethanol. Methyl ether of diethylene glycol	Eye irritant	
	2 - (2-Ethoxyethoxy) ethanol Ethyl ether of diethylene glycol	Eye irritant, cutaneous	
	2 - (2-Butoxyethoxy) ethanol Butyl ether of diethylene glycol	Eye irritant	
	2 - (2-Methoxypropoxy) propoxy propanol Methyl ether of tripropylene glycol	Eye irritant	
	2-ethoxynaphthalene	Skin irritant	
Polymers	Ethyl alcohol ethoxylate (Polyethoxy ethanol) (C ₂ H ₄ O) n, C ₂ H ₅ O	Irritant	
Aether-oxides	Lauryl alcohol ethoxylated ((C ₂ H ₄ O)n, C ₁₂ H ₂₆ O	Irritant	
	Ethoxylated octyl phenol (C ₂ H ₄ O)n, C ₁₄ H ₂₂ O	Eye irritant	
	Ethoxylated nonylphenol (C ₂ H ₄ O)n, C ₁₅ H ₂₄ O	Irritant	
	Polyethoxylated alkanols (C ₂ H ₄ O)n, CnHn'O	Irritant	
	Polyethylene glycol (C ₂ H ₄ O) n, H ₂ O	Eye irritant, cutaneous	
Aldehydes	Formaldehyde	Eye irritant, skin, respiratory	Allergenic Carcinogen (Group 1 IARC)
	Glutaraldehyde	Irritant eye skin, respiratory	Allergenic
Ketones	Acetone	Eye irritant, skin, Neurotoxic	
	Methyl isobutyl ketone	Eye irritant, skin, respiratory Neurotoxic	
Acids Carboxylic	Formic acid	Corrosive (Eyes, skin, mucous membranes)	Irritant
	Acetic acid	Eye irritant, cutaneous	
	Fumaric acid	Eye irritant, cutaneous	
	Adipic acid	Eye irritant	
	Glycolic acid	Eye irritant, skin, respiratory	
Acids Carboxylic	Thioglycolic acid (Mercaptoacetic acid)	Eye irritant, skin, respiratory	
Anhydride acid carboxylic	Acetic anhydride	Eye irritant, cutaneous	
Amines	Aminoethylethanediamine (Diethylenetriamine)	Eye irritant, cutaneous	Allergenic
N-Oxides Amine	1,6-hexanediamine	Eye irritant, skin, respiratory	
	Trimethylamine N-oxide	Irritant	
Salts Ammonium quaternary Salts of immonium Bases Heterocyclic nitrogenous unsaturated	Dimethyldiallylammonium chloride	Irritant	
	Dimethyl didecylammonium chloride	Skin irritant	
	Trimethylammonium chloride	Irritant	
	N-benzyl alkylpyridinium chloride		
	1 (-Phenylmethyl) quinolinium chloride		

3.8 The Oil Refinery and its impacts:

Many are skeptical about the impacts of the oil refinery on their livelihoods; they are concerned that the refinery will come with a number of industries many of them with significant challenges regarding the sound management of chemicals and chemicals wastes. However, many people support governments position of putting in place an oil refinery in the country, arguing that it will create a number of employment opportunities. They also argue that oil companies survive; among other things, survive on deceit, conspiracy, human rights violations and deliberate secrecy if given opportunity to export crude, they would therefore be the main beneficiaries from the proceeds from Uganda's oil and gas exploitation instead of governments and their people. However, there were concerns that even before the refinery is put in place, there are several incidences of reported chemical abuse and misuse especially at drilling sites where open mad pits were reported. Different stakeholders are concerned over the potential risks the oil and gas refinery is likely to have on the water bodies within the Albertine Graben; more particularly on Lake Albert.

One of the biggest public concerns about oil and gas in the Albertine Graben is the management of oil waste. Oil and gas wastes are hazardous; they are characterized by high flammability, corrosiveness, toxicity and reactivity which characteristics require critical analysis to be done on them prior to treatment and disposal. In this direction, a process of constructing a Uganda Shillings (UGX) 5 billion oil waste treatment plant is already in place on about 100 acres of land where a landfill facility to handle liquid and solid waste has already been acquired. The plant is located at Nyamasoga village, Buseruka Sub-county in Hoima district and it is expected that this plant will be East Africa's first hazardous oil waste treatment plant and it will treat waste generated from oil exploration and production activities, as well as other hazardous waste from across the region. The sh5 billion is being established by ENVIRO SERV Uganda limited a South African company in partnership with Green Albertine a Ugandan owned company. It is estimated that the plant will treat and dispose about 30 tons of oil wastes generated from the refinery and other related activities within the Albertine Graben and it has capacity is estimated to have a capacity of about one million cubic. However, communities expressed concern that;

- They were not fairly and adequately compensated for their land and property,

- They were not involved in the social and environmental impact assessments of the project,
- They were face with intimidation from different people who were threatening to use force to evict them,
- They had petitioned courts of law to seek redress although they still continued to get threats from different security organs of the state

There is proposal to construct another oil and gas waste treatment plant in Rwamutonga Village, Bugambe Sub County, Hoima District. The project is owned by McAlester Energy Resources Limited, an international firm, it is expected that this company will evict more than 200 families from their land. By the time of the study, it was learnt that an EIA for the project had already been done however, despite the complex nature of the refinery, the nature of oil wastes and the fear that such wastes would have severe impacts on these communities, NEMA and the project developer not to involve the different stakeholders in the project processes and therefore, there are concerns that;

- Community and other stakeholder participation was not considered during the EIA process,
- The EIA for the project was prepared and signed within a very short time; the process is said to have taken less than two month,
- The future impacts of the project on the communities and the environment are not known - communities fear that the project could become a source of hazardous chemical wastes.

3.9 Challenges:

Inadequate coordination: Since the power centers of stakeholders are different, every institution reportedly executing its mandate independent of each other with limited or no coordination; desperate institutions were not bothered know who was doing what, when, where and why.

Inadequate capacity: Since the oil and gas industry is a new in Uganda, there is still inadequate capacity on part of some key stakeholders to handle chemicals and chemicals wastes. For example, it was reliably learnt that oil and gas chemicals and their wastes are never discussed by the district Natural Resource Committee

Irresponsible disposal of wastes: Oil and gas companies are mostly interested in making profits and they have been seen not to be fair regarding sound management of chemical wastes. For instance, during the initial stages of exploration and well drilling the companies encouraged disposal of wastes on farmlands and as inputs into road constructions thereby risking human life and environment. At community level, issues of oil waste management have remained very unclear

Lack of information and transparency: Access to information to the public about oil activities and on how oil wastes and other associated chemicals are being managed is very limited. For example, there is misconception that fluid wastes at the waste consolidation sites were being treated and taken to Nakasongola for disposal yet such wastes were being stored at waste consolidation sites pending approval of proposal of disposal guidelines by government.

Lack of district and community ownership of oil and gas development processes: Oil is considered a national resource therefore, all activities have been managed centrally living districts and the local communities disenfranchised. For instance, it was observed that institutions like, MEMD, NEMA, PEPD and many others enter and leave district without prior informing the local district and so do they bypass local leaders at the district and report directly to their head offices in Kampala. This leaves many of the local leaders with a lot of information gaps on oil and gas processes.

Relationship between Government, NGOs and Communities: There has been growing conflict between government, NGOs and communities. The cause the conflict according respondents is based on NGOs and communities believing that government is not doing enough to protect the interests of the people that it is supposed to protect while at the same time protecting the broader national interests. On the other hand, government considers NGOs to be anti-development and as having overstepped their mandate. It was also noted that some of these NGOs were as a consequence being deliberately left out of important meetings and other oil and gas development processes. However, it is important to note that the role of NGOs in promoting sound management of chemicals and chemicals wastes was being under looked.

Lack of Strong Civil Society Coalitions: While CSOs are better organized at national level to effectively and constructively engage government and the private sector, this is not the case at district level. In addition, it was observed that each NGO worked independent of the other without clear avenues for synergy. There was no evidence of organised civil society activity to address issues of sound chemicals and chemicals wastes management. This was resulting into weak CSO voice at district level in the area of chemicals and chemicals wastes management. It was further noted that many NGOs are reluctant to join coalitions and networks because of the fear that bigger NGOs will swallow them and impose themselves on them.

Participation in Chemicals and Chemicals Wastes management: At district level, it was observed that there was no deliberate strategy to involve NGOs in chemicals and chemicals waste management. There was no evidence to suggest that any form of collaboration between NGOs and the districts existed regarding sound management of chemicals and chemicals wastes in all districts visited by the study team although it was evident that collaborations on other issues existed.

Inadequate guidance for the oil and gas industry: By the time of this study, it was evidently clear that the oil industry still lacked proper and adequate guidelines on a number of issues; including, oil spills guidelines and strategy as well as lack of waste management guidelines to guide handling and disposal of chemicals and chemicals wastes.

Poor funding for districts: It was noted that like other oil activities, the management of oil chemicals and chemicals wastes was being handled as a national issues. Therefore, the local districts were being left out of the participation arena. The districts were not being adequate funded to enable them handle oil and gas related chemicals' and chemicals wastes; for instance, the budget for the natural resources committee of Hoima district is less than 2% during 2013/14 Financial Year.

3.10 Way forward for stake holders

- Since some waste disposal sites are located near community settlements and community grazing lands, there is need for awareness on the risks and opportunities of the wastes at the consolidation sites as this help the communities to play a leading

role in ensuring their own safety and the environment.

- There is need for CSOs to form platforms, coalition and/or networks to be able to effectively influence issues of chemicals management;
- There is need of empowering local communities and imparting on them skills and knowledge to enable them effectively participate in activities that minimise the risks that are associated with chemicals and chemicals wastes;
- There is need for oil and gas companies to exhibit good corporate practice and commit themselves towards ensuring a healthy and clean environment by supporting community initiatives that promote good environmental health;
- Government, oil and gas companies, CSOs and other stakeholders should ensure that communities access relevant information on oil and gas to enable them avoid negative aspects of oil and gas development;
- Government together with other stakeholders should build the capacity of local governments and CSOs and impart on them technical knowledge and skills on issues of oil and gas;
- A committee to carry out routine monitoring and evaluation of oil and gas activities should be put in place and should be comprised of district leaders, NGOs and other stakeholders;
- Government should empower local NGOs on aspects of sound chemicals and chemicals waste management and facilitate a process for CSOs to develop a monitoring guide for chemicals and chemicals wastes management in the oil region;
- There is need for increased partnerships between all the different players and to work to build hope for some of the already hopeless communities.

4

CHEMICALS AND CHEMICALS WASTE MANAGEMENT IN SALT MINING AT LAKE KATWE IN KASESE IN WESTERN UGANDA:**4.1 Introduction**

Lake Katwe is located at the periphery of Queen Elizabeth National Park in Kasese district, in the western region of Uganda. The lake is historically famous for salt mining in Uganda. It is the largest salt lake in Uganda and has various types of salts that are produced from the same lake. The circumference of the Lake is about 8 Km and about 21 streams around the lake pour in fresh water every day from the surrounding rocks. Lake Katwe is located within the Katwe - Kikorongo explosion cluster. The lake is believed to have been discovered by Mulogo (the Witch) from Bunyoro Kitara kingdom which controlled the site by sixteenth century to around 1829. The lake was later taken over by Toro kingdom around 1837 during the reign of Kasagama but later lost it Kasese district administration in 1978. The lake is a depression where liquid has collected for ages. Deep in the ground is a main salt rock that lies on a contour line that connects the crater lakes of Lake Katwe, Lake Munyanyange Lake Nyamumunuka and Lake Kasenyi. All these lakes have a salt rock deep in the ground, but only Lake Katwe and Lake Kasenyi can produce salt. This unusual lake is far too salty to support any wildlife – though since the 16th Century it has ensured the survival of the Katwe villagers, who spend their days, harvesting salt from the waters.



A view of Lake Katwe where salt is mined.

The population of Katwe Kabatoro has been growing. According to the last population census, the Town Council had about a population of about 5,821 which is estimated to have tremendously grown. The Lake Katwe salt industry is the main source of income among the inhabitants of Katwe Kabatoro area and the entire sub county. The communities around the lake still practice rudimentary mining of salt which helps them to make a living. The salt extraction activities on the lake are mainly carried out by men and women; children are prohibited from carrying out any activities in the mine.

According to the salt winners, the majority of the people involved in salt extraction are women followed by men in the ratio 4:3. The salt extraction on the Lake is today carried out by people from different parts of the country.



Women mining salt in Lake Katwe

Just like many people in rural areas own gardens for cultivation, the communities around the lake own salt pans as their gardens. The lake is uniquely partitioned into various “plots” salt pans. However, although people own plots on the lake, it must be emphasized that the main lake is owned by the government.

The people who extract salt from the lake require licenses to do so. Salt pans are salt evaporation ponds designed to extract salts from the brine water. The brine is fed into large ponds and water is drawn out through natural evaporation which allows the salt to be subsequently harvested.

These salt pans are constructed within the lake and it is where a number of women carry out their mining activities. According to local communities, the lake today has more than 1,000 salt pans some of them believed to have existed since the 14th century.

Some members of the local community own as many as 10 to 20 pans many of them inherited from generation to generation. Traditionally the number of pans on the lake was regulated so was the number of people working on the lake.

Over the years Salt at Katwe has been managed using knowledge generated over the years and the use of traditional practices and culture. For example, traditionally, communities would never be allowed to eat millet, meat or fish while at the Lake neither would a woman in her periods be allowed to go to the lake. The communities also add that, people would never be allowed to play sex from the lake; a man who attempted to have sex at the lake ran mad. It was traditional practice and culture for cultural functions to be performed at the lake. Such functions would be carried out by a man called Komanda and would help in ensuring that the salt harvested would be grade number one which salt is good for eating. It was however noted that, Komando never performs his functions and consequently, since the eighties, no salt grade one has been seen on the lake.

The amount of salt water (brine) that is fed into the pan is largely determined by the owner although the depth on average is 30 – 40cm. The brine is channeled from the lake to the pan through mud-lined channels and thereafter, the pan owner begins to monitor for signs of increased salinity. The pan owner also monitors whether there is any rise in water levels in the absence of rain as any level rise in the pan would suggest inflow through openings on the floor of the pan. Water seepages in a pan greatly influence the crystallization process of the salt. Highly skilled people are usually contracted to locate and block any identified area of inflow with mud. Also important to note is that during rainy seasons, most of the pans on the lake are flooded, bringing to a halt the salt winning activities. It is because of this reason why the extractors on Lake Katwe do love the rainy season.

In an effort to conserve the lake, the local authorities have come in to regulate the establishment of more salt pans on the lake; no more salt pans are allowed on the lake. It has also been observed that the lake size has been reducing in size. Around 1929, the lake size was around 2.7 Km² and by the 1950's the lake size had reduced to 2.52 Km today, the size of the lake is not known. However, it is believed that the size of the lake is declining because the salt pans are eating up the size of the lake. Some of the Illegal pans have been constructed deep into the lake - such illegal pans are constructed at night.

The Toro kingdom never allowed construction of pans in the path of feeder streams.

By the beginning of the last century, Lake Katwe had about 48 streams flowing into it, by 1970 only 35 streams flowing into the lake while only about 20 – 22 streams currently into the lake. However, the lake does not have any outlet and is believed that these streams contribute a lot in the formulation of the salt.

Over the years the lake environment has been degraded through overgrazing and over harvesting raw materials for making salt pans and handcrafts. On the shores of the lake grows grass that is locally known as obusi (Cyprus) and another species of grass which looks like Odyssia (Omuzi) that is used in the construction of pans and it is grazed on by cows. This grass; before it was degraded, would filter the water and remove sediments. To address the challenges of degradation in the area, NAPE in collaboration with Katwe Kabatoro Town Council and the Kasese district administration developed a management plan (2012), to guide the restoration process of the degraded lake environment by re-planting over 900 hectares of the steep slopes of the Katwe area with trees.

According to the communities, a group from Germany called Thyssen set up Lake Katwe Salt Company in the 1970s. However, a few years later the sodium chloride had corroded all the factory pipes which had been put up to transport the salt. The Germans found it expensive to run the factory so they decided to close the factory. At the shoreline of the lake, grows a salt-tolerant plant species called *Cyperus Lievitigetus* which helps in conserving the lake by filtering impurities from erosion.

The relationship between the Salt winning community and the local government has not been good. There was growing concern that people were being taxed yet they were not getting services; such as health care, water to shower and good road services, from government commensurate to the taxes they were being made to pay. For a very long period of time salt production at Lake Katwe has been one of the most important sources of revenue for the local administrations in the area. The Katwe Kabatoro Town Council has been struggling to get total ownership and administration of the same lake. The local communities were getting concerned that the district was planning to give the lake to an investor which would deprive them of a major source income.

4.2 Types of activities that take place at Katwe:

Successful harvesting of salt on Lake Katwe requires availability of sunshine. It is therefore not surprising that on Lake Katwe there are two seasons during which salt harvesting

is done; from January to March and from July to September periods when there is much sunshine. There are two main activities that take place at Lake Katwe salt mines, namely;

Salt winning: Salt Pans are constructed at periphery of the lake and it is where salt winning takes place. The salt in the pans is formed under a process called fractional crystallisation. The salt winning activity is one of the activities on the lake that employs a number of women. However; to emphasise, no more salt pans are allowed to be dug up in the lake, this is measure that has been put in place to conserve the lake.

Rock Salt Extraction: This is done within the main lake and it is mainly done by men. The activities of rock salt extraction attract a work force of about 200 – 250 men.

Salt extraction is done only on three (3) days of the week and this is done because;

- a) To avoid health related problems
- b) To give time to the rock salt to regenerate

Lake Katwe, is also a source of trona, which is extracted, dried, turned into dust and then packed into bags and exported to Rwanda and Burundi for animal leak (EKIFUFU). Trona; trisodium hydrogencarbonate dihydrate ($\text{Na}_3(\text{CO}_3)(\text{HCO}_3) \cdot 2\text{H}_2\text{O}$), is an evaporite mineral. Trona dust is converted into soda ash and fertilizers on Lake Magadi in Kenya. Salt traders come from nearby markets in Uganda and from other countries like Kongo, Rwanda, Sudan and Tanzania.

4.3 Salt Products at Lake Katwe:

- a) **Salt grade I Washed (Sodium Chloride (NaCl)):** This salt is produced through the process of evaporation in mud-lined ponds commonly known as “salt pans” of average size 12 x 18 feet. Salt produced by this method is harvested about once a week in the salt seasons – depending on water conditions. This salt is high quality salt and primarily produced for human consumption.
- b) **Salt grade II Crude (Kihabule):** This is salt that is a by-product obtained during the process of preparation for salt grade I washed. It is mainly composed of the first crystals that are formed before salt grade I washed is crystallised out of the brine collected in mud lined ponds (salt pans). Salt grade II Crude (Kihabule) is for animal consumption.

- c) **Salt grade III Rock salt (Mahonde/Ekisura):** This type of salt is in rock form and it is extracted in the middle of the lake at the bottom of the main lake. Beneath the lake, is found a “mother rock” of sodium chloride, which is harvested by the miners. The extraction process is carried out by men who are called “Rock salt Extractors”. The salt grade III rock (Mahonde) is usually produced for animal consumption.

4.4 Impacts of Salt Mining on the Health of the Miners:

The salt mining activity on Lake Katwe has a number of significant impacts on human health. The chemicals in the brine water are very harmful; not only to human health, but it has also been found to be harmful to wildlife. The lake contains a lot of hydrogen sulphide which eventually gives out a stench like that of rotten eggs all over the places. The following are some of the health challenges to the mining community at Lake Katwe;

- a) **Accidental Loss of Life:** According to the salt winners, the brine in the lake can be lethal especially if this brine enters into the ears or nostrils of the salt winners. It is very vital that when winning salt care must be taken to ensure that the brine does not enter into the ears, the nose and any other openings on the body. One should avoid falling into the brine, about four years ago, a case was recorded of a man who fell into the brine and died.
- b) **Female Salt Winners:** Exposure of women to the brine results into the ammonia gas penetrating into their private parts through their reproductive organs thus experience uterus irritation and abdominal pains. Most women have problems relating to uterus pain and fallopian tube pain, among others. Therefore, women who are involved in salt winning heavily pad themselves before entering the salt pans with cotton wool since many of them cannot afford expensive pads. Padding helps in reducing on the amount of “salt water” entering the women’s reproductive organs. However, it was further noted that a number of women are shy and therefore, many of them chose not to share the negative health effects of engaging in salt mining. To minimize on the negative effects of the brine on Women, the mining communities encourage women to restrict their activities in shallow waters while men work in deep waters.

- c) **Men salt miners:** When brine enters into openings or exposed parts of the men, they are also irritated. For example, when the male organs get in contact with salty water, they become itchy leading to scratching that eventually results into wounds on their reproductive organs. To avoid such scenarios, the men fit condoms with a rubber-band on the on the open parts of their reproductive organ and tie it firmly. The tightly tied condom helps in preventing salt water from getting in contact with their organs.
- d) **Dehydration of salt extractors:** Due to the high concentration of the salt in the lake the people involved in the salt extraction suffer from dehydration. It is the risk of dehydration that drives the miners to drink of cheap juice and water that is packaged in plastic bags.
- e) **Use of super glue on wounds:** The communities use Super Glue on wounds mostly associated with rock salt extractors.



*A woman applying super glue on wounds
resulting from salt mining*

The Super Glue has a generic name of Cyanoacrylate. Super Glue is a strong fast-acting adhesive that has some degree of toxicity and includes methyl 2-cyanoacrylate and ethyl-2-cyanoacrylate.

- f) **High prevalence of HIV/AIDS and other diseases:** The community interviewed indicated that there was a high prevalence of HIV/AIDS in the community. However levels of HIV/AIDS prevalence could not be verified. Given the high population, their sexual behaviors and the migratory nature of the people the levels of HIV/AIDS transmission has been very high. While the communities claim to be aware about HIV/AIDS they seem not to care that much probably due to the migratory nature of the labour force at the lake. On the other hand, the use of condoms is limited probably because condoms have a better role to play during salt extraction. In addition, there is a booming commercial sex within the Katwe Kitoro Town Council which is used as

a strategy as for supporting the livelihoods of some women. There is heavy traffic involving trucker drivers and traders travelling from different parts of Uganda to the Democratic Republic of Congo (DRC), Tanzania, Rwanda and Burundi. The other main diseases in the area include Cholera and Malaria.

- g) Lack of Pit Latrines:** Beyond the impacts caused by the brine, the salt winners and extractors are faced with the challenge of poor sanitation. The Lake Katwe environment may be characterized as being dirty with lack of pit latrines thereby creating a conducive environment for cholera outbreaks.

4.5 Environmental and Human Health Challenges:

- **Spread of Diseases:** There is always a heavy influx of people during dry periods of the year increasing the risk of epidemics like cholera and the spread of HIV/AIDS;
- **Construction of Salt Pans:** The communities have seriously degraded the environment in search for construction materials for salt pans - they use spear grass and pegs from acacia trees and Euphorbia in construction;
- **Plastic bags:** Lake Katwe is threatened by the rampant use of plastic bags which are widely used in packaging water and juices that are taken by the people working in the salt mines;
- **Air pollution:** At Lake Katwe there is a problem of Air pollution arising from the different gasses that are emitted; for example the release of Hydrogen peroxide produces a stench like that of a rotten egg.
- **Deatruction of vegetation in the buffer area:** The communities and the surrounding schools over harvest the grass in the buffer areas of the lake shores as a raw material in the making of mats, baskets and other forms of hand crafts
- **Over grazing:** There is over grazing of the salty grass in the buffer zone exposing the overgrazed lands to the agents of soil erosion
- **Siltation of the lake surrounding areas:** There is a lot of siltation in many areas surrounding the lake; especially in Kasabuni village, Hakibale village and Harusonga village
- **Lack of appropriate medical facilities:** The communities lack appropriate medical facilities, the nearest referral hospital is about 30km from the lake

4.6 Way Forward

Amidst these challenges, it is suggested that;

- Government, communities, CSOs, the private sector and other stakeholders work together to protect the health of salt winning communities at L. Katwe; especially for female salt winners who are the main victims of the negative impacts;
- There need for increased community awareness and training to guide the communities on safety during mining and ensure that the communities utilise the environment in a sustainable manner,
- There is need for research on the best mining safety practices that can be adopted by the salt winners;
- Consciousness and awareness on HIV/AIDS of the Communities in Katwe Kabatoro Township should be raised. In addition, the communities should also be given appropriate knowledge on the wise use of preventive measures against HIV/AIDS
- Government should put in place monitoring and preventative mechanisms for diseases outbreaks and for the high infection rates of HIV/AIDS in the areas;
- There is need for raising community awareness on the use of chemicals especially on the use of chemicals like Super Glue on wounds;
- The Katwe Kabatoro town council should improve on the health and sanitation facilities and work to increase the health facilities at the lake.
- There is need for awareness raising on the adverse effects of degradation of the lake environment in search for materials to construct salt pans
- There is need for awareness on waste management to address the challenge of wastes which are a threat to the lake health
- There is need for regulating grazing activities around the lake since high numbers of cattle expose overgrazed lands to agents of soil erosion



CHEMICALS AND CHEMICALS WASTE MANAGEMENT IN ARTISANAL GOLD MINING IN MUBENDE UGANDA:

5.1 Introduction

Artisanal Gold mining has been rapidly growing in Uganda with several parts of the country already experiencing a boom in artisanal gold mining activity. According to the Ministry of Energy and Mineral Development (MEMD) gold is widely distributed in Uganda and it is found in the following districts; Buhweju, Bushenyi; Mbarara; Kabale; Kisoro; Rukungiri; Kanungu, Busia; Mubende; Moroto and Hoima. In most parts of Uganda, gold is recovered from alluvial material except for a few areas like Kisiita in Mubende where gold is being recovered from reefs (hard rock). Gold mining has also been taking place in only a few areas: Kahengyere and Muti in Buhweju, Mashonga in Kyamuhunga in Bushenyi district; Kitaka in Mbarara district; Chiruruma, Chilima, Bugarama, Mugyera in Kabale district; Murindi, Mpororo, Rubuguri and Karamba in Kisoro district; Bikongozo valley in Rukungiri district; Kashenyi, Kanungu, and Muramba in Kanungu district; Tira and Amonikakine in Busia district; Kamalenge and Kisita in Mubende district; Rupa and Kamalera in Moroto district and Kafu River in Hoima district. With the exception of Kisita, Kamalenge, Tira and Amonikakine where gold is being recovered from reefs (hard rock), most of the gold is recovered from alluvial material.

Mubende district is one of the districts of Uganda where commercial gold deposits; for both medium and small scale mining have been discovered. The district is located west of Kampala within the Buganda, in the central region of Uganda. Gold mining activities in Mubende district are remotely located in the hilly area of Kyasa village, in kitumbi Parish, Kassanda Sub County. Amazingly, despite Kyasa village being remotely located, the gold mines there have attracted a number of people who are involved in a host of activities. However, while gold mining is a booming industry and reported to be a growing business; with increasing selling and buying of gold, it is also associated with a high risk of exposure to mercury and other health risk.

A number of exploration and mining concessions were granted, renewed or expired. By the end of 2010, there were 611 mining licenses issued to companies. Some of the companies holding mining licenses include; African Mineral Fields Limited for exploration for gold, platinum group of metals (PGM), and base metals in Ntungamo, Mukono, Kamwenge, Bushenyi, and Mbarara districts.

Vangold Resources Limited acquired seven non producing artisan beryllium mines and secured nine joint ventures with exploration licenses holders including Rwenzori Copper and Nickel, Beryllium Exploration Limited, Dome Mines Limited adjacent to the Kilembe copper – Cobalt. AUC Mining Company which has gold mining rights at Kamalenge in Mubende District.



A Gold mine in Mubende

5.2 Study Findings

Most most of the production of gold has been by small scale producers who include licensed miners and artisans. Production statistics from artisanal miners is only indicative given the fact that most operators are not licensed and even the licensed ones tend to under-declare hence most of the gold is transacted through dubious channels. According to the local communities, the people involved in the mining come from all

parts of the country; virtually all districts of Uganda are represented at the mines.

It was also observed that some of the miners come from neighbouring countries like the Democratic Republic of Congo, Kenya, South Sudan, Rwanda and Burundi. However, given the fact that gold mining activities are quite energy demanding and require energetic people, most of the predominant people at the mine are from Kigezi and Burundi because these people are energetic and resilient to tough conditions.

Open cast mining is the most commonly used form of gold mining in almost all parts of Uganda. From the observations made in Kyasa village, indicate that both men and women are involved in gold mining activities. However, subsurface mining is mainly done by men and the youth who are able to dig and endure the burden of staying underground. The few women who are involved in the mining activities mainly go for surface mining and do not go deep into the tunnels. It is the men who are directly involved in the digging of tunnels and excavating the earth material from what is contained there underground. One has just to continue digging deep into the ground, following signs of existing trails of gold. Identifying the gold trails is based on experience and knowledge that the miners have generated over several years of mining. The tunnels have been growing deep and deeper day by day and in some places, they have become as deep as 40 feet, putting at risk the lives of the people who are involved in the mining.

According to the miners, one buys the soil and gravel particles without knowing the amount of gold they contain. “It depends on your luck, if the day is good, then one can get gold that is worthy millions but if you are unlucky, you don’t even get a coin out of the purchase” said one of the persons involved in decanting. Interestingly, the gold business in Kyasa is unpredictable, it is like gambling. The miners sell soil and gravel particles to a section of people who are specialised in decanting or sieving out the gold. This group of people buy the soil and gravel particles without knowing what is contained in them; they entirely depend on chance – with a possi-



A miner soaking soil in water to extract gold from the mud.

bility of finding gold or not. The lowest cost of a basin full of soil and gravel particles costs about UGX 15,000 and can go to as high as UGX 100,000 depending on the assessment made by the miners regarding the gold content.

In some incidences, large particles of the gravel ground into powder form, it is then mixed in water, stirred and left to settle. Because gold has a high density, it will settle first at the bottom before all the other substances in the basin. Decanting is done until only the fine materials of impurities remain at the bottom of the basin. Mercury is introduced after the process of decanting or the removal of soil and other solid particles from the basin. The introduced mercury helps in amalgamating the tiny gold particles that settled at the bottom of the basin during the decanting process. It is this stage of the artisanal gold mining process that presents the biggest risk of mercury exposure to the communities because almost all the people involved in the decanting process look at mercury as the ultimate solution.



Fine materials of impurities that remain at the bottom of the basin after decantation

Primarily the main chemical substance that is used at the gold mine is mercury. The other chemicals are mainly found in retorts that are used in the burning of gold to remove the mercury. These retorts contain propan and butan. Since the mine is located far away from a source of electricity, the miners also use a lot of fossil fuels

especially in running machines that crush stones suspected to contain gold.

The source of the mercury is not disclosed to the majority of the people involved in mining; mercury is mainly brought in and sold to the miners by traders who come in from Kampala. Mercury is sold in small quantities, where the least amount is a drop which costs 4000 Uganda shillings (approximately US\$ 1.5). It was noted that it is traders from Kampala who bring in the mercury and it is them that burn the gold using retorts to purify it from the mercury.

5.3 Quantities of mercury used

The total amount of mercury that is brought into the mine is not known, the trade is illegal therefore no records of mercury are kept. It was also observed that even the amount of gold that is produced at the mine is not recorded by the miners.



Mercury used in Gold mining in the hands

The maximum and minimum measure of quantity of the mercury that is required to amalgamate the gold is not known however, the amount used depends on the amount of mercury available to the miner and whether it is commercially viable to the miner. It was however noted that the mercury is used over and over again, significant losses in mercury mainly occurs during burning at the stage of

purifying the gold. Ultimately and as earlier noted, the source of mercury is not disclosed since any disclosure could jeopardize their business.

5.4 Awareness on Chemicals Use and Safety at the Mine

It was generally noted that the levels of awareness on the sound management of chemicals among the mining community in the area is very low. There has not been any form of awareness on the need for sound chemicals management. Lack of such awareness; more particularly on the harmful effects of mercury, may be a contributing to the lack of has resulted into the miners not using any form of protective gear during mining and other chemicals handling processes.



Miners eat using bare hands, which are also used in handling mercury.

While at work, the miners take off some time to eat using bare hand, which hands are also used in handling mercury.

Some of the mercury that remains in the water during scanting is poured away in the waste water without any form of treatment.

The burning of mercury during the purification of gold also leads to contamination of the air which is breathed in without any form of protection by the people that are involved in the activity. Important to note is the fact that there are appropriate storage facilities for the mercury and other chemicals that are used in the mining process. The local miners do not store the mercury because they get it in small quantities and use it there and then.

The Relationship between Miners and Government and Interventions from Government
While the mining at the site may be presumed to be illegal, it was observed that their existed good working relationship between the people and the local leadership who, have left the people to go ahead, doing their mining activities without any interference. According to the communities, during the early days of mining, the communities were harassed by the police but today, the police no longer disturb the communities but it instead provides them with security and performs its duty of maintaining “law” and order among the mining community. Beyond this, the community notes that there has not been any other form of assistance rendered to them.

a) The Cost of gold and payment of workers

The gold that is got is sold to business people who operate small informal stalls at the site where it is normally mined. At the time of the study, the lowest one would have to pay was UGX 80.000 (US\$ 32) for the smallest measure of gold. It was noted that only a few people were being employed, the majority people were self employed since the places where tunnels are dug are rented or bought by persons interested in the mining at a cost ranging from UGX 500,000 to UGX 2,000,000.

b) Local Governments Interventions

So far there is limited or no intervention from the local government. According to the communities, there was some form of intervention from the local government that led to a form of community harassment on the part of government to the communities.

5.5 Challenges Encountered by the Miners and the Host Community

Artisanal gold mining at Kyasa may be characterized as being an informal mining activity. Like else where in the country where informal mining is practiced, government may not come in directly to support the communities not until these mining activities are legal-

ized. It was observed that at Kyasa, the artisanal gold mining activities that take place in the area are labor intensive; the miners manually dig through the mines using hammers and chisels to blast very hard rocks, yet not much yield results are got. The area today is characterised by a rapidly growing population which has made it difficult for planning and for providing sufficient social amenities.

Given that the area is highly populated, the potential for epidemic outbreak is high yet to the contrary, the potential for handling such out breaks at local government level is very low. The potential for accidents at the mine is very high but the capacity to respond to such disasters at the district level is very low, making gold mining a death trap. It was also noted that the gold trading activities at the mines is like gambling; one has to buy a mixture of soil and rocks that is extracted from the tunnels without knowledge of how much gold it contains. A person pays UGX 15,000 for a basin of the mixture of soil and rocks with probability of finding or not finding gold after going through a rigorous process of decanting. However, there the communities said that there were chances for luck where person gets a good harvest. On the other hand, artisanal gold mining is a water intense activity yet there is lack of water in the hilly areas of Kyasa. The people involved in separating gold for the soil have to part with UGX 3000 for a 20 litres jelly can of water.

Most miners don't know the price of gold in Kampala or even on the world market; this therefore means that the price of gold is normally determined by vendors from Kampala who have agents at the mining site. Because of anticipated monetary benefits from mining activities, the majority of the people in the area have abandoned farming and instead joined the gold business although, the same miners lamented over inadequacies in income from gold to help them meet their basic necessities.

While mercury has been identified as one of the most toxic chemicals to human health, it was found that the artisanal gold miners in Kyasa do not put on protective gear thereby, they expose themselves to high risk of mercury exposure and the consequent contamination. The mercury that is used at the mines is eventually eroded into community water sources which eventually become a health risk to the communities in the area. In addition to mercury exposure, the miners are faced with the risk of tunnels collapsing in on them. When the miners discover alternative direction of gold existence while underground, they change course, sometimes the change is horizontal making it possible for the tunnels to

meet those that run vertically which makes the tunnels susceptible to collapsing. There is also a high risk of flying stones which are always dangerous to the eyes of miners.

The district local government administration do not have adequate capacity and resources to adequately regulate the activities of the artisanal miners. As a consequence, there is; among other things, a looming threat of adverse environmental degradation in areas where artisanal mining is taking place due to poor implementation of environmental laws; including the lack capacity and resources of Environmental Impact assessments (EIAs).

5.6 Summary of findings on Gold Mining

- District local administrations do not have adequate capacity and resources to adequately regulate work of artisanal miners.
- There is a looming threat of adverse degradation of the environment in areas where mining is taking place due to poor implementation of environmental laws.
- For oil, it was noted that much of the activities have been more nationalised living the local governments without power on issues of oil. It was also noted that on several circumstances, the district administration is by passed by Kampala based institutions when carrying out their activities in the area.
- Not enough has been done by the different companies in the area to sensitise the community on the chemicals used and the potential harm of such chemicals to the communities, wildlife and to the environment in general. There is lack of preparedness on the part of the communities regarding handling of chemicals waste in collaboration with the different stakeholders and what role they will have to play
- There is inadequate coordination the different stakeholders; every institution seems to be doing its work in isolation of other institution.
- The oil business is still new in Uganda while there was indication of plans for future capacity development in the handling of oil and other chemical wastes in the oil industry; it was noted that currently there isn't enough capacity to handle such wastes.
- There is still lack of or inadequate information to the public more especially on how to manage oil waste and this creates a gap on how chemicals are being managed.
- There was an identified gap in relationship between government and civil society organizations as civil society since government looks at CSOs as being – this has result-

ed into government living out CSOs in its development activities and labelling them anti-development and sometimes are left out from attending important meetings.

- There is no or inadequate effort of enhancing and organising small scale and artisanal miners into meaning and more secure mining businesses.
- Lack of strong coalitions/ Networks to work on issues of sustainable chemicals and chemicals wastes management.

5.7 Recommendations

- There is need for local governments in areas where mining is taking place to be funded adequately to enable them build their capacity to be able to address the challenges of mining
- Government should make adequate efforts to organise and enhance small scale and artisanal miners into meaning and more secure mining businesses.
- Government should recognise and promote community safety in mining more especially in the artisanal mining industry. Efforts should be made to ensure that such mining recognises the gravity of risks to women, children and the environment in general.
- Government, CSOs and other stakeholders should raise awareness on the risk of HIV and other diseases to ensure good health of the miners and the communities in the general
- In the case of gold mining, the risk of mine accident was highly prevalent; especially the risk of tunnels collapsing on the miners, this requires central government together with local government to develop regulatory measures for artisanal mining.



GENERAL FINDINGS AND RECOMMENDATIONS

6.1 General Findings

The study made a lot of findings regarding the management of the sound management of chemicals and chemicals wastes in artisanal salt and gold mining as well as in exploration and drilling of oil and gas. One of the most important findings of the study is that, there is very poor relationship between Government on one hand and CSOs, communities and the private sector on the other; for example, many CSOs have been blacklisted and are considered to be anti development yet they are important partners with enormous potential to complement governments efforts. In the case of oil and gas; which is expected to have very significant impacts on human health and the environment, it was noted that exploration, drilling and exploitation are new in Uganda processes, not enough capacity currently exist to adequately handle chemicals and chemicals wastes although there is evidence of plans for capacity development. It was noted that most oil and gas activities are centrally managed at national level living local governments without powers. On several occasions, local district administrations are by passed by Kampala based government and private institutions when carrying out their activities in the area. Generally speaking, there is still lack of institutional and community preparedness regarding the handling of oil and gas related chemicals and chemicals wastes, the communities up to now do not know what role they may have to play regarding the managing of chemicals and chemicals wastes. Other findings of the study among others include;

- There is inadequate sensitisation of communities on chemicals and chemicals wastes handling and their potential harm to human health, wildlife and the environment;
- There is inadequate coordination among the different stakeholders; every institution seems to be doing its work in isolation of the others;
- Information disclosure to the public; more especially on the type of chemicals and chemicals wastes and how they can best be managed is still lacking or inadequate creating a knowledge gap for community participation;
- While artisanal mining in the country has been growing, there seems to be deliberate efforts to recognize, legalise and regulate this sector. The actors are not well organized into meaning and more secure artisanal mining businesses and they find it not easy

- to secure support from government not until this activity is formalised or legalized;
- There is lack of customized protective gear for the salt mining community on L. Katwe;
 - There is a general lack of strong coalitions/ Networks to work on issues of sustainable chemicals and chemicals wastes management;
 - Because of lack of regulation in artisanal mining, there is over population in areas where mining is taking place making it very difficult to plan and provide sufficient social amenities. Such areas provide high potential for epidemic outbreak due to high an regulated population influx yet the potential for handling and/or responding to such epidemic outbreaks and accidents at artisanal mining areas by local governments is very low;
 - The majority of the people in the area have abandoned farming activities and instead gone into the gold business yet the same people lament that they do not get enough money to meet their basic necessities from the gold business;
 - The majority of the people involved in artisanal gold mining do not put on protective gear thereby exposing themselves to a high risk of mercury exposure and consequently to mercury contamination. The mercury is eventually eroded into community water sources which eventually become a health risk to the communities in the area. In addition to mercury exposure, gold miners are exposed to the risk of tunnels collapsing in on them;
 - There is a looming threat of environmental degradation in areas where mining is taking place due to poor implementation of environmental laws; including the lack of capacity to carry out and implement environmental impact assessments (EIAs).

6.2 Recommendations

- There is need for deliberate capacity development on different aspects of mining for local governments in areas where mining is taking place to enable them face the challenges at hand.
- Government should empower local governments by decentralizing some of its powers in the mining sector to them. In the spirit, government should also coordinate all the other stakeholders instead of suppressing or oppressing them;
- There is urgent need for government to recognize contribution of artisanal mining to national development and the need for building the capacity of artisanal miners and transform them into a secure, well organized and profitable business venture.

- Government should address the legal challenges that are associated with artisanal mining with a view of improving this form of mining and adequately regulating it;
- Government should recognize the gravity of risks faced by women and children in artisanal mining and make efforts to ensure that such risks are reduced or even eliminated;
- Government, CSOs and other stakeholders should join hands to raise awareness and scale up capacity development on the risk of HIV/AIDS and other diseases to artisanal miners and the communities as a way of ensuring good health;
- Government together with other stakeholders should scale up capacity development and sensitize communities on sound management of chemicals and chemicals wastes and their potential harm to community health, wildlife and the environment;
- Information disclosure to the public on chemicals and chemicals wastes regarding best management practices should be disseminated to facilitate meaningful community participation;
- Government should put in place mechanisms for mending relationship with CSOs, communities and other stakeholders to facilitate meaningful participation of all stakeholders in mining processes;
- Government should promote the use of protective gear in all artisanal mining areas and work with local and international research institutions to come up with customized protective gears for the salt winning community at L. Katwe;
- CSOs should form strong coalitions/networks to carry out research, raise awareness and work on all other issues of sound management of chemicals and chemicals wastes;
- Government should put in place disaster rapid response units in areas where artisanal mining is taking place to minimize loss of life resulting from mining accidents;
- There is need for ensuring that environmental laws are adequately implemented, government should therefore carry out environmental impact assessments to assess the threat of environmental degradation from artisanal mining and the risks arising from the use of mercury and other chemicals and chemicals wastes to community water sources and come up with a mitigation plan for the negative impacts;
- There is need for carrying out research and identify less harmful chemical alternatives to mercury to be used in artisanal gold mining.

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